CHILDREN'S EDUCATION SOCIETY (Regd.)
THE OXFORD COLLEGE OF ENGINEERING
(Recognised by the Govt. of Karnataka, Affiliated to Visvesvaraya Technological University, Belagavi
Approved by A.I.C.T.E. New Delhi.
Recognised by UGC Under Section 2(f)
Bommanahalli, Hosur Road, Bangalore - 560 068.
Ph: 080-61754601/602, Fax: 080 - 25730551
E-mail: engprincipal@theoxford.edu Web: www.theoxfordengg.org

Details of books and chapters in edited volumes/books published and papers published in national/ international conference proceedings

Index

PRINCIPAL
The Oxford College of Engineering
Bommanahalli, Hosur Road
Bengaluru-560 068

CHILDREN'S EDUCATION SOCIETY (Regd.)
THE OXFORD COLLEGE OF ENGINEERING
(Recognised by the Govt. of Karnataka, Affiliated to Visvesvaraya Technological University, Belagavi.
Approved by A.I.C.T.E. New Delhi.
Recognised by UGC Under Section 2(f)
Bommanahalli, Hosur Road, Bangalore - 560 068.
Ph: 080-61754601/602, Fax: 080 - 25730551
E-mail: engprincipal@theoxford.edu Web: www.theoxfordengg.org

Summary

In last 5 Academic Year, the faculty of The Oxford College of Engineering has presented 34 papers in international conferences. There are total 7 books published last 5 academic years.

Sl. No	Academic Year	Conferences		Book
		National	International	
1	2016-17	0	13	5
2	2017-18	0	4	1
3	2018-19	0	4	0
4	2019-20	0	5	0
5	2020-21	0	8	1
Total		34		7

PRINCIPAL
The Oxford College of Engineering
Bommanahalli, Hosur Road
Bengaluru-560 068

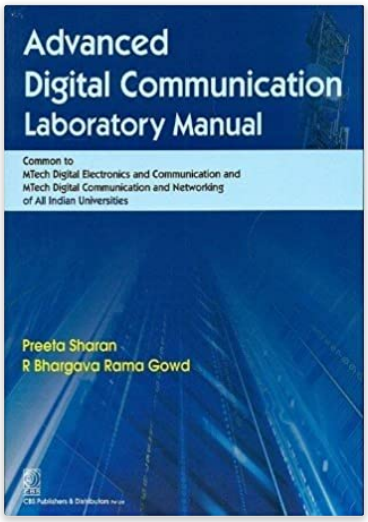
CHILDREN'S EDUCATION SOCIETY (Regd.)
THE OXFORD COLLEGE OF ENGINEERING
(Recognised by the Govt. of Karnataka, Affiliated to Visvesvaraya Technological University, Belagavi.
Approved by A.I.C.T.E. New Delhi.
Recognised by UGC Under Section 2(f)
Bommanahalli, Hosur Road, Bangalore - 560 068.
Ph: 080-61754601/602, Fax: 080 - 25730551
E-mail: engprincipal@theoxford.edu Web: www.theoxfordengg.org

Sl.NO	Name of the teacher	Title of the book/chapters published	Title of the paper	Title of the proceedings of the conference	Name of the conference	National / International	Year of publication	ISBN/ISSN number of the proceeding	Affiliating Institute at the time of publication	Name of the publisher
1	Dr. Preethasharan	Digital Communication Lab Manual					2016		The Oxford College of Engineering, Bangalore	CBS, Publications, Delhi.
2	R.Bhargava Rama Gowd		Real Time Implementation of Multimedia Traffic Unicast and Multicast groups using Optical Network	Advanced Communication, Control& Computing Technologies	ICACCCT	International	2016	I978-1-4673-9544-1	The Oxford College of Engineering, Bangalore	Syed Ammal Engineering college, Ramanathpuram,Tamilnadu.
3	Gunjan Thakur Vemana Institute of Technology, Bangalore, Karnataka ,Preeta Sharan; Mrinal Sarvagya		A digital Cross Connect (DCS) switch for multicast and broadcast traffic	2016 IEEE Annual India Conference (INDICON)	INDICON	International	2016	2325-9418	The Oxford College of Engineering	IEEE Explorer
4	Indira Bahaddur, P.C. Srikanth, and Preetha Sharan		Photonic crystal nano cavity pressure sensor	13th International Conference on Fiber Optics and Photonics		International	2016	978-1-943580-22-4	The Oxford College of Engineering	Optical Society of America

5	Gunjan Thakur; Ambika Gumpe; Mrinal Sarvagya; Preeta Sharan		An area efficient multiplexer for crossbar arbiter design using quantum dot cellular automata	2016 IEEE International Conference on Recent Trends in Electronics, Information & Communication Technology (RTEICT)	RTEICT	International	2016	978-1-5090-0774-5	The Oxford College of Engineering	IEEE Explorer
6	Savitha; K. Srinivas Rao; Preeta Sharan		Detection of oncological cell for breast cancer by using SPR technology	2016 3rd International Conference on Computing for Sustainable Global Development (INDIACom)	INDIACOM 2016	International	2016	978-9-3805-4421-2	The Oxford College of Engineering	IEEE Explorer
7	Gunjan Thakur Vemana; Mrinal Sarvagya; Preeta Sharan		Wireless digital cross connects SOC for optical networks using FPGA	2016 3rd International Conference on Computing for Sustainable Global Development (INDIACom)	INDIACOM 2016	International	2016	978-9-3805-4421-2	The Oxford College of Engineering	IEEE Explorer
8	H. A. Navyashree; Pre eta Sharan		An optical storage device by surface plasmon resonance	2016 3rd International Conference on Computing for Sustainable Global Development (INDIACom)	INDIACOM 2016	International	2016	978-9-3805-4421-2	The Oxford College of Engineering	IEEE Explorer
9	S.K. Pratibha; T.N. Vinay		An efficient design of QCA based memory	2016 3rd International Conference on Computing for	INDIACOM 2016	International	2016	978-9-3805-4421-2	The Oxford College of Engineering	IEEE Explorer

	Kumar; Preeta Sharan			Sustainable Global Development (INDIACom)						
10	Samyukta A Hassan; Preeta Sharan		Low power quantum gates for the implementation of reversible memory elements using quantum dot cellular automata	2016 3rd International Conference on Computing for Sustainable Global Development (INDIACom)	INDIACOM 2016	International	2016	978-9-3805-4421-2	The Oxford College ofEngineering	IEEE Explorer
11	Sandip Kumar Roy; M Harshitha; Preet a Sharan		A comparative study of saline and non-saline water in application of tomato yield by using photonic sensor	2016 3rd International Conference on Computing for Sustainable Global Development (INDIACom)	INDIACOM 2016	International	2016	978-9-3805-4421-2	The Oxford College ofEngineering	IEEE Explorer
12	Indira Bahaddur; P C Srikanth; Preeta Sharan		A photonic crystal based pressure sensor	2016 International Conference on Electrical, Electronics, and Optimization Techniques (ICEEOT)	ICEEOT 2016	International	2016	978-1-4673-9939-5	The Oxford College ofEngineering	IEEE Explorer
13	Mrs.Nisha c Rani		Modular phaseDC-DC converter with soft switching high frequency isolation			National	2016	ISSN (Online): 2347 - 2812	The Oxford College of Engineering, Bangalore	IJRAET
14	Dr.B.K.Manjun atha and Divakara R		Propyl 4-(3-oxo-1,3-dihydro-2H-benzo[g]indazol-2-yl) benzoate an novel bioactive	Proceedings of the 10th INDIA Com-2016, 16th - 18th march 2016, ISSN:0973-7529	Indiacom	International	2016		The Oxford College ofEngineering	INDIAOM

			compound from Streptomyces species, RHC-1, isolated from soil of Western Ghats, Karnataka, India							
15	Prof A.Sahana	Transforming management education for sustainable tomarrow	A competency model for determining the profile of b-school faculty in bangalore				2016		The Oxford College of Engineering, Bangalore	AIMA
16	Dr.James Thomas	Innovation in marketing, E Commerce ,information technology and banking (IMEIB-2016)	Innovation in marketing, E Commerce ,information technology and banking (IMEIB-2016)	Business sustainability		International conference	2016	ISSN :0254-8755	The Oxford College of Engineering, Bangalore	IMEIB2016
17	P.Chandrika reddy	Thakur Publications	Managerial communication				2016	ISBN:978-93-86232-83-0	The Oxford College of Engineering	Thakur Publications
18	Dr. M S Shashidhara	Data warehousing and Data Mining					2016		The Oxford College of Engineering	Thakur Publications



See this image

Advanced Digital Communication Laboratory Manual (Pb 2013) Paperback – January 1, 2013

by Preeta Sharan / R.Bhargava Rama Gowd (Author)

1 rating

See all formats and editions

Paperback
INR 928.37

3 Used from INR 625.46
11 New from INR 250.79

This book is designed for the Mtech students of Digital Electronics and Communication as well as Digital Communication and Networking courses.It gives relevant information on the basic concepts of processes circuits and other building blocks of experiments related to digital communication. It presents the basic concept used in circuit

Report incorrect product information.

Print length	Language
72 pages	**English**

INR 928.37

Your selected delivery location is beyond seller's shipping coverage for this item. Please choose a different delivery location or purchase from another seller.

Add to Cart

Deliver to ANUP - Bengaluru 560061

Share

Other Sellers on Amazon

INR 1,538.72 Add to Cart
Sold by: EMC_STORE

INR 1,992.71 Add to Cart
Sold by: Dutchess Collection

INR 250.79 Add to Cart
Sold by: Books_Vallue

Have one to sell?
Sell on Amazon

amazon book clubs early access

Add to book club

Not in a club? Learn more

Special offers and product promotions

- **Amazon Business** : For business-only pricing, quantity discounts and FREE Shipping. **Register a free business account**

Product details

ASIN : 812392268X
Publisher : CBS; 1st edition (January 1, 2013)
Language : English
Paperback : 72 pages
ISBN-10 : 9788123922683
ISBN-13 : 978-8123922683
Item Weight : 5.1 ounces
Best Sellers Rank: #5,070,518 in Books (See Top 100 in Books)
Customer Reviews: 1 rating

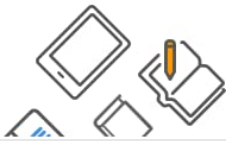
Videos

Help others learn more about this product by uploading a video!

Upload video

How would you rate your experience shopping for books on Amazon today

Very poor ---------- Neutral ---------- Great



Customer reviews

5 out of 5

1 global rating

5 star		100%
4 star		0%
3 star		0%
2 star		0%
1 star		0%

How are ratings calculated?

No customer reviews

There are 0 customer reviews and 1 customer rating.

Back to top

Real Time Implementation of Multimedia Traffic Unicast and Multicast Groups Using Optical Network

[1] Bhargav Rama Gowd
Resarch,scholar.
Department of ECE
JNTU Anantapur, Andhrapradesh, India.
[1]rbg4u84@gmail.com.

[2]Nalina kumari. Student
Department of ECE.
The Oxford college of Engineering(TOCE)
Bangalore, India
[2]Nalianpirangi45@gmail.com

[3]S.Thenappan
Department of ECE,
Sri Krishna Institute of Technology,
Bangalore,India.
[3]honey.souri@gmail.com

[4]Dattathreya
Department of ECE,
The Oxford College Of Engineering,
Bangalore, India,
[4]dattugujjar28@yahoo.com

***Abstract*— The performance and analysis of Multicast groups using optical cable of 1KM distance network based on RTP(Real time Transfer Protocol) for the communication on real time connection oriented network Multimedia communication in internet need a large Bandwidth, Viewers or Peoples are more interested in watching live programs. Thus here we are using the RTP, During the transmission of the data from server to client systems redundant bit are introduced leading to buffering in order to overcome this streaming is adopted. Transmitting Multicast data from one point of server to the interested receiver or groups receiver systems, The main aim of this project is to improve the life time of network, Qos, communication system, Increases Bandwidth and Essential to avoid packet loss, delay than the unicast communication.**

Index Terms*— *Unicast, Multicast, Optical Network, Addresses of IP.

I. INTRODUCTION

The popular application in internet is a Multimedia communication. It needs to larger bandwidth a unicast is a point to point communication and acts a single direction or single host to overcome this here we taken Multicast group communication, Multicast environment consist of data is send server to multiple group of receiver is called multipoint communication or Multicast group, it gives packets are delivered high quality and The Qos(quality of service) is dependents on computer network. A Multicast address starts from 224.0.0.0 to the 239.255.255.255. the membership of hosts. Local area network of a the translation address between multicast traffic is sent over a switched Ethernet network. In this we used IGMP (Internet Group Management protocol) when TTL =1 then the IGMP is a joining the Multicast groups to hosts, and it is transmits the Membership Report Messages to the router system. For given multicast packets. IGMP messages are never forwarded by routers provides a path to receiver groups of Multicast computer systems.

A Multicast address is chosen for the receives in a multicast group. The membership of hosts can join and leaves at any time, A multicast group can be active for a long time network system are converters the routers systems, In multicast data communication the router system are used the IGMP. Multicast is delivery of High quality video, Bandwidth.

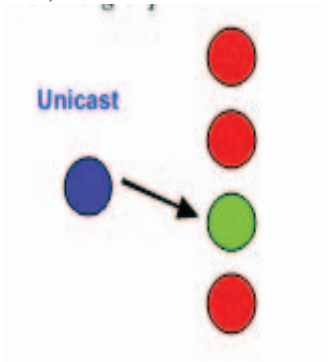


Fig1.1: unicast communication.

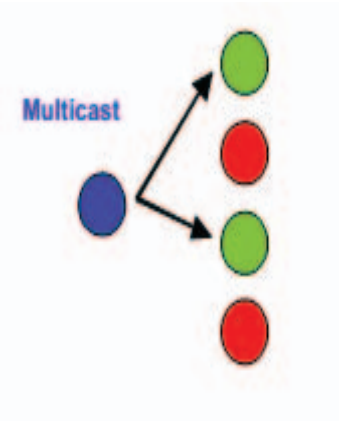


Fig 1.2: Multicast communication.

Fig 1.1 and fig 1.2 Comparison of unicast and multicast communication from server to client system a shown in above figs. Peoples are more want to watch live programs like audio, video conferences, cricket

program, live News ect.. here Multicast results is more efficient than unicast.

II. SCOPE AND MOTIVATION

To maintain an unwanted flow of data also Quality of service(Qos), it is to avoid packet delay in the multicast data stream. Applying Qos and giving Multicast data packets. priority over other packets. The multicast stream usually have some buffering built in so that losses are smoothed out than the unicast communication. The data is transfer from one point to point communication or single directions.A service where data is delivery from a sender to a multiple receiver groups is called multicast communication. Main aim of this project is it eliminates redundant bits and gives the High quality of results, The more important gives the long distances communication by using Optical cable.

Gmp(Internet Group Managament Protocol) Multicast Communication

Internet group management protocol (IGMP) supports to multicast communication. It does not send messages to router system. IGMP is informs to router for receive multicast host or multicast packets from the given Multicast address of host.

Version (1)	IGMP byte (1-2)	Unused	16-bit Checksum
32-bit groups address(class D IP Addresses)			

Fig 3.1: IGMP Packet.

IGMP consist of 32- bit as shown in the fig 3.1. it has the 32-bit group address of class D addresses. The class D is a higher order four bits of 1110 and the range of IP Multicast group address is from 224.0.0.1 to address 239.255.255.255.

III. IP MULTICAST GROUP

IP Multicast point to group of receiver points. IP multicast over ATM point to multipoint virtual circuits(VCs) as feature of dynamically. It creates the ATM point to multipoint is a switched virtual circuits gives the IP multicast traffic more efficient. Components required are in hardware are Computer network, switches, Ethernet cable, optical cable, and software are Linux based on Ubuntu OS (version 14.04), Wireshark analyser to analyses the real time results. VLC Player to streaming the video and audio of Multimedia files. Because of live program connection oriented network used (RTP) Real time transport protocol like audio and video of Live conferences. RTP is Monitor transmission statistics and quality of service(Qos) and synchronization of Multiple streams.

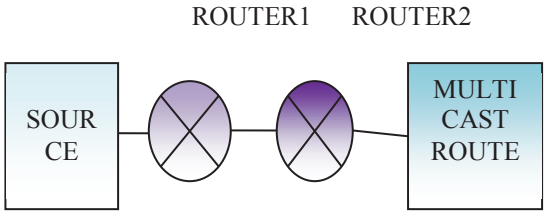


Fig 3.1: Block diagram of IP Multicast group.

The above fig 3.1 shows IP Multicast group of multimedia traffic. It consist of four network systems, first system is a server and two systems are act as a routers the last system has a client system or Multicast group. Router is used to forward the packets from the server(sources)to client(destination) network systems. For long distance communication I have used optical cable of 1Km for Multicast communication network. Multimedia is easy to watch and listen in the form of Text, audio, video. FM radio, this was shown by below fig 3.2 it has similar to the fig 3.1.

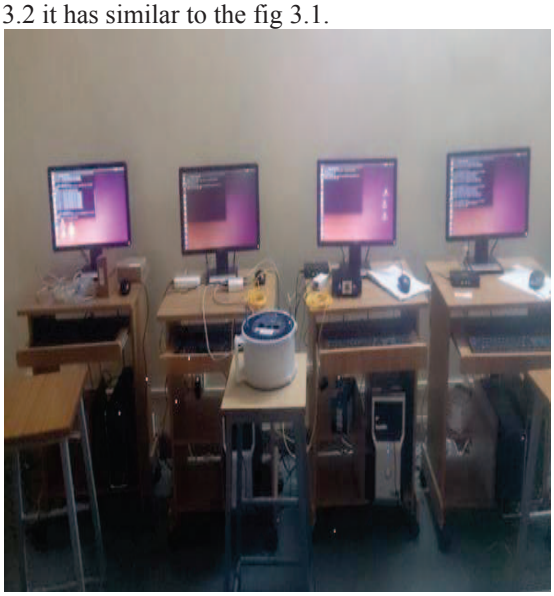


Fig3.2: unicast and Multicast communication using 1KM distances of Optical cable.

IV. ANALYSIS AND RESULTS OF REAL TIME APPLICATION

The above fig 3.2 unicast and Multicast communication of using Optical cable connecting the system network using switches by the desired Topology, configure the sever systems using linux based commands and also configure client systems. Similar to routers, then analysis the real time results of Audio, video. Comparison between the unicast and Multicast. Stored data is 2-3 Mbps in one second.

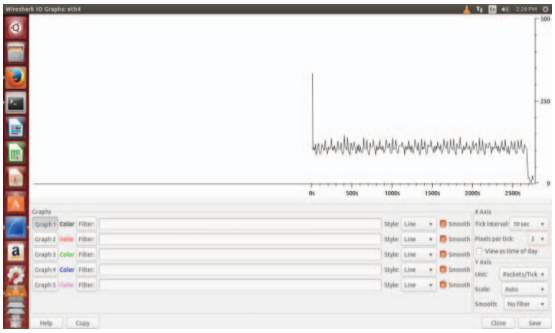


Fig 4.1 unicast audio file.

The above graph of unicast live Audio file consist along y-axis packets per interval and along x-axis time per second (.MP3).

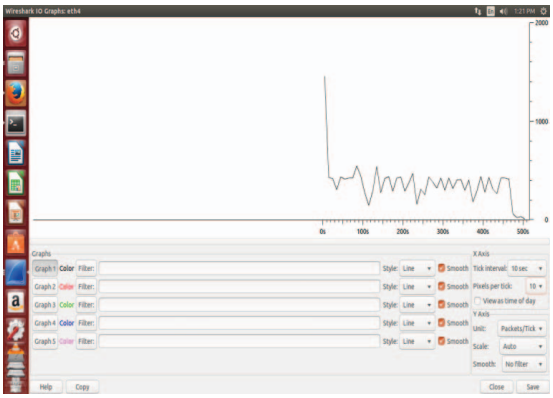


Fig 4.2: unicast video file.

The above fig4.2 is unicast live video file by analysis results using Wireshark analyser for point to point of receiver network system. Video file denoted as .Mp4. it is one second of data is stored or frame of 2 Mbps.

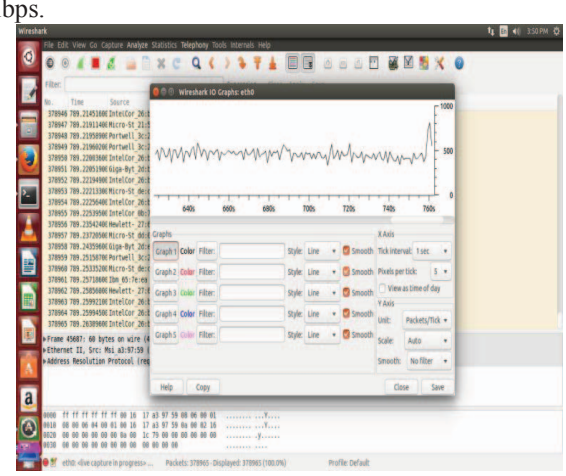


Fig 4.3: Multicast Audio file.

A service where the data is delivery from sender to Multiple receiver network systems or Multicast groups has shown in fig3.2. it consist of graph of long Y-axis Packets per interval and long X-axis time per seconds. By connected the etho and eth1(Ethernet 1). Audio file denoted as .Mp3. one second of data is stored in rang of 2-3Mbps of quality of real time result.

The above fig 4.4: is a Multicast Video files of live systems it denoted by each frame consist of 2Mbps. Multicast of traffic is less than Unicast communication network. Video file configure by access of live programs by capture the frames from the web camera with streaming process.

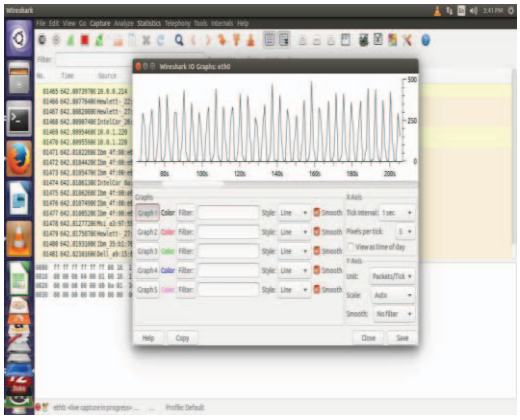
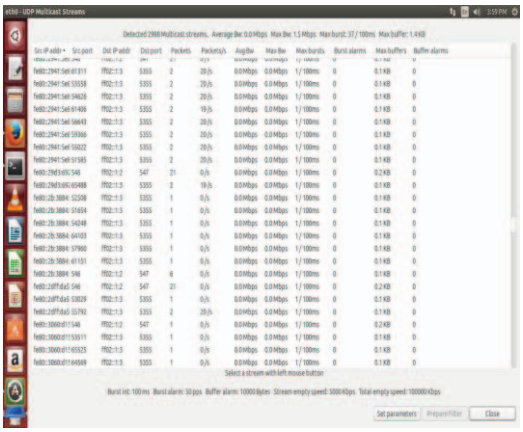


Fig 4.4: Multicast Video file.

Fig 4.5 Summary of Multicast Packets.

The summary of Multicast packets captured by 39665, Displayed 39665 and given packet displayed 100.00%, the average per sec is 475.385,average packet size 64.783 bytes, Between first packet and last packet is 83.366 sec.



In this Multicast data streaming Eliminates the buffering while Transmission of live Audio or Video data from server to client bits Detected bits are 2988

Multicast streams. Max Bandwidth 1.5 Mbps and Max Buffer size is 1.4KB.

Multicast consist of IP address are IPV4 and IPV6 by given addresses.

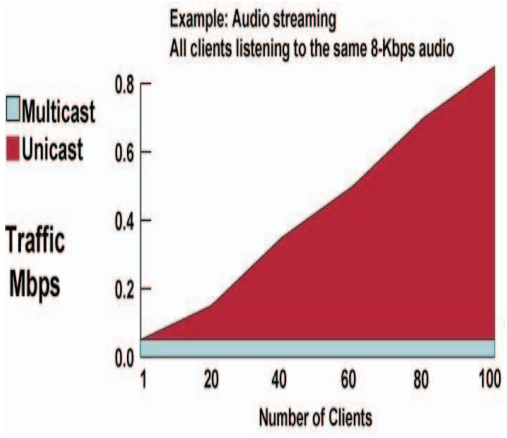


Fig 4.7: Comparison of Unicast and Multicast of Traffic in Mbps.

From the fig 4.7 Comparision of Unicast and Multicast of Traffic. The graph consist of long Y-axis Traffic Mbps and long X-axis Number of clients. Here we conclude that Multicast of a Traffic is less than Unicast as shown in fig 4.7.

V. CONCLUSION

The analysis and Implementation of a Multicast group communication using optical cable 1KM based on real time transfer protocol presented in this paper. The multicast network is used in Live program communications like a cricket, live News, Audio, Video conferences without buffering the data. The main aim of this project is increases the life time of Network bandwidth and Avoids the delay than the Unicast communication. Achieve Wavelength is 1550nm and Bandwidth is 1.5Mbps. Unicast traffic is more than the Multicast communication.

VI. FUTURE SCOPE

The analysis is carried out Multicast communication better than the Unicast. In order to Improve the Network system or network communication. Network system proposed work is Broadcast communication. The data transfer from sender to all Receiver systems or many Network computer.

REFERENCES

[1]. Aijun Ding, Gee-Swee Poo, “A survey of optical multicast over WDM networks”, Elsevier computer communications 26(2003) 193-200.

[2]. Tze-ping Low, Y.-W. Peter Hong and C.-C. Jay Kuo, “Opportunistic Multicast Scheduling Multiple Multicast Groups”, IEEE communication society subject matter experts for publication in the IEEE Globecom 2011 proceedings.

[3]. Jie Li,Malsthi Veerarnghavan, Steve Emmerson, and Robert. D. Russell, “File Multicast Transport Protocol(FMTP)”, 2015 15th IEEE/ACM International Symposium on cluster,Cloud and Grid Computing.

[4]. Gemmel et al,”The PGM Reliable Multicast Protocol”Wu, “Verification Analysis of Reliable Multicast Protocol”

[5]. Tanenbaum and Steen, “Distributed system Principle and Paradigms”

[6]. Internet Research Tsk Froce,Reliable Multicast Research Group http:// www.irtf.org/charter?gtype=old-rg&group=rmrg

A digital Cross Connect (DCS) switch for multicast and broadcast traffic

Publisher: IEEE

Gunjan Thakur ; Preeta Sharan ; Mrinal Sarvagya All Authors

Abstract: The tremendous growth of broadcast and multicast traffic applications (audio, video, IPTV, teleconferencing etc) over the internet has created an imperative demand for hi... **View more**

Metadata

Abstract:
The tremendous growth of broadcast and multicast traffic applications (audio, video, IPTV, teleconferencing etc) over the internet has created an imperative demand for high performance switches. Various switching architectures have been proposed for multicast traffic support. A Digital Cross Connect (DCS) is a crossbar-based switching device and has been considered the most suitable architecture because of its low cost and internal multicast capabilities. In this paper we have proposed the design of a Digital Cross Connect (DCS) switch for broadcast and multicast traffic support. The proposed DCS design has been simulated for different traffic modes (multicast and broadcast) using Verilog Hardware Description Langauage (HDL) in Xilinx software. Further, the design can be implemented on the FPGA board in order to achieve flexibility, adaptibility and scalability.

Published in: 2016 IEEE Annual India Conference (INDICON)

Date of Conference: 16-18 Dec. 2016 **INSPEC Accession Number:** 16640130

Date Added to IEEE *Xplore*: 02 February 2017

DOI: 10.1109/INDICON.2016.7838949

Publisher: IEEE

ISBN Information:

Conference Location: Bangalore, India

Electronic ISSN: 2325-9418

Contents

In recent years we have seen a large number of applications supporting the use of multicasting. These rapidly growing popular applications such as sharing of audio & video, group based interaction, online gaming, video conferencing, streaming of multimedia etc results in tremendous increase of multicast traffic over the internet. At the same time the advancement in technology offers a wide range of broadcasting applications and services such as live video streaming, distance learning, IPTV etc. Therefore, the fusion of broadcasting and multicasting traffic has created an imperative demand for high performance switches capable of handling point to multipoint communication efficiently. As a result, numerous switching architectures have been proposed for efficient multicast traffic support. A Digital Cross Connect (DCS) is a crossbar based switch and has been considered the most suitable switching architecture owing to its scalability, low cost and intrinsic multicast capabilities [1], [2]. The crossbar switch allows simultaneous connection between any input ports and all the output ports. DCS has various applications which includes Mobile Switching Centers (MSC), LAN connectivity, Broadband Exchanges, Landline Exchanges, Internet hubs etc.

PHOTONIC CRYSTAL NANO CAVITY PRESSURE SENSOR

Indira Bahaddur, P.C. Srikanth, and Preetha Sharan

13th International Conference on Fiber Optics and Photonics OSA Technical Digest (online) (Optical Society of America, 2016), paper Tu4A.69 • **https://doi.org/10.1364/PHOTONICS.2016.Tu4A.69 (https://doi.org/10.1364/PHOTONICS.2016.Tu4A.69)**

Abstract

Photonic crystal technology is used in many areas of detection and measurements of parameters like pressure, temperature, displacement etc. The sensor is based on two dimensional photonic crystals. A two dimensional photonic crystal gives high sensitivity. The Nano cavity is formed by modifying the radius of one air hole in the centre of lattice structure. Simulation results show that resonant wavelength of Nano cavity shifts to longer wavelength with increasing the pressure.

PDF Article (viewmedia.cfm?uri=Photonics-2016-Tu4A.69&seq=0)

More Like This

Diverse dynamics in silicon photonic crystal nano-cavities towards photonic microwave and secure communications (/abstract.cfm?uri=ACPC-2016-ATh2H.2)
Jia Gui Wu, Shu-Wei Huang, Hao Zhou, Ling Chen, and Fei Wang
ATh2H.2 Asia Communications and Photonics Conference (ACPC) 2016

Torsion-Free Photonic Crystal Pressure Sensor Array Using Novel Piston-type Resonator Array (/abstract.cfm?uri=CLEO_SI-2013-CM4O.2)
Daquan Yang, Huiping Tian, Nannan Wu, Yi Yang, and Yuefeng Ji
CM4O.2 CLEO: Science and Innovations (CLEO_SI) 2013

Pressure/Temperature Sensor Based on a Dual-Core Photonic Crystal Fiber (/abstract.cfm?uri=ACP-2011-83071N)
Daru Chen, Gufeng Hu, and Lingxia Chen
83071N Asia Communications and Photonics Conference and Exhibition (ACP) 2011

View More...

International Conference on Fibre Optics and Photonics 2016 Kanpur India

4–8 December 2016 ISBN: 978-1-943580-22-4

From the session **Poster Session I (Tu4A)** (/conference.cfm?meetingid=139&yr=2016#Tu4A)

Home (/) **To Top ⬆**

◀ Previous Article (abstract.cfm?uri=Photonics-2016-Tu4A.68) **Next Article ▶ (abstract.cfm?uri=Photonics-2016-Tu4A.7)**

An area efficient multiplexer for crossbar arbiter design using quantum dot cellular automata

Publisher: IEEE

Gunjan Thakur ; Ambika Gumpe ; Mrinal Sarvagya ; Preeta Sharan All Authors

Abstract: The demand for the design and implementation of efficient crossbar arbiters has raised due to advancement in network-on-chip communication. The function of arbiters is to... **View more**

Metadata

Abstract:
The demand for the design and implementation of efficient crossbar arbiters has raised due to advancement in network-on-chip communication. The function of arbiters is to resolve contention among different i/o ports accessing a common resource. Digital circuits such as multiplexers are building blocks for the implementation of such arbiters in order to provide the best connectivity. The major challenge for the design of on-chip arbiters is to keep the overall area overhead at the minimum level. In this paper we have proposed an optimized design for 4:1 MUX using Quantum Dot Cellular Automata (QCA) technology. QCA is an emerging nanoscale technology which provides advantages such as extremely small size, low power consumption and very high speed. The proposed design has been simulated with QCADesigner tool. From the simulation results it can be derived that the proposed 4:1 MUX occupies 0.97844 μm ^{2} area which is 18% lesser than the previous most efficient design. The number of cells has also been reduced by 23 % Therefore, the proposed 4:1 MUX design in QCA implementation provides an optimal solution for the implementation of an area efficient arbiters.

More Like This

Published in: 2016 IEEE International Conference on Recent Trends in Electronics, Information & Communication Technology (RTEICT)

Date of Conference: 20-21 May 2016

Date Added to IEEE *Xplore*: 09 January 2017

ISBN Information:
Electronic ISBN:978-1-5090-0774-5
Print on Demand(PoD) ISBN:978-1-5090-0775-2

INSPEC Accession Number: 16582968

DOI: 10.1109/RTEICT.2016.7807970

Publisher: IEEE

Conference Location: Bangalore, India

Contents

A cross connect switch acts as a building block for an on-chip communication network and causes the switching of network traffic. The growing internet and mobile traffic requires high speed switches and routers. A cross connect switch consists of three major blocks which includes I/O ports, arbiter/scheduler and the switching fabric. The function of arbiter is to provide control signals between input and output ports for the successful transfer of packets. It issues proper control signals for the configuration of switching matrix and ensures high throughput and utilization. Among the various blocks, an arbiter decides the switching speed of a DCS system. Hence, the efficient design of arbiter is required for overall network performance.

Detection of oncological cell for breast cancer by using SPR technology

Savitha ; K. Srinivas Rao ; Preeta Sharan All Authors

Abstract: Surface Plasmon Resonance (SPR) is a detection method which is widely used over the past decades in analyzing the bimolecular interaction. This is a technique with which ... **View more**

Metadata

Abstract:
Surface Plasmon Resonance (SPR) is a detection method which is widely used over the past decades in analyzing the bimolecular interaction. This is a technique with which we can measure the small variation find in the refractive index near the surface of metal with higher sensitivity. This change in refractive index is measured due to the interaction in the molecules. In this paper early stage detection of breast cancer is done by using this SPR technique. Simulation results shows a distinct shift in the wavelength spectrum for normal and cancer cell. This SPR based sensor is highly sensitive and best choice for bio-medical applications. Here channel waveguide dependent SPR sensor structure is used and simulation is done by Rsoft Full Wave tool.

Published in: 2016 3rd International Conference on Computing for Sustainable Global Development (INDIACom)

Date of Conference: 16-18 March 2016 **INSPEC Accession Number:** 16426213

Date Added to IEEE *Xplore*: 31 October 2016

Publisher: IEEE

Conference Location: New Delhi, India

ISBN Information:

Electronic ISBN:978-9-3805-4421-2
DVD ISBN:978-9-3805-4420-5
Print on Demand(PoD) ISBN:978-1-4673-9417-8

Contents

Nomenclature

SPR-

Surface Plasmon Resonance

FDTD-
Finite Difference Time Domain

SPW-
Surface Plasmon Wave

IEEE Account
» Change Username/Password
» Update Address

Purchase Details
» Payment Options
» Order History
» View Purchased Documents

Profile Information
» Communications Preferences
» Profession and Education
» Technical Interests

Need Help?
» **US & Canada:** +1 800 678 4333
» **Worldwide:** +1 732 981 0060
» Contact & Support

About IEEE *Xplore* | Contact Us | Help | Accessibility | Terms of Use | Nondiscrimination Policy | Sitemap | Privacy & Opting Out of Cookies

A not-for-profit organization, IEEE is the world's largest technical professional organization dedicated to advancing technology for the benefit of humanity.
© Copyright 2021 IEEE - All rights reserved. Use of this web site signifies your agreement to the terms and conditions.

Wireless digital cross connect SOC for optical networks using FPGA

Gunjan Thakur Vemana ; Mrinal Sarvagya ; Preeta Sharan All Authors

Abstract:A networking and communications revolution led by internet based technologies has caused intensive research in the domain of switching fabrics. The available Digital Cros... **View more**

Metadata

Abstract:
A networking and communications revolution led by internet based technologies has caused intensive research in the domain of switching fabrics. The available Digital Cross Connects (DCS) IP cores requires lot of reengineering and recurrent engineering to customize them for any application and also are implemented through complex software algorithms which are expensive to develop and maintain. We proposes a comprehensive, plug-and-play, high performance, scalable & reconfigurable DCS which can work under different traffic situations and data rates. The different switching modes of proposed DCS, such as synchronous mode, asynchronous mode, priority based round robin, bulk data transfer and request & acknowledge are simulated using Verilog Hardware Description Language (HDL) in Xilinx ISE9.1İ version software can be implemented on Xilinx Spartan2 family based FPGA board.

Published in: 2016 3rd International Conference on Computing for Sustainable Global Development (INDIACom)

More Like This

Date of Conference: 16-18 March 2016

INSPEC Accession Number: 16426665

Date Added to IEEE *Xplore*: 31 October 2016

Publisher: IEEE

Conference Location: New Delhi, India

ISBN Information:

Contents

Nomenclature

DCS-

Digital Cross Connect

SOC-
System On Chip

FPGA-
Field Programmable Gate Array

ASIC-
Application Specific Integrated Circuits

SDH-
Synchronous Digital hierarchy

IP-
Intellectual Property.

An optical storage device by surface plasmon resonance

Publisher: IEEE

H. A. Navyashree ; Preeta Sharan **All Authors**

Abstract: The data storage mechanism is based on the array structure, fast in acceptance and used to create a availability of information. We created a 4 layer structure in cuboids... **View more**

Metadata

Abstract:
The data storage mechanism is based on the array structure, fast in acceptance and used to create a availability of information. We created a 4 layer structure in cuboids, which have the capacity of absorbing data and retransmitting, via plasmonic media even in transmission of array of high conductive aperture inside dielectric medium, In this paper we use monochromatic light in order to record and store data in memory device. Optical storage is needed in this version of hardware in order to promote a successful storage device as similar to Blu-ray technology.

Published in: 2016 3rd International Conference on Computing for Sustainable Global Development (INDIACom)

Date of Conference: 16-18 March 2016

INSPEC Accession Number: 16426639

Date Added to IEEE *Xplore*: 31 October 2016

Publisher: IEEE

Conference Location: New Delhi, India

ISBN Information:

More Like This

Contents

I. Introduction

As there is a new advent in VLSI technology in the mobile industries there is a serious lack of industry academic interaction in performance and scaling. SPR is the best answer for impenitently VLSI Technology. SPR [surface plasmon resonance] and micro fabrication can be combined into an advanced device manufacturing method in order to address the memory short coming of VLSI memory devices. Some of the micro generation of storage devices available in market, which is having the capability to store in gigabytes of digital data with blue ray die s, pendrive and some externally connectable hard drives that are similar to be like microprocessor system. The motivation of this research is to compare the blue-ray technology with SPR.

Conferences > 2016 3rd International Confer...

An efficient design of QCA based memory

Publisher: IEEE

S.K. Pratibha ; T.N. Vinay Kumar ; Preeta Sharan All Authors

Abstract: In this paper we have designed and implemented QCA memory such as hybrid memory. Quantum dot cellular automata nanotechnology which is most innovative technology in today... **View more**

Metadata

Abstract:
In this paper we have designed and implemented QCA memory such as hybrid memory Quantum dot cellular automata nanotechnology which is most innovative technology in today's world. Hybrid memory is designed to overcome the demerits of the serial and parallel memories. QCA main advantages are to increase speed of operation, reduced circuit area, high efficiency, low power consumption or we can say that zero power consumption. QCA nanotechnology can be replaced by CMOS technology which has some limitations. In this paper designed circuits of simulation results are verified by truth table.

Published in: 2016 3rd International Conference on Computing for Sustainable Global Development (INDIACom)

Date of Conference: 16-18 March 2016

INSPEC Accession Number: 16426159

Date Added to IEEE *Xplore*: 31 October 2016

Publisher: IEEE

Conference Location: New Delhi, India

ISBN Information:
Electronic ISBN:978-9-3805-4421-2
DVD ISBN:978-9-3805-4420-5
Print on Demand(PoD)
ISBN:978-1-4673-9417-8

Contents

Authors

Figures

References

Keywords

Metrics

Low power quantum gates for the implementation of reversible memory elements using quantum dot cellular automata

Publisher: IEEE

Samyukta A Hassan ; Preeta Sharan **All Authors**

Abstract: Energy can neither be created nor be destroyed but it can be conserved. The processors of present day computers are designed using conventional logic circuits which are i... **View more**

Metadata

Abstract:
Energy can neither be created nor be destroyed but it can be conserved. The processors of present day computers are designed using conventional logic circuits which are irreversible in nature. They suffer from loss of information during computation, leading to energy dissipation in the form of heat affecting the performance and life of the circuits. These limitations of conventional logic circuits can be overcome by the reversible logic circuits designed using quantum gates, the essential elements for quantum computing. Quantum computing is an emerging area of research which finds application in optical computing, DNA computing, cryptography, low power CMOS design, digital signal processing and nanotechnology.

Published in: 2016 3rd International Conference on Computing for Sustainable Global Development (INDIACom)

Date of Conference: 16-18 March 2016 **INSPEC Accession Number:** 16426242

Metrics

More Like This

Date Added to IEEE *Xplore*: 31 October 2016

Publisher: IEEE

Conference Location: New Delhi, India

ISBN Information:

Electronic ISBN:978-9-3805-4421-2

DVD ISBN:978-9-3805-4420-5

Print on Demand(PoD) ISBN:978-1-4673-9417-8

Contents

I. Introduction

The computing elements of present day processors are designed using conventional logic circuits which are irreversible in nature. They suffer from loss of information as the intermediate bits used to compute the final results are discarded. According to Von Neumann Landeur principle, the loss of one bit information leads to energy dissipation in the form of heat which is of the order of kT1n2 joules where 'k' is Boltzman's constant (1.38056 $\mathrm{x}\ \ 10^{-23}\mathrm{JK}^{-1}$) and 'T' is the absolute temperature at which computation is carried out. Heat dissipation is directly proportional to the number of bits lost during computation.

IEEE Account

» Change Username/Password

» Update Address

Purchase Details

» Payment Options

» Order History

» View Purchased Documents

Profile Information

» Communications Preferences

» Profession and Education

» Technical Interests

Need Help?

» **US & Canada:** +1 800 678 4333

» **Worldwide:** +1 732 981 0060

» Contact & Support

About IEEE *Xplore* | Contact Us | Help | Accessibility | Terms of Use | Nondiscrimination Policy | Sitemap | Privacy & Opting Out of Cookies

A not-for-profit organization, IEEE is the world's largest technical professional organization dedicated to advancing technology for the benefit of humanity.

© Copyright 2021 IEEE - All rights reserved. Use of this web site signifies your agreement to the terms and conditions.

A comparative study of saline and non-saline water in application of tomato yield by using photonic sensor

Sandip Kumar Roy ; M Harshitha ; Preeta Sharan **All Authors**

Abstract:A sensor based on 2D photonic crystal is proposed and designed in present work. Here the sensor can measure the small changes in dielectric constant of the samples. As th... **View more**

Metadata

Abstract:
A sensor based on 2D photonic crystal is proposed and designed in present work. Here the sensor can measure the small changes in dielectric constant of the samples. As the refractive index for fresh water and saline water varies, the sensor can easily differentiate between saline and non-saline water. The sensor is a Dual-hexagonal shaped Photonic crystalring resonator (PCRR) structure composed of Si rods embedded in air medium. Here the Photonic crystal is designed and modeled by using MIT electromagnetic equation propagation tool. Analysis is done using Finite Difference Time Domain (FDTD) method. The transmission spectrum is obtained after the simulation. From this spectrum, it is observed that there is a shift output in frequency and transmitted power. Hence it acts as a sensor.

Published in: 2016 3rd International Conference on Computing for Sustainable Global Development (INDIACom)

Date of Conference: 16-18 March 2016 **INSPEC Accession Number:** 16426466

Date Added to IEEE *Xplore*: 31 October 2016

Publisher: IEEE

Conference Location: New Delhi, India

ISBN Information:

Electronic ISBN:978-9-3805-4421-2

DVD ISBN:978-9-3805-4420-5

Print on Demand(PoD) ISBN:978-1-4673-9417-8

Contents

Nomenclature

FDTD

Finite Difference Time Domain

MEEP-

MIT Electromagnetic Equation Propagation

MIT-

Massachusetts Institute of Technology

PCRR-

Photonic Crystal Ring Resonator

A photonic crystal based pressure sensor

Indira Bahaddur ; P C Srikanth ; Preeta Sharan **All Authors**

Abstract: Photonic detecting technologies have extended physical parameter like temperature, stress detecting for huge selection of applications. The process of the photonic detect... **View more**

Metadata

Abstract:
Photonic detecting technologies have extended physical parameter like temperature, stress detecting for huge selection of applications. The process of the photonic detecting technological innovation is to observe the modification of indicative catalog. MOEMS based micro-sized stress indicator can be developed to identify even sub-micron variety sizing modify using the photonic amazingly. The applied stress on the item will modify the sizing of the waveguide designed in the photonic amazingly. As a result, this alternation in space can alter the reproduction feature of electro-magnetic surf that passes through them that is changing the transmitting variety. So, this modification can directly be planned to stress on the noticed item. In this paper, the stress indicator using photonic amazingly has been made and examined.

Published in: 2016 International Conference on Electrical, Electronics, and Optimization Techniques (ICEEOT)

Date of Conference: 3-5 March 2016 **INSPEC Accession Number:** 16497463

DOI: 10.1109/ICEEOT.2016.7755444

Date Added to IEEE *Xplore*: 24 November 2016

Publisher: IEEE

Conference Location: Chennai, India

ISBN Information:

Electronic ISBN:978-1-4673-9939-5
CD:978-1-4673-9936-4
DVD ISBN:978-1-4673-9937-1
USB ISBN:978-1-4673-9938-8
Print on Demand(PoD) ISBN:978-1-4673-9940-1

Authors

Keywords

Metrics

Modular Phase DC-DC Convertor with Soft Switching High Frequency Isolation in Series and Parallel Output

[1]Veena A P, [2]Nisha C Rani

[1,2]Department of EEE, TOCE, Bengaluru

Abstract -A new power transmission and distribution system concept for HVDC is Modular stacked DC architecture. Presently high frequency isolated DC-DC power conversion has special interest in high power applications. The two essential requirements of these high power applications are high reliability and high power density. The Modular stacked architecture fulfil this requirements .Its main application is in subsea oil and gas fields where the reliability and retrieval are the most critical requirements. The subsea oil and gas fields searching better way of power delivery to the loads without significant increase in the overall system cost. So a suitable system for subsea power transmission and distribution system is Modular stacked with soft switching and high frequency isolation. In this project series connection is preferred at input side and parallel connection is preferred at output side. This arrangement is used to improves voltage blocking capability at the input side and to reduces the current ripples at the output side. The basic building block is Zero current switching full bridge phase shift DC-DC converter. In this architecture fault detection techniques are used for continued operation of the converter.

Key words: subsea power distribution, high frequency isolation, current ripples.

I. INTRODUCTION

Presently DC-DC converter with high frequency isolation is having more attentions in renewable energy sources due to their compact size and power density. In this project high frequency isolation dc-dc converter is using in subsea oil and gas fields for transmission and distribution system. The subsea oil and gas fields have many technical challenges like long distance power transmission .Here huge power is transmitted over long distance. For this dc transmission is better and efficient than ac transmission. When high power loads distributed in long distance ac transmission creates severe problems and charging current flows along the ac cables due to the capacitance of the cable. This decreases cable capacity for carrying useful current. When the length of the cable is long then it has high capacitance and high charging current. So by considering the above factors dc transmission is more suitable for subsea power system as compare to ac. Converters are required to connect HVDC system . The component that enables the converter process is used Insulated gate bipolar transistors(IGBT) or thyristors. These controllable switches can carry very high current and are capable to block very high voltage upto 10 kv.

Conventional HVDC system in subsea power system results in large size and high count of component limit application and it has many disadvantages. So a promising system topology for subsea power system is modular stacked method. This consists of cascaded connection of three level converters. The main disadvantage of this method is frequency, here low frequency subsea transformers make system larger in size and it also decreases the reliability. So the main aim of this is to replacement of low frequency DC-DC converter with high frequency isolated converters. Which results in smaller size and efficient operation of the system. In this paper converter analysis, fault detection and fault tolerance operations are discussed with simulation and experimental results.

II. PROPOSED SYSTEM

The basic block diagram of the proposed system is shown below. Which implies the basic operation of proposed system.

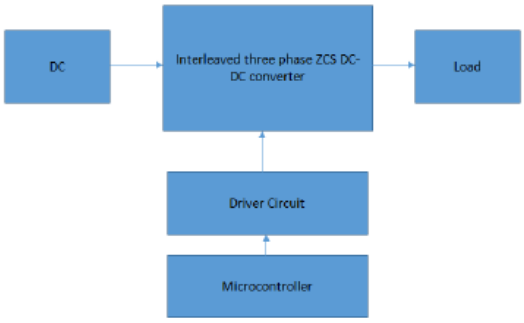


Figure1: basic block diagram of proposed system

The above block diagram gives the brief idea about the operation of the proposed system. Which consists of input as dc source and is given to the main building block that is interleaved zero current switching dc-dc converter. It consists of IGBT or thyrister as switches at the primary side and at the secondary side diode rectifier is connected. And transformer having a 1:1 turns ratio. In this system microcontroller is used to generates the

pulses but these pulses are having insufficient voltage to drive the load. Because microcontroller having only 5 v. So the driver circuit is introduced here to drive the load. This circuit amplifies the pulses from 5v to 12v which sufficient to drive the load. In this interleaving is used to decreases the ripples of the voltage and currents at the dc link. Finally output of the converter is given to the load.

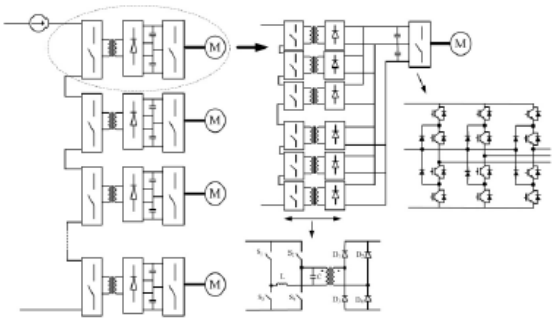


Figure 2: Block diagram of three phase inverter for power conversion system

The above block diagram shows the three phase inverter for the power conversion system. Basically conversion system used here is dependent on the two level dc-dc converter with high frequency isolation. Very low to high ranges power levels are there in two level system. Power conversion uses the three level inverters at the output side. In this each leg is consists of four IGBT switches namely Q1, Q2, Q3, Q4 in series connection. Leg is completed only when the two clamping diodes are added to the each leg.

It produces the output as three voltage levels. They are positive bus voltage, zero voltage and negative bus voltage. For single phase when switches Q1 and Q2 are closed then the output is connected to positive bus voltage, When Q2 and Q3 are on then output is connected to zero voltage, and when Q3 and Q4 are turned on then output is connecting to negative voltage. Here series connection is implemented for input ports and parallel-series connections are implemented for the output ports. This arrangement gives the necessary dc link for the inverter. Depending on the ratings of current and voltage of the transmission line, the number of modules are decided. It is a current fed circuit at the input side and having full bridge zero voltage current switching circuit with switching frequency of 20 kHz. In two legs two adjacent switches having phase shift which can be controlled for the output voltage regulation. The switches in the full bridge circuit at the primary side must have a ability to blocks the voltage. Due to presence of galvanic isolation flexibility is obtained in designing part and in output stage interconnections.

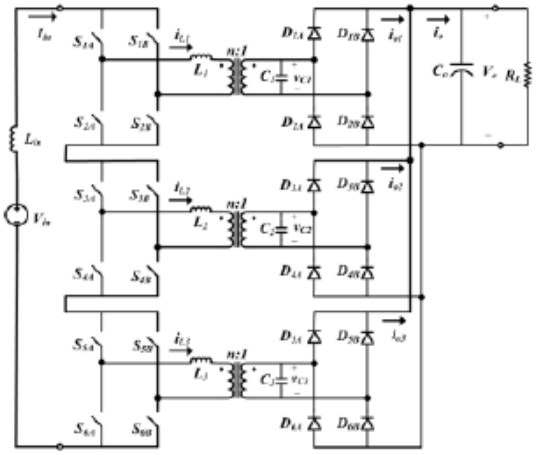
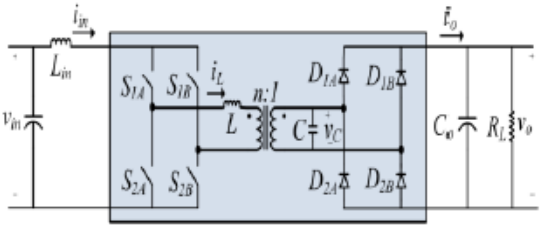
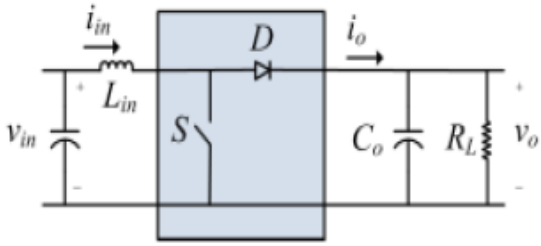


Figure 3: ZCS three phase DC-DC converter

The above circuit diagram shows three phase dc-dc converter. Each module is full bridge dc-dc converter. These full bridge switches must have voltage blocking capability at the primary side. For this purpose modules are connected in series. It is similar to normal boost circuit operation .In single module four switches are connected in full bridge circuit at the input side and diode rectifier circuit is present at the secondary side for rectification purpose. Here isolation is provided between primary and secondary circuits. The below diagram shows single module of the proposed system. These modules are cascaded and connected in series and parallel to the input and output respectively. It operates equivalent to the basic boost converter, but the only difference is, phase shift is introduced in the module which is helpful to controlling the power flow in the system.



(a)



(b)

Figure 4:(a) full bridge phase shift ZCS converter (b) basic boost converter

Because of high power applications in this current fed converter is preferred since advantages are more in

current fed converters as compared to voltage fed converters. In voltage fed converters transformer turns ratio is very high so parasitic components produces the high voltage and current spikes which creates switching loss problems in the circuit. This problem is overcome by zero current switching operation. Regulation of output is done by variable frequency control operation, from this we can reduce the size and mass of the converter. Increasing switching frequency results in increased switching losses so soft switching techniques are used to eliminates the switching losses and it will improves the efficiency also. DC –DC converter uses the leakage inductance and parasitic capacitance which shown in fig 4 above.

III. STEADY STATE ANALYSIS

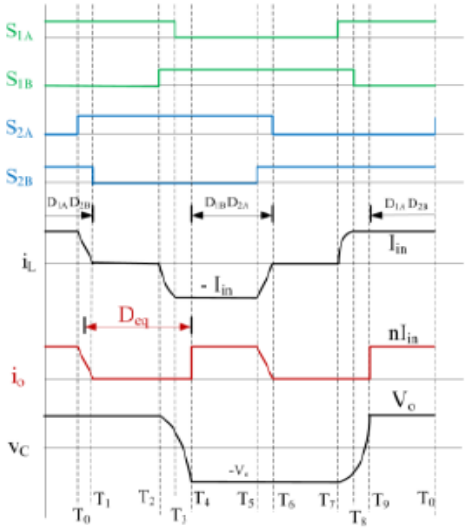


Figure 5: Proposed three phase converter for single module waveforms

Figure 5 shows the steady state waveforms of the proposed converter. Here switches $S_{1A,}$ S_{1B} consists of complement gate signals with little overlapping portion. Zero current switching utilized this portion for ZCS operation. In converter power flow controlling is done by phase shifting the lower leg gate signals with gate signals of upper leg switches. i.e $S_{2A,}$ S_{2B} gate signals are phase shifted with S_{1A} and S_{1B}.

Analysis of steady state converter operation for developing the simple model is done for system level simulation. It considers the zero current switching effect. Resonant frequency ω_0 and characteristic impedance Z_0 of the LC circuit is given as follows

$$\omega_0 = \frac{1}{\sqrt{LC}}$$

$$Z_0 = \sqrt{\frac{L}{C}}$$

Where L and C are inductor and capacitor of the resonance circuit.

Normalized input current J_{in} is defined as

$$J_{in} = \frac{Z_0 I_{in}}{V_0}$$

Where I_{in} is the input current and V_0 is the output voltage

The interval by interval analysis is help to calculating the interval length in terms of normalized current and resonant parameters.

The first, third and fourth intervals length can be calculated by analysing the circuit within that interval. In first interval switches S_{1A}, S_{2A} and S_{2B} are on the inductor and load current decreases and capacitor voltage is maximum in this interval. In second interval i_L and i_0 becomes zero and V_c remains at the maximum voltage. It is control parameter duration when the gate signals are phase shifted this sets the interval. In the third interval S_{1A}, S_{1B},S_{2A} are closed. I_L current goes negative gradually and i_0 remains in the zero current only, the voltage V_c starts decreasing slowly. In the fourth interval switches S_{1B},$S_{2A}$are on inductor current reaches to negative of the input current, output current increases and V_c reaches to negative of the output voltage. The fifth and final interval is calculated using constant frequency switching taken into account. i_L and V_c are in the negative phase only but i_0 reaches its maximum value. From the figure 5 it can be seen that in second and fifth interval converter operation is more so it is equivalent to boost converter operation i.e on state and off state of the switches. The below table 1 gives details of the intervals conduction in steady state operation.

Table 1: summary of intervals conduction

Mode	Conducting devices	$i_L(t)$	$v_C(t)$	$\omega_o T_{ij}$
$I:[T_0-T_1]$	$S_{1A}, S_{2A}, S_{2B}, D_{1A}, D_{2B}$	$\frac{-V_o}{L}(t-t_0)+I_{in}$	V_o	J_{in}
$II:[T_1-T_2]$	S_{1A}, S_{2A}	0	V_o	–
$III:[T_2-T_3]$	S_{1A}, S_{1B}, S_{2A}	$\frac{-V_o}{Z_o}\sin(\omega_o(t-t_0))$	$V_o\cos(\omega_o(t_3-t_2))$	$sin^{-1}(J_{in})$
$IV:[T_3-T_4]$	S_{1B}, S_{2A}	$-I_{in}$	$\frac{-I_{in}}{C}(t_4-t_3)+V_o\cos(\omega_o(t_3-t_2))$	$\frac{1}{J_{in}}\left(1+\sqrt{1-J_{in}^2}\right)$
$V:[T_4-T_5]$	$S_{1B}, S_{2A}, D_{1B}, D_{2A}$	$-I_{in}$	$-V_o$	–

The model investigation and waveforms of the converters gives the following formula for duty cycle of basic boost is given below

$$D_{eq} = \frac{T_{01} + 2(T_{12} + T_{23} + T_{34})}{T_s}$$

Where T_{ij}=T_j-T_i ,i=0,1,2,3 and j=i+1

And T_j is switching instant.

Waveforms of the output current is almost square wave if the duration of small overlap is neglected. By adjusting the phase shift of gate signals we can control the duty cycle of the square waveforms. Duty cycle of the converter and number of modules decides the current

ripple of the output. In this we are using duty cycle of 2/3 which makes the output current ripple free. Fault detection circuit is proposed in this project. It is very advantages to the subsea power system. The circuit arrangement is shown in below figure 6.

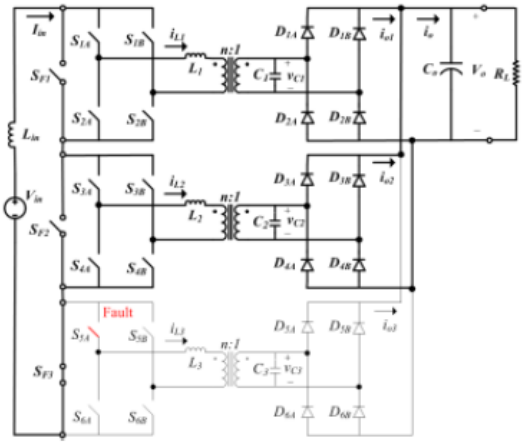


Figure 6: Fault detection arrangement for three phase dc-dc converter

Reliability, high power density, maintainability, and fault tolerance are essential requirements for the subsea power system. This proposed system is having high reliability so we can concentrating on the faults occurs in the modules. Proper techniques are designed to fast detection of the faults and continued operation of the system when fault occurs in the one module.

The above figure 6 shows the arrangements for the fault detection in this circuit we are adding bypass switches S_{F1},S_{F2},S_{F3} at the primary side when fault is occurred in the one module that module is disconnected and bypassed switches will be activated for continued operations. In this case converter is operating in CCM Mode and input is almost constant in the normal case with the 50% duty cycle. Current wave forms of this switches are square wave in this fault detection circuit fault is found when sampling frequency is greater than the switching frequency. When this happening the circuit duty cycle changes to less or greater than 50% then the fault flag is set and additional bypass switch is closed and it starts next period of fault detection.

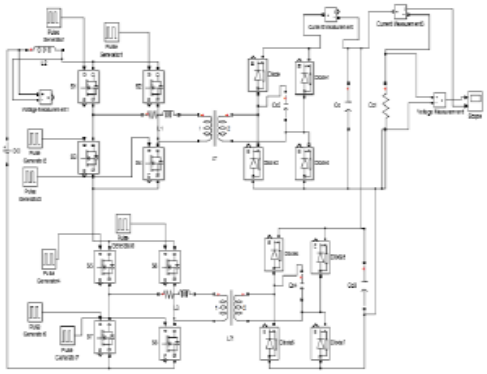
IV. RESULTS

The simulation results for the proposed system is given below. And laboratory prototype specifications are given in table 2.

Table 2: Laboratory prototype specifications

Items	Values
Switching frequency	20KHz
Nominal load power	3kW
Nominal input	300V
Nominal output	150V

1Fig: simulation for cascaded module



The above simulation circuit shows the cascaded three phase ZCS dc-dc converter connected with pulse generators which provides the phase shift to the gate signals. Here ,output current and voltages are measured. The simulating waveforms for this circuit is given below.

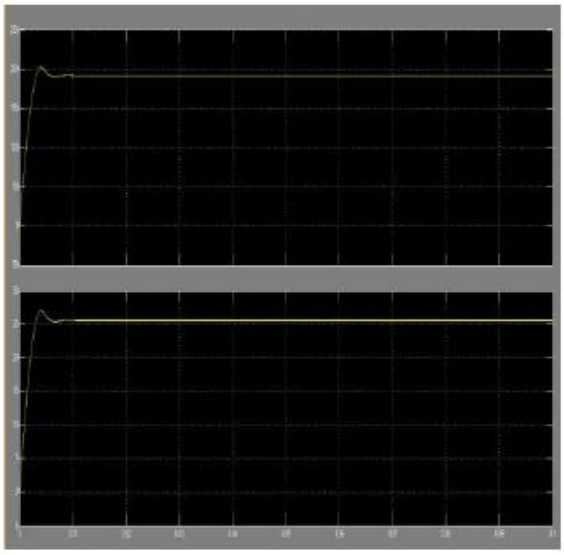
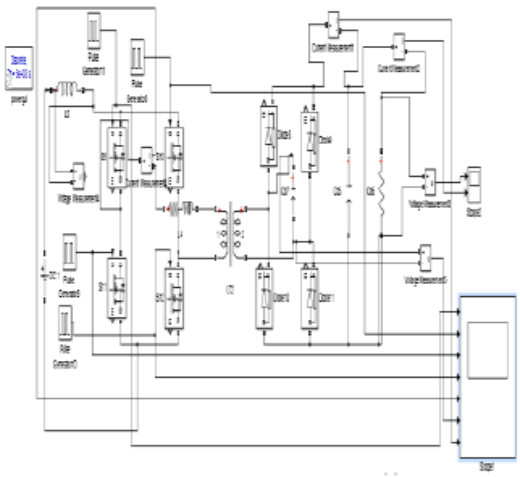


Fig 7: simulation for cascaded circuit

2 fig: Simulation for the single module circuit



The above simulation circuit is for the single module of the proposed system. Here, we got the pulse waveforms with phase shift, inductor current, output current, and capacitor voltage waveforms. And output voltage and current for the single module. The simulation waveforms for the above circuit is shown below.

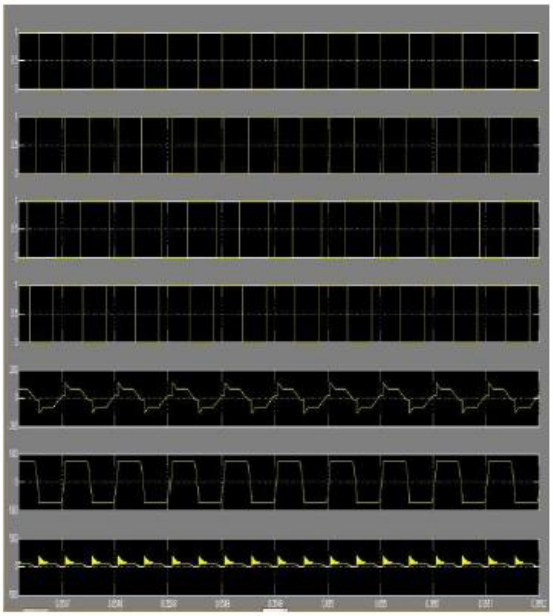


Fig 8:single module circuit

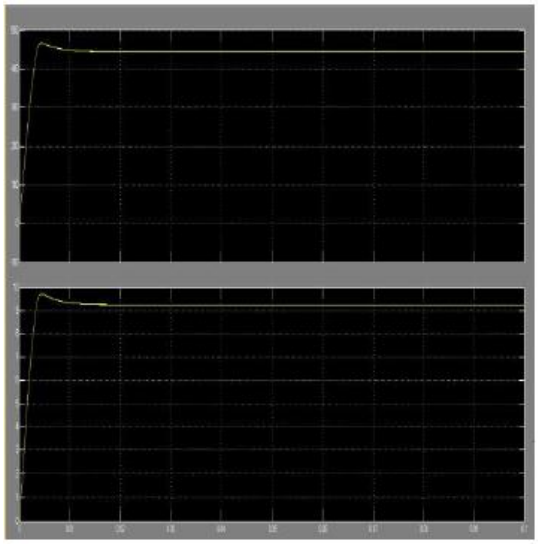


Fig 9:single module voltage and current waveforms

The closed loop operation of the proposed system is shown below. The closed loop system is more advantages than the open loop system. In closed loop system we can get the required output voltage without using the pulse generators. Here, the reference voltage is set that voltage is compared and generates the error voltage. output of the comparator given to the PI control that sets the duty cycle and it is compared with saw tooth waveforms, and generates the PWM pulses. The simulation circuit for the closed loop operation is shown below.

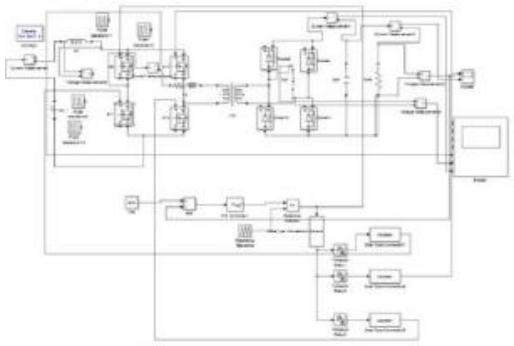


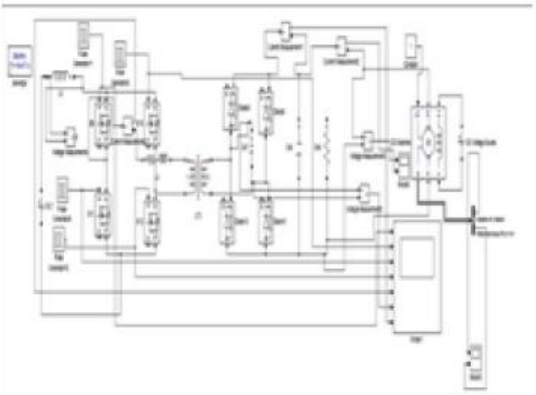
Fig: closed loop zcs converter

The simulation waveforms for above showed closed loop circuit is given below which gives the constant voltage and little bit vary in current values. For example the reference voltage value is 200 volts means the output of the module gives nearly 200 volts.

Fig 10: closed loop voltage and current waveforms

I. Modified Phase Shift Full Bridge Zcs Converter

The proposed system is modified by replacing the resistive load with dc motor load. From the output of the proposed converter we can run the dc motor. Which gives required speed. This modification is shown in the below diagram.



The simulation of this motor load circuit is shown below

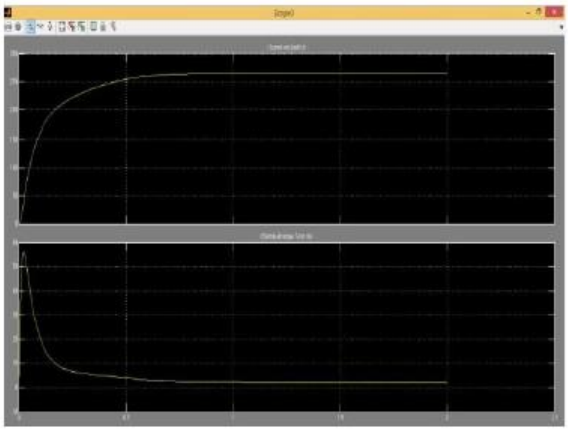


Fig 11: speed and torque of the dc motor

V. CONCLUSION

Modular phase high frequency isolation design architecture provides the high reliability and high power density. The proposed system is applicable in subsea power distribution system. It is simple but efficient model. The faults detection techniques also helps to improves the overall efficiency of the system. Modified circuit is used in the different high power applications. Simulation results are verified and observed.

REFERENCE

[1] "Series input parallel output Modular Phase dc-dc converter with soft switching and high frequency isolation" DOI 10.1109/ TPEL. 2015.2398813, IEEE Transaction on Power Electronics

[2] H. Fan and H. Li, "High-frequency transformer isolated bidirectional dc-dc converter modules with high efficiency over wide load range for 20 kva solid-state transformer," IEEE Transactions on Power Electronics,, vol. 26, pp. 3599-3608, Dec. 2011.

[3] S. Inoue and H. Akagi, "A bidirectional isolated dc-dc converter as a core circuit of the next-generation medium-voltage power conversion system," IEEE Transactions on Power Electronics, vol. 22, pp. 535- 542, Mar. 2007.

[4] B. Zhao, Q. Yu, and W. Sun, "Extended-phase-shift control of isolated bidirectional dc-dc converter for power distribution in microgrid," IEEE Transactions on Power Electronics,, vol. 27, pp. 4667-4680,Nov. 2012.

[5] Series input parallel output Modular Phase dc-dc converter with soft switching and high frequency isolation" DOI 10.1109/TPEL.2015.2398813, IEEE Transaction on Power Electronics

[6] H. Fan and H. Li, "High-frequency transformer isolated bidirectional dc-dc converter modules with high efficiency over wide load range for 20 kva solid-state transformer," IEEE Transactions on Power Electronics,, vol. 26, pp. 3599-3608, Dec. 2011.

[7] S. Inoue and H. Akagi, "A bidirectional isolated dc-dc converter as a core circuit of the next-generation medium-voltage power conversion system," IEEE Transactions on Power Electronics, vol. 22, pp. 535- 542, Mar. 2007.

Propyl 4-(3-oxo-1, 3-dihydro-2H-benzo[g]indazol- 2-yl) Benzoate an Novel Bioactive Compound Isolated from Streptomyces Species, RHC-1 Isolated from Soil of Western Ghats, Karnataka...

Conference Paper · March 2016

CITATIONS
0

READS
348

3 authors, including:

Bukkambudhi Krishnaswamy Manjunatha
The Oxford Educational Institutions
66 PUBLICATIONS **849** CITATIONS
SEE PROFILE

Praveen KUMAR S V
Visvesvaraya Technological University
27 PUBLICATIONS **223** CITATIONS
SEE PROFILE

Proceedings of the 10th INDIACom; INDIACom-2016; IEEE Conference ID: 37465
2016 3rd International Conference on "Computing for Sustainable Global Development", 16th - 18th March, 2016
Bharati Vidyapeeth's Institute of Computer Applications and Management (BVICAM), New Delhi (INDIA)

Propyl 4-(3-oxo-1, 3-dihydro-2*H*-benzo[*g*]indazol-2-yl) Benzoate an Novel Bioactive Compound Isolated from Streptomyces Species, RHC-1 Isolated from Soil of Western Ghats, Karnataka, India

Manjunath B K
Department of Biotechnology, The Oxford College of Engineering, Bengaluru, Karnataka, INDIA
Email ID: professorbkm@gmail.com

Praveen Kumar S V
Department of Biotechnology, The Oxford College of Engineering, Bengaluru, Karnataka, INDIA

Divakara R
Department of Biotechnology, The Oxford College of Engineering, Bengaluru, Karnataka, INDIA

Shridhar A H
Department of Chemistry, SVM Arts Science and Commerce College Ilkal-587125, Karnataka, INDIA.

N S KUMAR
Defence Bioengineering and Electromedical Laboratory (DEBEL)-DRDO, Bengaluru, Karnataka, INDIA.

***Abstract* - The antibacterial potency was studied for the isolate RHC-1, isolated from soil samples of Western Ghats of Karnataka, India. The isolate RHC-1 was identified as Streptomyces spp. 13636G based on the 16s r DNA genomic sequence and the bioactive compound of ethyl acetate extract of RHC-1 was predicted as propyl 4-(3-oxo-1, 3-dihydro-2H-benzo[g]indazol-2-yl) benzoate based on the mass spectral, IR and NMR studies. The RHC-1 showed significant activity against both gram positive and negative bacteria. The present study discloses that, the potency of the isolate for the expansion of a novel antibacterial drug possessing ability.**

Key words: Western Ghat's; Streptomyces; Antimicrobial; 16s r DNA sequence.

I. INTRODUCTION

Actinomycetes are the major promising sources for the bioactive compounds with agricultural and pharmaceutical prominence. They belong to the order Actinomycetales and they are Gram's positive, filamentous eubacteria with higher G+C content [1]. The metabolic diversity of actinomycetes owing their importance in the antibiotic production along with the other bioactive metabolites like lytic enzymes, plant growth promoters, herbicides, insecticides, and antitumor agents [2]. Hence they are considered as industrially treasured prokaryotes since they have produced a huge amount of compounds of pharmaceutical and agricultural significance [3, 4, 5, 6]. Approximately among in the 150 described actinomycetes species, a very few are accountable for the majority of over 25,000 microbial products recognised so far [7]. In specific, the genus Streptomyces accounts for about 80-85 % of the actinomycetes products reported [8]. The assortment of natural actinomycetes has extraordinary importance in numerous extents of science and technology, around 60-70% of naturally occurring antibiotics with of medical significance are from actinomycetes [9]. The diversity of secondary metabolites produced by Actinomycetes is unrevealed and unmatched in medical significance [10]. The findings of novel actinomycetes from different territory with distinctive metabolic activity will often leads to the discovery of new antimicrobial agent. Several studies reported that, now a day about 60-70 % of the bacteria that cause infections in hospitals are resistant to at least one of the drug most frequently used for the treatment. Recent studies showed that few microbes are resistant to numerous antibiotics and it is an alarming increase in resistance of pathogenic microbes which is responsible for the community acquired infections and also causes diseases and mortality [11]. In order to overcome this problem, research and development in the search of novel antibiotics for all the resistant strains using effective drugs [12]. This frightening state demands search of novel bioactive compounds having ability to act against drug resistant pathogens. In the present study, we made an effort to isolate novel actinomycetes species from soils of Western Ghat's region having antimicrobial potency.

II. MATERIALS AND METHODS

A Collection of Soil Sample and Isolation Actinomycetes:

The soil samples were collected from the different localities of Western Ghats region of Karnataka State in sterile sample containers by following the method by Kekuda et al.,[13]. The pure colonies of actinomycetes were isolated from pre-processed soil sample using Actinomycetes Isolation Agar by

 ISSN 0973-7529; ISBN 978-93-80544-20-5

following pure culture techniques. The pure colonies are sub cultured on GAA (ISP-5) slants and stored at 4°C [14].

B Morphological features and microscopic and biochemical characters of the isolate RHC-1:

The strain RHC-1 was inoculated on various media namely ISP-3, ISP-4 and ISP-5. Colony characteristics and production of diffusible pigments for the isolate was recorded. The distinguishing arrangement of spores was studied according to the method followed by Akshatha *et al.*, [14]. by the slide culture technique. Gram's nature and biochemical characteristics for the isolate RHC-1 was studied according to the method followed by Aneja, 1996 [15], Florencio, 2012[16].

C Primary antibacterial screening of the actinomycetes isolates:

In order to screen the antibacterial activity of the isolated actinomycetes, perpendicular streak method was followed [17].

D Production and extraction of bioactive secondary metabolites:

The production of secondary metabolite from the isolate RHC-1 was observed by inoculating the sporulated culture into Yeast Extract Malt Extract broth (YEMEB). The culture filtrate from the YEMEB was subjected to centrifugation and the obtained supernatant was extracted using ethyl acetate solvent according to the method followed by Kekuda *et al.*, [13] Akshatha *et al.*,[14]. The obtained crude extract was used to screen for its antimicrobial potency.

E Antibacterial activity of ethyl acetate extract of RHC-1:

Agar well diffusion method was performed by employing the method by Akshatha *et al.*, [14] to check the antibacterial potency of the ethyl extract of RHC-1. Six gram positive bacteria and nine Gram negative bacteria are inoculated on Muller Hinton Agar (Himedia-M173). Finally the bioactivity of the test isolate was determined by measuring the zone of inhibition (in diameter 'mm').

F Determination of Minimum Inhibitory Concentration (MIC):

Based on the results of antibacterial broad spectrum activity, the isolate was selected to determine the MIC. The lawn culture of the test pathogens was prepared by adjusting the cell density with 0.5 McFarland turbidity standards. The different concentration of the extract was loaded to corresponding wells 20 µl, 10µl, 5µl, and 3 µl respectively. The plates were incubated for 18-24 hrs. at 37° C. The minimum concentration producing the zone of inhibition was considered as MIC.

G 16s r RNA Sequencing:

The genomic DNA of RHC-1 was extracted by following the method Dasari *et al.*, [17]. The purity of the extracted DNA and its quantity was measured at 260 and 280 nm using spectrophotometer. The PCR amplification of 16s r DNA of RHC-1 was made using two prímers: 27f (5 -AGAGTTTGATCCTGGCTCAG-3´) and 1498r (5´-GGTTACCTTGTTACGACTT-3´). The determined sequence was compared for its similarity level using the NCBI data base (ncbi-nlm-nih.gov) web site.

H Spectral studies for RHC-1:

The absorption spectrum of the extract was determined in the UV region (200-400 nm) using a UV-visible spectrophotometer (Thermo Evolution 201) according to the method Sahin and Ugur [19].

Infra-Red spectra were recorded on Perkin Elmer-spectrum RX-1model spectrophotometer using KBr pellets. NMR spectra was verified by Bruker DRX 400MHz spectrometer and acquired on a Bruker Avance-2 model spectrophotometer using DMSO as a solvent and TMS as an internal reference.

III. RESULTS

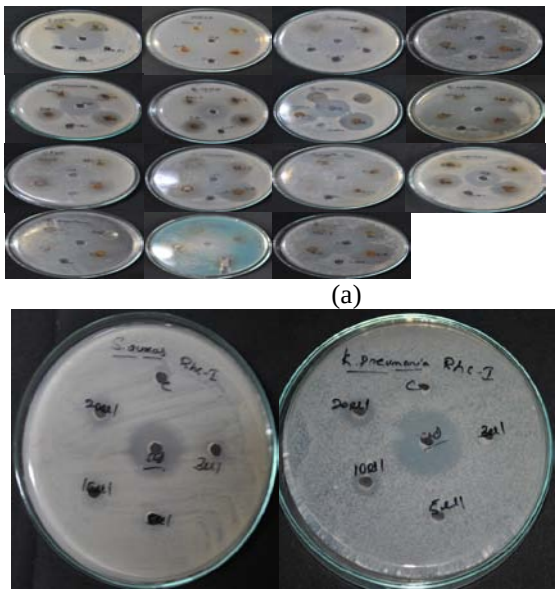
Cultural characteristics and Microscopic study:

The cultural characteristics of the isolate RHC- 1, studied using three different media *viz.*, ISP-3, ISP-4 and ISP-5. The growth was good on ISP-4 and ISP-5 whereas temperate growth was noticed on ISP-3. The colour of substrate and aerial mycelium varied in different media. The organism produced colonies with 3 mm diameter, entire, slightly umbonate colony with grey colored powdery mass of sporulation on ISP-5 with inhibition of neighbouring colony. The isolate produced good growth on ISP-4 medium. Colonies were 3 mm in diameter, entire and umbonate margin, bearing cream colored spores. On ISP-3 it showed poor growth when compared with colonies on ISP-4 & ISP-5, these colonies were minute, light cream colored, entire, elevated margin, with grey colored powdery sporulation. The organism was gram positive (Fig. 1), positive for starch hydrolysis, casein hydrolysis and lecithinase & lipase production. It is negative for gelatine hydrolysis and citrate utilization. Based on morphological and biochemical characterization of the organism it was found to be *Streptomyces* sp.

Preliminary antibacterial activity and MIC:

The ability of ethyl acetate extract of RHC-1 to impede bacteria was tested against 15 bacteria (Fig. 1). It was noticed that the Gram positive bacteria shows maximum inhibition by the extract was high compared to Gram negative bacteria. Among Gram positive and Gram negative bacteria, high vulnerability to extract was shown by *S. aureus* and *K. pneumoniae* respectively. However, the inhibitory effect of extract was lesser than that of standard antibiotic and control (Fig. 1; Table 1).The MIC was determined against 2 bacteria *S. aureus* (10 µl) and *K. pneumoniae* (10 µl) and found to be 10 µl for both the bacteria (Table 1).

 ISSN 0973-7529; ISBN 978-93-80544-20-5



(a)

(b)

Fig. 1. (a,b)Preliminary antibacterial activity and MIC by ethyl acetate extract of RHC-1

TABLE I. PRELIMINARY ANTIBACTERIAL ACTIVITY OF RHC-1 AND MINIMUM INHIBITORY CONCENTRATION (MIC) OF RHC-1

Test organisms	Zone of Inhibition (mm)	
	RhC-1	Standard (Streptomycin)
B. cereus	0	2.5±0.1
P. vulgaris NCIM-2078	1.3±0.1	2.8±0.1
S. marscences NCIM-2078	2.1±0.1	3.4±0.1
B. coagulans MTCC-492	1.8±0.1	2.5±0.1
E. coli MTCC-1610	1.5±0.1	3.1±0.1
A. baumanii NCIM-5152	2.2±0.1	3.5±0.1
S. typhi MTCC-734	1.8±0.1	3.0±0.1
P. aerogenosa MTCC-7296	0.0±0.1	3.4±0.1
Micrococcus spp. NCIM-2913	0	3.2±0.1
B. megaterium MTCC-4912	0	2.9±0.1
B. subtilis NCIM-2063	1.3±0.1	2.5±0.1
S. sonii MTCC-2959	2.0±0.1	3.3±0.1
MRSA	0.0±0.1	2.6±0.1
S. aureus NCIM-2079	1.7±0.1	2.9±0.1
P. putida MTCC-3316	1.5±0.1	3.4±0.1
K. pneumonia MTCC-4352	2.1±0.1	3.2±0.1

Test bacteria	Zone of Inhibition in cm			
Rhc-1	20µl	10µl	5µl	3µl
K. pneumonia	0.8±0.1	0.5±0.1	0	0
S.aureus	1.0±0.1	0.3±0.1	0	0

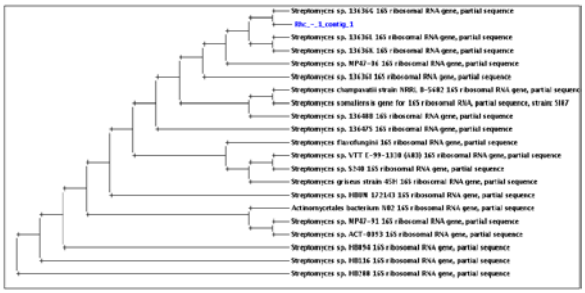


Fig. 2. 16s r DNA sequence data for RHC-1 and Phylogenetic tree

16s r DNA sequencing

The 16s r DNA sequence showed, total of 1446 bp, amplified fragments and its compared with the NCBI data base. The results showed about 96.3 % and 97.8 % similarity with *Streptomyces Sp. 13636G*. Using the related obtained data the Phylogenetic tree was constructed (Fig 2).

Spectral study:

The ethyl acetate extract of RHC-1 showed maximum absorption λ_{max} at 396 nm. IR (KBr) cm^{-1} = 2915.8(-OH), 2849.8(CH_2), 1742 (C=O), 1638 (N=N), 1512(C=C) 90(Fig 9). ^{1}H NMR (DMSO) δ p p m= 7.3 (m, 8 H, Ar-H), 5.3(m, 1H, -NH), 3.4 (s, 1H, -OH), 2.1(S, 4H, -CH_2), 1.05(s, 3H, -CH_3) (Fig 11). MS *m/z* = 346 (M^-) (Fig. 10).Anal. Calcd. For $C_{21}H_{18}N_2O_3$; C, 72.82; H, 5.24; N, 8..09 Found; C, 72.53; H, 518; N, 8.14. From the UV-Visible, IR, NMR and mass spectral data the structure of the isolate predicted as propyl 4-(3-oxo-1,3-dihydro-2*H*-benzo[*g*]indazol-2-yl)benzoate and the structure of isolate given in the Fig. 03-06.

 ISSN 0973-7529; ISBN 978-93-80544-20-5

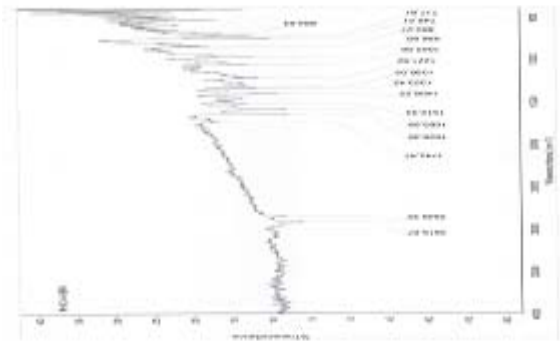


Fig. 3. IR spectra of RHC-I

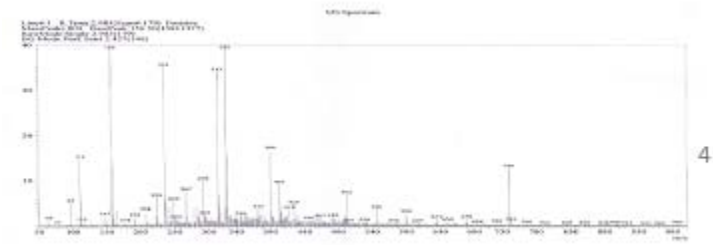


Fig. 4. MS spectra of RHC-I

Fig. 5. H-NMR of RHC-I

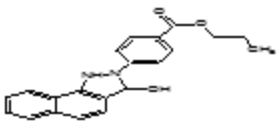


Fig. 6. propyl 4-(3-oxo-1,3-dihydro-2*H*-benzo[*g*]indazol-2-yl)benzoate

IV. DISCUSSION

In this study we found that Gram positive bacteria were susceptible to high extent than gram negative bacteria. The lowest activity of ethyl acetate extract of RHC-1 against the gram negative bacteria, could be ascribed to the presence of an outer membrane that possess hydrophilic polysaccharides chains and forms an additional barrier for the entry of extract as well as antibiotics into the cells [19]. UV spectral studies showed absorption maxima (λ_{max}) at 396 nm and indicates the presence of the alkaloid and xanthone groups because most of bioactive compounds of which are subsiding under this range. The genomic partial sequence of 16s ribosomal RNA gene, confirms the novel isolate RHC-1 is closely related to the *Streptomyces* spp. 13636G. The structure of the isolate were confirmed by the UV-Visible, IR, NMR and mass spectral studies, in the UV-Visible spectra the absorbance at λ_{max} at 396 indicated the presence of pi conjugation in the isolate. In the IR spectra absorbance at I cm^{-1} 2915.8 indicate the presence of -OH, 2849.8 indicates the presence of aromatic CH_2, 1742 indicates the presence of C=O, 1638 indicates the presence of N=N and 1512 indicates the presence of C=C. In NMR spectra peak at δ ppm 7.3 indicate the presence of aromatic hydrogen atom, δ ppm 5.3 indicate the presence -NH within the five membered ring, δ ppm 3.4 indicate the presence of -OH, δ ppm 2.1 indicate the presence of aliphatic $-CH_2$ and δ ppm 1.0 indicate the presence of $-CH_3$. The mass of the compound found to be *m/z* = 346 (M^-). From the above data the isolate predicted as propyl 4-(3-oxo-1,3-dihydro-2*H*-benzo[*g*]indazol-2-yl)benzoate. Further media optimization and strain improvement to be carried.

V. CONCLUSION

The RHC-1 isolate is a novel Actinomycetes strain obtained from the soil of Western Ghats region of Karnataka, India. The isolate shows conspicuous antimicrobial and antioxidant activity. Hence we conclude that the isolate RHC-1 is a potent strain closely related to *Streptomyces spp*. 13636G and presence of **propyl 4-(3-oxo-1, 3-dihydro-2*H*-benzo[*g*]indazol-2-yl) benzoate** compound was predicted by IR, NMR and Mass spectra, having the antibacterial ability further off other biological assays was carried using the obtained compound.

ACKNOWLEDGEMENT

We express our deep gratitude to Chairman Sri. NarasaRaju, Executive Director Sri. Ramesh Raju, Principal Dr. Karibasappa and Dr. Kusum Paul Head, Dept. of Biotechnology, The Oxford College of Engineering, Bangalore for facilities to conduct work, kind support and encouragement.

REFERENCES

[1]. Qin S, Xing K, Jiang JH, Xu LH, Li WJ. Biodiversity, bioactive natural products and biotechnological potential of plant-associated endophytic actinobacteria. Applied Microbiology and Biotechnology. 89(3):457-73, 2010.

[2]. Adegboye MF and Babalola OO. Taxonomy and ecology of antibiotic producing actinomycetes. African Journal of Agricultural Research. 7(15); 2255-226, 2012.

[3]. Ripa FA, Nikkon F, Zaman S, Khondkar P. Optimal conditions for antimicrobial metabolites production from a new *Streptomyces* sp. *RUPA-08PR* isolated from Bangladeshi soil. Mycobiology. 37(3), 211-214, 2009.

[4]. Gonzalez-Franco AC, Robles-Hernandez L, Nunez-Barrios A, Strap JL, Crawford DL. Molecular and cultural analysis of seasonal actinomycetes in soils from *Artemisia tridentate* habitat, Int. J. Expntl Bot. 78, 83-90, 2009.

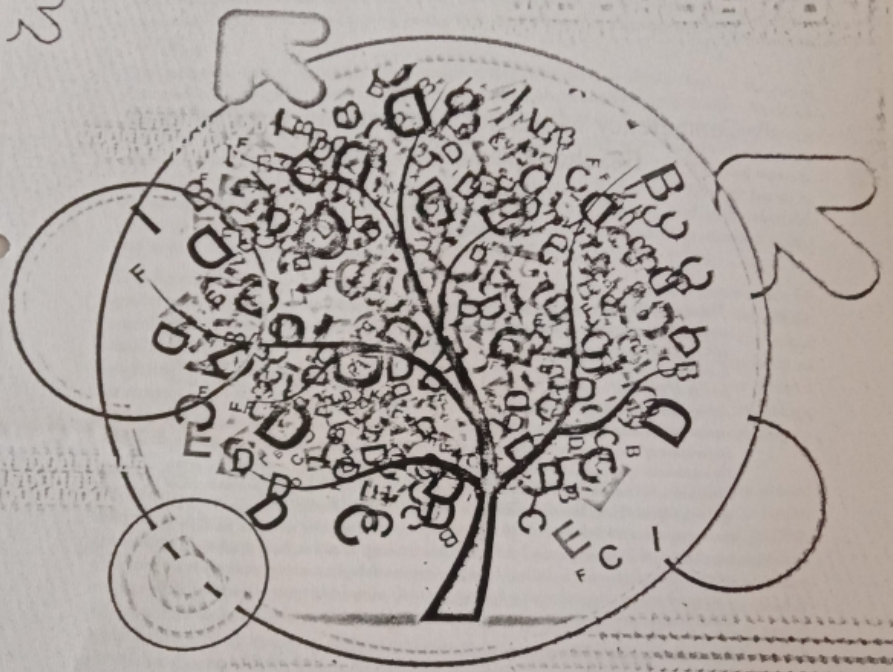
[5]. Khamna S, Yokota A, Lumyong S. Actinomycetes isolated from medicinal plant rhizosphere soils: diversity and screening of antifungal compounds, indole-3-acetic acid and siderophore production, World J. Microbiol. and Biotech. 25(4), 649-655, 2009.

[6]. George M, Anjumol A, George G, Hatha AAM. Distribution and bioactive potential of soil *actinomycetes* from different ecological habitats, *Afcn. J. Microbiol Res.*, 6(10), 2265-2271, 2012.
[7]. Thenmozhi M and Kannabiran K. Studies on isolation, Classification and phylogenetic characterization of novel antifungal *Streptomyces* sp. *VITSTK-7* in India. Cur Res *J Biol. Sci;* 2:306-12, 2010.
[8]. Bull AT, Stach JEM. Marine *actinobacteria*: new opportunities for natural product search and discovery. Trend Microbiol.15:491-499, 2007.
[9]. Saha SS, Dhanasekaran D, Shanmugapriya S, Latha S. *Nocardiopsis sp. SD5:* A potent feather degrading rare actinobacterium isolated from feather waste in Tamil Nadu, India. J.Basic Microbiology, 2012.
[10]. Magarvey NA., Keller, JM., BernanV, Dworkin M, Sherman, DH. Isolation and characterization of novel marine-derived actinomycete taxa rich in bioactive metabolites. Appl Environ Microbiol. 70; 7520–7529, 2004.
[11]. Bisht R, Katiy ARA, Singh R, Mittal P. Antibiotic Resistance –A Global Issue of Concern. Asian Journal of Pharmaceutical and Clinical Research. 2 (2); 34-39, 2009.
[12]. Stephen TO and Kennedy KA. Bacteria Resistance to Antibiotics: Recent Trends and Challenges. *Int J Biol Med Res.* 2(4): 1204 – 1210, 2011.
[13]. Kekuda PTR, Shobha KS, Onkarappa R, Gautham SA, Raghavendra HL. Screening biological activities of a *Streptomyces* species isolated from soil of Agumbe, Karnataka, India, Int. J. Drug Development and Res., 4(3), 104-114, 2012.
[14]. Akshatha MD, Manjunatha BK, Pooja R, Umesh TM and Sreevijeth R. Screening for Novel Antibiotic Producing Actinomycetes from Western Ghats of Karnataka State, India. Paripex - Indian Journal of Research. 2(3); 11-13, 2013.
[15]. Aneja KR. Experiments in Microbiology, Plant pathology, Tissue culture and Mushroom cultivation, 2nd Edition, WishwaPrakashan, New Delhi, 1996.
[16]. Florencio C, Couri S, Farinas CS. Correlation between agar plate screening and solid-state fermentation for the prediction of Cellulase production by *Trichoderma* strains, Enzyme Research, 2012.
[17]. Dasari VRRK, Nikku MY, Donthireddy SRR. Screening of antagonistic marine actinomycetes: optimization of process parameters for the production of novel antibiotic by *Amycolatopsis alba*var. *nov.DVR D4*, Journal of Microbial and Biochemical Technology, 3: 5, 2011.
[18]. Sahin N, Ugur A. Investigation of the antimicrobial activity of some *Streptomyces* isolates, Turkish Journal of Biology, 27, 79-84, 2003.
[19]. Singh SL., Baruha I and Bora TC. Actinomycetes of loktak habitat isolation and screening of antimicrobial activity. Biotech. 5 (2): 217-21, 2006.

 ISSN 0973-7529; ISBN 978-93-80544-20-5

AIMA

ALL INDIA MANAGEMENT ASSOCIATION



TRANSFORMING
Management Education

FOR SUSTAINABLE TOMORROW

6

A Competency Model for Determining the Profile of B-School Faculty in Bangalore

A Sahana*
Dr Vijila**

The primary focus of management education today is to develop the intellectual abilities of the students, nurturing them to align themselves with industry requirements. Rightly said, the three pillars of higher education institution are: quality of faculty, infrastructure facilities and learning environment. The responsibility of preparing the students for their future rests on the faculty of B-school as they are involved in curricula development, teaching content with appropriate methodology and technology. Faculty are also required to upgrade themselves with research, publications, consultancy and faculty development programmes. Thus it stresses on the importance of analysing the competencies of B-school faculty. Competencies are underlying characteristics of people and indicate "ways of behaving or thinking, generalizing across situations, and enduring for a reasonably long period of time. Very broadly competencies consist of knowledge, skills, abilities that relate to the behaviour of an individual at the job. People are no longer seen as job holders with life long career prospects, but rather viewed as packages of capabilities. A B-School faculty's job is not just teaching, it also includes academic and administrative functions, also includes knowledge creation through researching and consultancy. This paper presents the preliminary findings of a study related to competency mapping of B School faculty and in designing the competency model of the faculty.

Keywords: Competency, Competency Model, Skills, B-School Faculty.

INTRODUCTION

At present India is striving to compete in a globalized economy in areas that require highly trained professionals, and thus the quality of higher education has become increasingly important. Management is not just a subject or an academic discipline; it is a professional programme that help a student become an effective manager. For the student to develop the capability to take decisions, his/her educational inputs play a vital role in moulding him. Experience which the students will derive from higher education is, to a large extent,

* Asst. Prof., Dept of MBA, The Oxford College of Engineering, Bommanahalli, Hosur Road Bangalore 560 068
** Director, KCT Business School, Coimbatore 641 049

dependent on the performance of the faculty, both as teachers and as researchers. Management education is the latest academic discipline to arrive in the world of academia, hardly hundred years worldwide and just about sixty years on Indian scene. It is today the most preferred choice for higher education, among young men and women of the country (Agarwal, Swati 2010).

The primary focus of management education today is to develop the intellectual abilities of the students, nurturing them to align themselves with industry requirements. Academic practices should operate not only in the realm of teaching students but should also involve the functions of developing the faculty, associating practicing managers in designing curriculum and establishing active relations with the business world. If a B-school wants to build a long term future, consistent improvement of quality is essential. Quality has to be operationalised in various parameters like: quality of input (faculty and infrastructure), quality in processes (active learning time), quality in outputs (tests and graduation scores) and quality in outcomes (gainful employment) (Hatfield and Taylor, 1998).

Enrichment through practical learning (Malmarugan and Prabhu 2005), competence for quality teaching (Gupta and Gollakota, 2005), faculty shortage (Kannan R Vijay, 2008), accreditation, promoting a research culture (Mayank & Dave 2007) are some of the serious challenges that need to be addressed. With the given challenges the responsibility of preparing the students for their future rests on the faculty of B-school as they are involved in curricula development, teaching content with appropriate methodology and technology. Faculty are also required to upgrade themselves with research, publications, consultancy and faculty development programmes.

Of the many B-school rankings conducted in the country every year, parameters stressed are infrastructure – physical, knowledge centers, teaching aids; education process – faculty, research, consultancy, publications and Management Development Programmes (MDPs); academic programmes – admission, curriculum, delivery systems; social responsibility, placement and industry interface. Most institutions are found to put up good infrastructure but not so in others factors. Moreover, the quality of an institute is not based on the level of infrastructure alone, but also on many more equally important factors. The worst area of performance among majority of B-schools has been the poor faculty and lack of research orientation (Sinha, 2007). Thus it stresses on the importance of analysing the competencies of B-school faculty.

VARIOUS DEFINITIONS OF COMPETENCY

According to Boyatzis (1982) Competency is a capacity that exists in a person that leads to behaviour that meets the job demands within parameters of organizational environment, and that, in turn brings about desired results.

According to Scott (1998) competency is (a) a cluster of related knowledge, attitudes, and skills that affects a major part of one's job; (b) that correlates with performance on the job; (c) that can be measured against well accepted standards; (d) and that can be improved via training and development.

A more detailed definition synthesized from the suggestions of several hundred experts in Human Resource Development who attended a conference on the subject of competencies in Johannesburg in 1995, is 'a cluster of related knowledge, skills and attitudes that affects a major part of one's job (a role or responsibility), that correlates with performance on the job, that can be measured against well-accepted standards and that can be improved via training and development.' (Parry, 1996)

Rankin (2002) describes competencies as 'definitions of skills and behaviours that organizations expect their staff to practice in their work' and explains that:

"Competencies represent the language of performance. They can articulate both the expected outcomes from an individual's efforts and the manner in which these activities are carried out provide a common, universally understood means of describing expected performance in many contexts".

According to **Shukla (2009)** Competency can be described as "an underlying characteristic of a person in that it may be a motive, a trait, a skill, an aspect of one's self image or social role, or a body of knowledge which he or she uses".

According to **Tripathi et al. (2010)** competency can be defined as the combination of attributes such as personality, ability, knowledge and skills (PAKS) that help the institution in the process of knowledge transfer, knowledge creation and the knowledge services to the society.

REVIEW OF LITERATURE

The importance of understanding competencies required for a career is authenticated by the Trait and Factor theory of career selection (Parsons, 1909). According to this theory, three factors contribute to a person's success and happiness in a career: 1) the person's traits, which include aptitudes, abilities, interests, ambitions, resources, and limitations; 2) knowledge of the factors or competencies required for a given career; and 3) the closeness in match between the two. Thus, understanding the competencies and traits of B-School faculty becomes essential for analysing performance and areas of development.

The term competence was used for the first time in 1959 (White, 1959). It is used to describe personal characteristics associated with job performance and motivation. The modern concept of competencies has been formulated in the work of the psychologist McClelland, D. C. (1973).

Spencer and Spencer (1993) in their work Competence at Work have defined competency as 'an underlying characteristic of an individual that is casually related to criterion-referenced effecting and/or superior performance in a job situation.' An 'underlying characteristic' means the competence is a fairly deep and enduring part of a person's personality and can predict behaviour in a wide variety of situations and job tasks. 'Casually related' means that it causes or predicts behaviour and performance. 'Criterion-referenced' means that the competency actually predicts who does something well or poorly, as measured on a specific criterion or standard.

Competencies have some or all of these characteristics:

(a) Cluster of knowledge, skills, abilities, motivation, beliefs, values and interests;

(b) Relate to a major part of the job;

(c) Associated with effective and/or superior performance;

(d) Observable and measurable against well-accepted standards;

(e) Linked to future strategic directions; and,

(f) Can be improved via training and development (Cooper 2000; Parry 1996; Shippmann et al. 2000).

Competencies are underlying characteristics of people and indicate ways of behaving or thinking, generalizing across situations, and enduring for a reasonably long period of time. Based on the Ice-berg model (Figure 6.1) there are five types of Competency characteristics (Spencer and Spencer, 1993). They identified five types of competency characteristics consisting of motives, traits, self-concept, knowledge and skill. First, motives were the things which one thought about or wanted the stimulate action. Motives drove behaviour toward certain goals and away from others. Second, traits were physical characteristics and consistent responses to situations. Third, self-concept was ones attitudes, values. Fourth, knowledge was information that one had in specific areas. Finally, skill was the ability to perform a certain task.

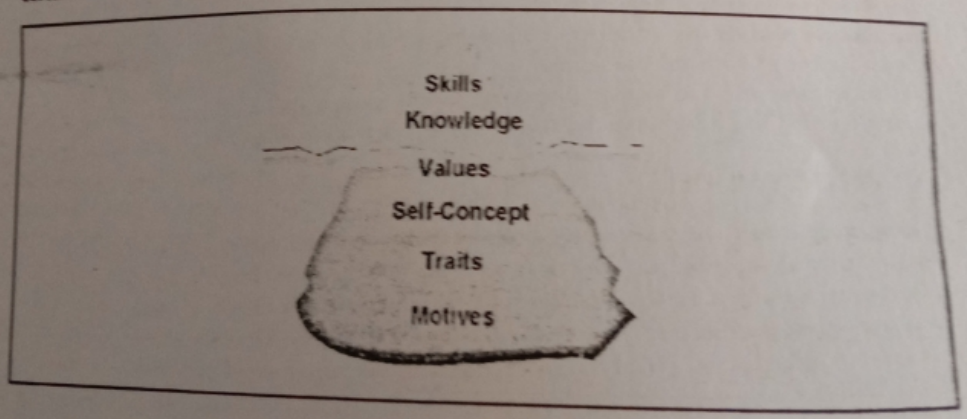


FIGURE 6.1: ICEBERG MODEL

Surface knowledge and skill competencies were relatively easy to develop and training was the most cost-effective way to secure those abilities (Spencer and Spencer, 1993). Any individual characteristics that could be measured or counted were in the visible part and could be delineated between superior and average performers or between efficient and inefficient performers. The hidden part were the most difficult to develop and they were ones that existed in personality.

The various research works related the competency mapping is summarized in the following section. Competency as a link to the human performance model was analysed by Spencer L.M., Spencer, (1992). Lepsinger and Lucia (1999) suggest that for best performance the

Competencies have some or all of these characteristics:

(a) Cluster of knowledge, skills, abilities, motivation, beliefs, values and interests;

(b) Relate to a major part of the job;

(c) Associated with effective and/or superior performance;

(d) Observable and measurable against well-accepted standards;

(e) Linked to future strategic directions; and,

(f) Can be improved via training and development (Cooper 2000; Parry 1996; Shippmann et al. 2000).

Competencies are underlying characteristics of people and indicate ways of behaving or thinking, generalizing across situations, and enduring for a reasonably long period of time. Based on the Ice-berg model (Figure 6.1) there are five types of Competency characteristics (Spencer and Spencer, 1993). They identified five types of competency characteristics consisting of motives, traits, self-concept, knowledge and skill. First, motives were the things which one thought about or wanted the stimulate action. Motives drove behaviour toward certain goals and away from others. Second, traits were physical characteristics and consistent responses to situations. Third, self-concept was ones attitudes, values. Fourth, knowledge was information that one had in specific areas. Finally, skill was the ability to perform a certain task.

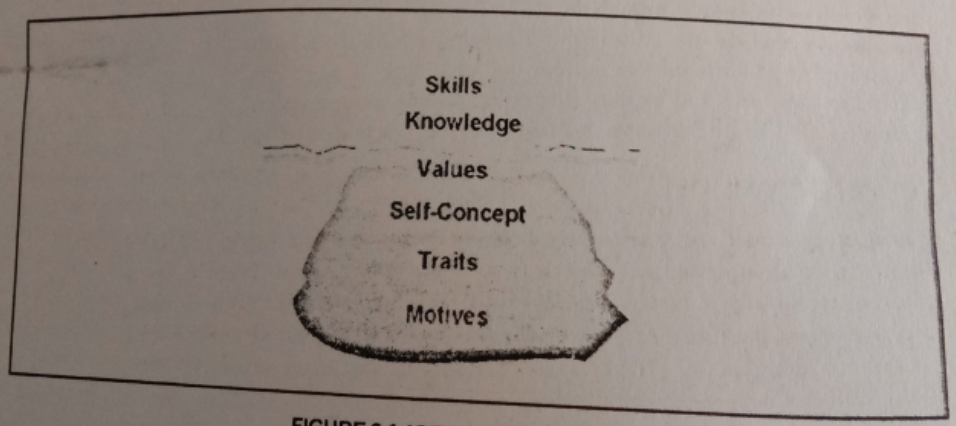


FIGURE 6.1: ICEBERG MODEL

Surface knowledge and skill competencies were relatively easy to develop and training was the most cost-effective way to secure those abilities (Spencer and Spencer, 1993). Any individual characteristics that could be measured or counted were in the visible part and could be delineated between superior and average performers or between efficient and inefficient performers. The hidden part were the most difficult to develop and they were ones that existed in personality.

The various research works related the competency mapping is summarized in the following section. Competency as a link to the human performance model was analysed by Spencer L.M., Spencer, (1992). Lepsinger and Lucia (1999) suggest that for best performance the

competency model should not only identify the necessary skills and knowledge (description model, competency map), but also define the expected outcomes of their performance. (Chambers, Tony, 2002) analyzed the teaching paradigm for the development of faculty (Austin, Ann E., 2002), identified the need for creating the bridge to the future by preparing new faculty to face changing expectation in shifting.

Srikanathan G (2003) developed an alternative perspectives for quality in higher education through the quality management techniques. Hollmann and Elliott (2006) proposed a competency map (rather than a model), which describes how an individual can move beyond his or her current job posting. A theoretical framework for measuring competencies in academic institutions was developed by Ranjan J,Tripathi P (2007). (Ranjan J, Tripathi P 2008) presented an Empirical Study for the competence Management. Tripathi and Suri (2010) presented a competency model consisting of personal effectiveness, ability effectives, skills effectiveness and the knowledge effectiveness aspect of competencies to explore the relevance of the competencies from the industrial sector in education sector.

Rosenshine and Furst (1971) combined other research and identified five fundamental characteristics of effective teachers: clarity, variability, enthusiasm, student opportunity to learn material, and task oriented/business like behaviour.

Suydam (1983) identified that effective teachers also offer encouragement, engage students, minimize distractions and wasted time, establish and follow rules, monitor behaviour, give clear directions, and move through the classroom. Arundell and Richardson (1989) appended that effective teachers use a variety of examples, effectively plan for instruction, and are knowledgeable of both subject matter and pedagogy. Young (1990) further added that effective teachers plan and execute interesting lessons using a variety of methods, monitor student learning and behaviour, and maintain rapport with students.

COMPETENCY MODEL

A competency model was a set of competency factors analyzed and generalized from the characteristics of superior performers at a certain job position. It could be applied to recruitment, employment, education and training, human resource management, development and performance assessment. A model which could identify competence and link between strategies and HRM (human resource management) were highly needed (Yang et al., 2006). Competency modelling and competency assessment could link core competence and generic competencies. They were used to identify the key success factors driving performance in organizations (Lucia and Lepsinger, 1999).

A competency model could divide a three-phase hierarchy into cluster, competency and indicator (Figure 6.2). Here, cluster was a group of competency factors in a specific occupational category. Competency factors were classified in accordance with the posts or roles under the cluster. Indicators were assessment specifications under competency that could be measured and evaluated precisely (Wu and Lee, 2006). Drawing on the study of Boyatzis (1982) and Spencer and Spencer (1993), Crawford (2004) defined a model of competence that integrated knowledge, skills, demonstrable performance and core personality characteristics.

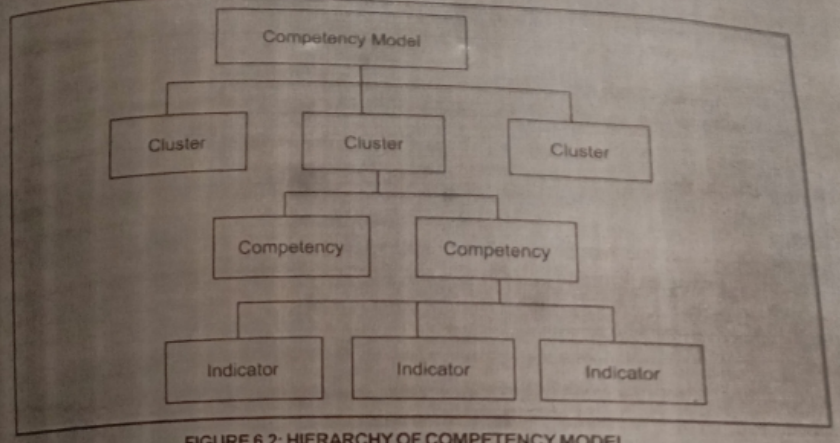


FIGURE 6.2: HIERARCHY OF COMPETENCY MODEL

A large amount research exists on skills, competencies and traits of effective teachers, in the general sense. The review of the literature also reveals that though there is lot of research taking place regarding the changing role of faculty in academics, there is a significant gap in the study for the development of competency model for B-Schools. The development of a competency model will immensely contribute towards the quality enhancements of B-school faculty.

Objectives of the Study

This paper presents the preliminary findings of a study related to competency mapping of B School faculty and in designing the competency model of the faculty. The research objectives are

- To identify the competencies of B School faculty for competitive enrichment
- To identify competencies from the literature
- To integrate objective 1 and objective 2 and develop a working competency model for B School faculty.

Significance of the Study

The three pillars of higher education institution are: quality of faculty, infrastructure facilities and learning environment (Agarwal, Swati 2010). Thus teacher's role in higher education is vast and quality based teaching is the biggest challenge before the higher education system. In higher education, the teacher besides teaching promotes research, experimentation and innovation (Rymbai, 2011). At present India is striving to compete in a globalised economy in areas that require highly trained professionals, thus the quality of higher

education has become increasingly important. Experience which the students will derive from the higher education is, to a large extent is dependent on the performance of faculty, both as teachers and researchers (Agarwal, Swati 2010).

Quantitatively teaching profession is the largest, India has six million teachers, with 5.5 million working at the school stage and 0.5 million at higher education it may be noted that teachers constitute a major portion of the working professionals (Rymbai, 2011).

In this present scenario, teacher's role also includes participating in management of various services and activities which are undertaken by the educational institutions for implementing their programmes (Rymbai, 2011). Teachers need to improve knowledge and skills to enhance, improve and explore their teaching practices (Selvi, Kiymet 2010).

METHODOLOGY

The purpose of this research was accomplished with multiple methods of data collection. The available literature was examined to identify the competencies presented by various researchers. Generic dictionary of Harvard University Competency Dictionary and New Jersey Institute of Technology competency dictionary, academic performance indices of National Board of Accreditation was also taken in to consideration for identifying the competency list. An expert panel (Head of Departments, senior Professors, Directors of various B-Schools) were administered the competency list along with an open ended question "***What are the ideal competencies required by B-School faculty?***" to extract as diverse response as possible.

With the results of the expert panel a questionnaire was designed to determine the competencies of the B- School faculty. The questionnaire was administered to 40 faculties of different B schools. Table 6.1 gives the profile of the respondents of pilot study.

TABLE 6.1: PROFILE DISTRIBUTION OF RESPONDENTS

Sl. No	Gender	Professor	Asst. Professor	Lecturer	Total
1	Male	03	09	11	23
2	Female	02	07	08	17
				Total	40

FINDINGS

The findings of this study pertaining to the three objectives are presented together to generate a logical discussion about the competencies of B school faculty. It includes demographic details age, teaching experience, job responsibilities, gender, educational qualification etc. The general statistics pertaining to the competency variables are presented in Table 6.2. It describes the mean, standard deviations and Cronbanch's alpha co-efficient among the variables.

TABLE 6.2: GENERAL STATISTICS

Sl. No.	Variables	Mean	S.D	Cronbanch Alpha
1	Functional roles	6.4	3.4	0.94
2	Knowledge update	53.4	10.3	0.87
3	ICT skills	8.4	2.19	0.81
4	Evaluation skills	18.0	3.67	0.82
5	Administrative skills	4.0	2.55	0.81
6	Research & Consultancy	2.8	1.78	0.83
7	Resource activities	1.6	1.5	0.81
8	Networking	3.0	1.23	0.83
9	Teaching skills	4.2	2.3	0.80
10	Professional knowledge	3.3	1.4	0.84
11	Personal skill	4.6	2.5	0.79
12	Achievement orientation	4.7	2.9	0.81
13	Initiative	4.1	2.72	0.82
14	Information seeking	4.0	0.91	0.87
15	Interpersonal understanding	3.8	1.92	0.81
16	Customer service orientation	3.2	2.1	0.76
17	Impact and influence	4.7	2.7	0.84
18	Developing others	4.4	4.3	0.93
19	Team work and co-operation	3.9	1.87	0.80
20	Analytical thinking	6.2	2.97	0.89
21	Conceptual thinking	5.6	4.1	0.81
22	Professional expertise	4.4	3.2	0.72
23	Self control	3.6	1.69	0.88
24	Self confidence	3.7	2.1	0.75
25	Flexibility	2.4	1.9	0.82
26	Relationship building	3.9	1.3	0.83
27	Communication	5.7	2.7	0.81
28	Adaptability	2.7	1.2	0.70

CONCLUSION

The review of the literature also reveals that though there is lot of research taking place regarding the changing role of faculty in academics, there is a significant gap in the study for the development of competency model for B-Schools. The development of a competency model will immensely contribute towards the quality enhancements of B-school faculty. A major part of the existing research available has been related to analyzing the competencies of employees working in organizations. People are no longer seen as job holders with life long career prospects, but rather viewed as packages of capabilities. A B-School faculty's job

is not just teaching, it also includes academic and administrative functions, also includes knowledge creation through researching and consultancy. The current study provides the base for the development of competency model for the B-School faculty members.

REFERENCES

Agarwal, Swati (2010). *Talent Management Model for Business School: Factor Analysis*, The Indian Journal of Industrial Relations, Vol 45, no: 3, pg 481-491.

Arundell, A. & Richardson, A. C. (1989). *Characteristics of the effective teacher as perceived by pupils and teachers: A Caribbean case study.* (ERIC Document Reproduction Service No. ED 311 013).

Austin, Ann E. (2002). *Creating a bridge to the future: Preparing new faculty to face changing expectations in shifting contexts. The Review of Higher Education*, 26 (2), 119-144.

Boyatzis, R. (1982). *The competent manager: A model for effective performance*, New York: John Wiley & Sons.

Chambers, Tony (2002). *Helping students find their place and purpose: Tony Chambers talks with Sharon Parks About Campus*,20- 24.

Cooper, K C. (2000). *Effective Competency Modeling and Reporting*, New York:AMACOM

Crawford L (2004). *Senior management perceptions of project management competence.* Int. J. Project Manage. 23(1): 7-16.

Gupta, V. and Gollakota, K. (2005). *Critical challenges for Indian business schools as partners in development*, Decision, Vol. 32 No. 2, pp. 35-56.

Hatfield, L. and Taylor, R.K. (1998), *Making business schools responsive to customers: lessons learned and actions*, Marketing Education Review, Vol. 8 No. 2, pp. 1-8

Kannan, R Vijay (2008). *Business Schools in India: Current Challenges, Future Opportunities*, Decision Line, October, 13-15. Retrieved November 2009 http://www.decisionsciences.org/decisionline/vol39/39-5/dl-d139_5intl.pdf.

Lucia, A. D., & Lepsinger, R (1999). *The art and Science of Competency Models: Pinpointing Critical Success Factors in Organizations*, New York: Pfeiffer.

Malmarugan, D and Prabhu Dr NRV (2005). *Students as Customers*, Effective Executive, August, 43- 44.

Mayank, Girika and Dave, Ketik, (2007). *Paucity of faculty: A Bottleneck in the Growth of Management Education in India*, AIMS International, Vol, 1, no 3, 211 – 221.

McClelland, D. C., (1973). *Testing for competence rather than for intelligence.* American Psychologist, 28.

Parry, S R. (1996) . *The Quest for Competencies*, Training, July

Parsons, F. (1909). *Choosing a vocation*. Garrett Park, MD: Garrett Park Press.

Ranjan J., Tripathi P. (2007). *Decision Supporting System for the Competence Management*. Proceedings of the First International Conference on Information System Technology and Management, 2007.

Ranjan J., Tripathi P. (2008). *Measuring Competencies using Expert System: Educational Perspective*. Journal of Theoretical and Applied Information Technology, 2008.

Rankin, N. (2002). *Raising Performance through People : The Ninth Competency Survey*, Competency and Emotional Intelligence, January, 2-21.

is not just teaching, it also includes academic and administrative functions, also includes knowledge creation through researching and consultancy. The current study provides the base for the development of competency model for the B-School faculty members.

REFERENCES

Agarwal, Swati (2010). *Talent Management Model for Business School: Factor Analysis*, The Indian Journal of Industrial Relations, Vol 45, no: 3, pg 481-491.

Arundell, A. & Richardson, A. G.,(1989). *Characteristics of the effective teacher as perceived by pupils and teachers: A Caribbean case study.* (ERIC Document Reproduction Service No. ED 311 013).

Austin, Ann E. (2002). *Creating a bridge to the future: Preparing new faculty to face changing expectations in shifting context. The Review of Higher Education*, 26 (2), 119-144.

Boyatzis, R. (1982). *The competent manager: A model for effective performance*, New York: John Wiley & Sons.

Chambers, Tony (2002). *Helping students find their place and purpose: Tony Chambers talks with Sharon Parks.About Campus*,20- 24.

Cooper, K C, (2000), *Effective Competency Modeling and Reporting*. New York:AMACOM

Crawford L (2004). *Senior management perceptions of projectmanagement competence*. Int. J. Project Manage. 23(1): 7-16.

Gupta, V. and Gollakota, K. (2005), *Critical challenges for Indian business schools as partners in development*, Decision, Vol. 32 No. 2, pp. 35-56.

Hatfield, L. and Taylor, R.K. (1998), *Making business schools responsive to customers: lessons learned and actions*, Marketing Education Review, Vol. 8 No. 2, pp. 1-8

Kannan, R Vijay (2008). *Business Schools in India: Current Challenges, Future Opportunities*, Decision Line, October, 13-15. Retrieved November 2009 http://www.decisionscience.org/decisionline/vol39/39-5/dsi-dl39_5intl.pdf.

Lucia, A. D., & Lepsinger, R (1999). *The art and Science of Competency Models: Pinpointing Critical Success Factors in Organizations*, New York: Pfeiffer.

Malmarugan, D and Prabhu Dr NRV (2005). *Students as Customers*, Effective Executive, August, 43- 44.

Mayank, Gitika and Dave, Krtik, (2007). *Paucity of faculty: A Bottleneck in the Growth of Management Education in India*, AIMS International, Vol, 1, no 3, 211 – 221.

McClelland, D. C., (1973). *Testing for competence rather than for intelligence*. American Psychologist, *28*.

Parry, S R. (1996) . *The Quest for Competencies*, Training, July

Parsons, F. (1909). *Choosing a vocation*. Garrett Park, MD: Garrett Park Press.

Ranjan J., Tripathi P. (2007). *Decision Supporting System for the Competence Management*. Proceedings of the First International Conference on Information System Technology and Management, 2007.

Ranjan J., Tripathi P. (2008). *Measuring Competencies using Expert System: Educational Perspective*. Journal of Theoretical and Applied Information Technology, *2008*.

Rankin, N. (2002). *Raising Performance through People : The Ninth Competency Survey*, Competency and Emotional Intelligence, January, 2-21.

is not just teaching, it also includes academic and administrative functions, also includes knowledge creation through researching and consultancy. The current study provides the base for the development of competency model for the B-School faculty members.

REFERENCES

Agarwal, Swati (2010). *Talent Management Model for Business School: Factor Analysis*, The Indian Journal of Industrial Relations, Vol 45, no: 3, pg 481-491.

Arundell, A. & Richardson, A. G.,(1989). *Characteristics of the effective teacher as perceived by pupils and teachers: A Caribbean case study*. (ERIC Document Reproduction Service No. ED 311 013).

Austin, Ann E. (2002). *Creating a bridge to the future: Preparing new faculty to face changing expectations in shifting context. The Review of Higher Education*, 26 (2), 119-144.

Boyatzis, R. (1982). *The competent manager: A model for effective performance*, New York: John Wiley & Sons.

Chambers, Tony (2002). *Helping students find their place and purpose: Tony Chambers talks with Sharon Parks.About Campus*,20- 24.

Cooper, K C, (2000), *Effective Competency Modeling and Reporting*, New York:AMACOM

Crawford L (2004). *Senior management perceptions of projectmanagement competence*. Int. J. Project Manage. 23(1): 7-16.

Gupta, V. and Gollakota, K. (2005). *Critical challenges for Indian business schools as partners in development*, Decision, Vol. 32 No. 2, pp. 35-56.

Hatfield, L. and Taylor, R.K. (1998), *Making business schools responsive to customers: lessons learned and actions*, Marketing Education Review, Vol. 8 No. 2, pp. 1-8

Kannan, R Vijay (2008). *Business Schools in India: Current Challenges, Future Opportunities*, Decision Line, October, 13-15. Retrieved November 2009 http://www.decisionscience.org/decisionline/vol39/39-5/dsi-dl39_5intl.pdf.

Lucia, A. D., & Lepsinger, R (1999). *The art and Science of Competency Models: Pinpointing Critical Success Factors in Organizations*, New York: Pfeiffer.

Malmarugan, D and Prabhu Dr NRV (2005). *Students as Customers*, Effective Executive, August, 43- 44.

Mayank, Citika and Dave, Krtik, (2007). *Paucity of faculty: A Bottleneck in the Growth of Management Education in India*, AIMS International, Vol, 1, no 3, 211 – 221.

McClelland, D. C., (1973). *Testing for competence rather than for intelligence*. American Psychologist, 28.

Parry, S R. (1996) . *The Quest for Competencies*, Training, July

Parsons, F. (1909). *Choosing a vocation*. Garrett Park, MD: Garrett Park Press.

Ranjan J., Tripathi P. (2007). *Decision Supporting System for the Competence Management*. Proceedings of the First International Conference on Information System Technology and Management, 2007.

Ranjan J., Tripathi P. (2008). *Measuring Competencies using Expert System: Educational Perspective*. Journal of Theoretical and Applied Information Technology, 2008.

Rankin, N. (2002). *Raising Performance through People : The Ninth Competency Survey*. Competency and Emotional Intelligence, January, 2-21.

Dr. James Thomas, HOD MBA
The Oxford College of Engineering Bangalore, Karnataka
Dr. Ajit Dhar Dubey Asst.Prof. MBA
The Oxford College of Engineering Bangalore, Karnataka

INVITATION FOR CONTRIBUTION OF PAPER

Dear Sir/Madam,

Greetings we are happy to inform you that there is an **Edited Book with ISBN Number** titled on "**Business Sustainability**" is going to publish from a reputed publisher very soon.

Sustainability has been on regular discussion since 1990s and being acknowledged widely for growing economy and hence development among the developed and developing countries. The government, NGOs, public sectors and other stakeholders are in worry, that how limited or slow development can be accelerated. This question is at everywhere. The demand of sustainability also becomes more necessary, when we compare it with fast growing population one side and limited known resources at other end. The industry like services industry, tourism, manufacturing, industrial and software is playing vital role in socio economic development. The aim behind this book is supposed to find out the way for sustainability and how sustainable development can be performed?

So, you are requested to submit your research in the form of qualitative or in quantitative research paper format and hence your contribution for India.

Proposed Title of the Book: Business Sustainability

Sub-themes are:

- Marketing Management
- Business Environment
- Production & Operations Management
- Human Resource Management
- Financial Management
- Organizational Behaviour
- Accounting
- Economics
- Strategic Management

- Project Management
- Entrepreneurship
- Sales Management
- Service Marketing
- Industrial Relations
- Consumer Behaviour
- Education and Globalization
- Sustainable Tourism and Hospitality
- Learning & Development
- Banking & Financial Services
- Investment Management
- Insurance
- Supply Chain Management
- Total Quality Management
- Rural Marketing
- Leadership

Important Dates:

Full Paper Submission (through email) 30th August 2014

Email Confirmation for Full Paper 15th September 2014.

Registration 30th September 2014

Guidelines for paper Submission

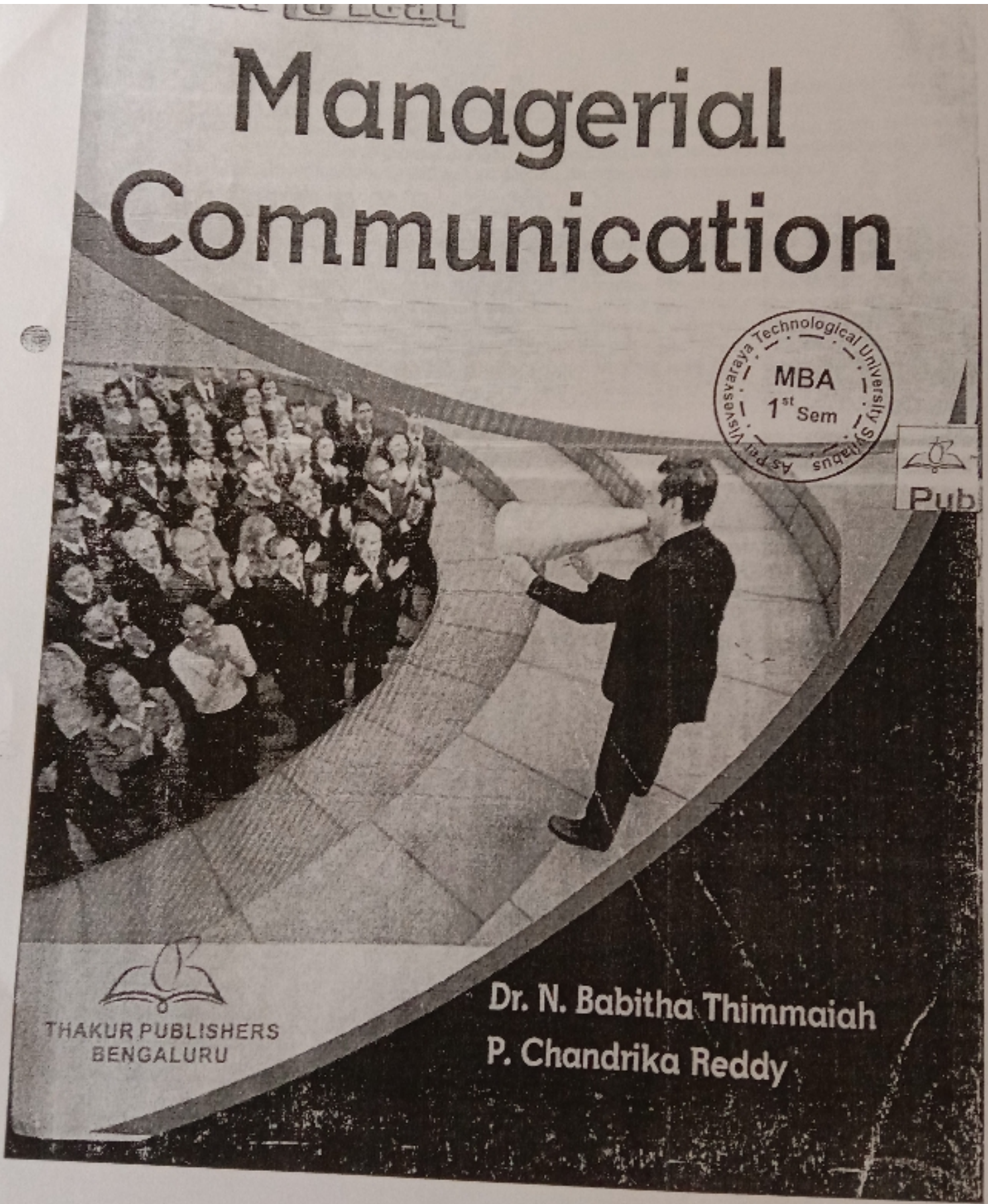
1. **Full paper** should be not more than 15 pages including figures, tables and references.

2. **Title of the Paper** (Font size 16 Times New Roman), Body of the paper: font size 12, Times New Roman, 1.5 Space, Justified paragraphs, margins of 1" on all the four sides, Body Text outline level, spacing of 6 before and after.

4. **Name of the author,** designation, affiliating organization, email id (font size 12) should not be sent separately as an additional attachment.

5. **Check grammar** and punctuation carefully. Give suitable titles and subtitles in bold. Soft copy of full paper must be emailed at **drajitdubey@gmail.com For any queries, please send a mail to** *drajitdubey@gmail.com* **with the subject line "Clarification". 09739224764**

Managerial Communication



Dr. N. Babitha Thimmaiah
P. Chandrika Reddy

THAKUR PUBLISHERS
BENGALURU

About the Book

This book of **'Managerial Communication'** provides in-depth information about various basic concepts related to communication in business, mechanics of writing, and negotiation. The book is enriched with exercises and solved papers to facilitate proper understanding of the subject. This book is a valuable volume for students, teachers and others who are interested in learning of managerial communication, media management, and employee communication.

About the Author

Dr. N. Babitha Thimmaiah has done **M.Com, MBA** and has qualified **UGC-NET**. She has acquired her **Ph.D** degree in **Finance** on the topic "An Empirical Evaluation of Capital Structure Practices of Corporate Organization in India". She has specialisation in Finance and Marketing. She is currently working as **Assistant Professor** at **Department of Business Administration, PG-Centre, Visvesvaraya Technological University, Mysore**. She has **16 years** of teaching experience and corporate training. She has been teaching various courses in the areas of Financial Management, Accounting for Management, Management Accounting, Tax Management, etc.

Mrs. P. Chandrika Reddy has done **B.Sc, MBA, M.Phil** and is currently pursuing her **Ph.D**. She has also achieved **ISTD Diploma in Training & Development**. She has **16 years** of experience in teaching and industry. She is presently serving as **Associate Professor** in **The Oxford College of Engineering, Bengaluru**. She has taught various subjects like Management and Behavioural Process, Human Resource Management, Marketing Management, Managerial Communication. She has presented and published more than 20 Papers in various National and International Journals and has also attended various Conferences and Seminars.

Visvesvaraya Technological University MBA - 1st Semester

Subject Name	Author Name
Management & Organisational Behaviour	Dr. Sathyanarayana Babu B V, Dr. Sneha Ravindra Kanade
Economics for Managers	Dr. Nagarajan Govindachari, Raghu G
Accounting for Managers	Suresh A. S
Quantitative Methods	Dr. Surekha. I. Prabhu
Marketing Management	Dr. Girish. C, Tejas B Vyas
Managerial Communication	Dr. N. Babitha Thimmaiah, P. Chandrika Reddy

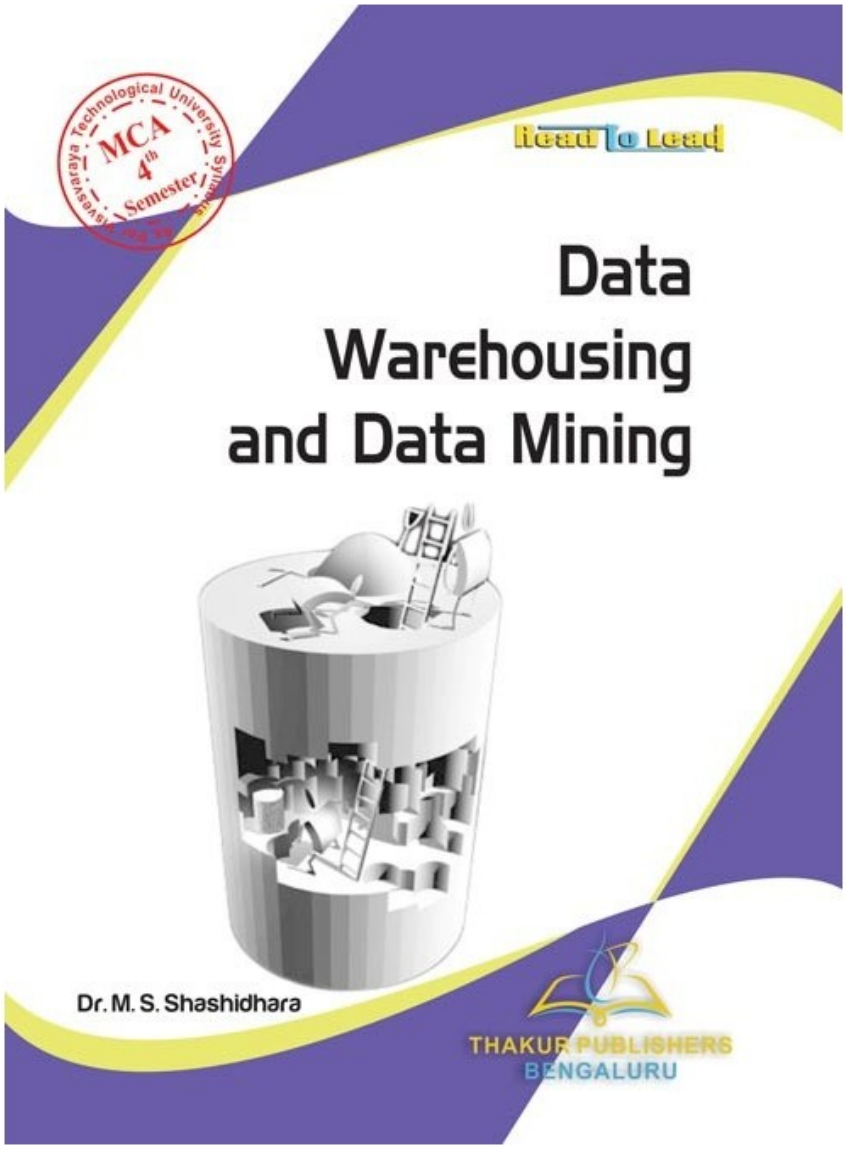
Printed at: Sovereign Printing Press, Jankipuram, Lucknow. MRP: 9235318506/07

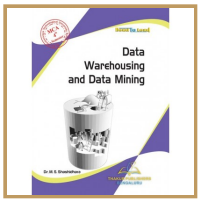
MRP: ₹180

THAKUR PUBLISHERS
BENGALURU
www.tppl.org.in

ISBN: 978-93-86232-83-0

Data Warehousing & Data Mining





₹120.00

Tax excluded

1

ADD TO CART

Out-of-Stock

Share Tweet Pinterest

Add Reviews

Dr. M. S. Shashidhara

ISBN – 9789351634898

Description **Product Details** **Reviews**

Visvesvaraya Technological University (VTU), MCA, Fourth Semester

Syllabus

DATA WAREHOUSING AND DATA MINING

Subject Code : 13MCA442 I.A. Marks : 50

Hours/Week : 4

Data Warehousing and OLAP 8 Hours

Data Warehouse Basic Concepts, Data Warehouse Modeling, Data Cube and OLAP.

Data Mining 6 Hours

Introduction, What is Data Mining, Motivating Challenges, Data Mining Tasks, Which Technologies are Used, which Kinds of Applications are Targeted by Data Mining.

Data Mining 6 Hours

Types of Data, Data Mining Applications, Data Preprocessing.

Association Analysis: Basic Concepts and Algorithms 8 Hours

Frequent Item set Generation, Rule Generation, Compact Representation of Frequent Item Sets, Alternative Methods for Generating Frequent Item Sets, FP Growth Algorithm, Evaluation of Association Patterns.

Classification 12 Hours

Basics, General Approach to Solve Classification Problem, Decision Trees, Rule Based Classifiers, Nearest Neighbor Classifiers. Bayesian Classifiers, Estimating Predictive Accuracy of Classification Methods, Improving Accuracy of Clarification Methods, Evaluation Criteria for Classification Methods, Multiclass Problem.

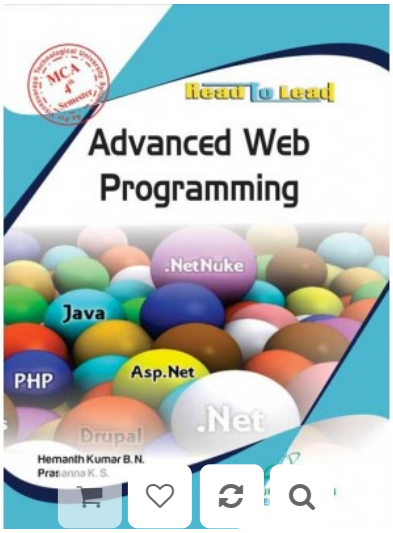
Clustering Techniques 8 Hours

Overview, Features of cluster analysis, Types of Data and Computing Distance, Types of Cluster Analysis Methods, Partitional Methods, Hierarchical Methods, Density Based Methods, Quali Cluster Analysis.

Outlier Analysis 4 Hours

Outlier Detection Methods, Statistical Approaches, Clustering based Applications, Classification based Approached.

4 other products in the same category:

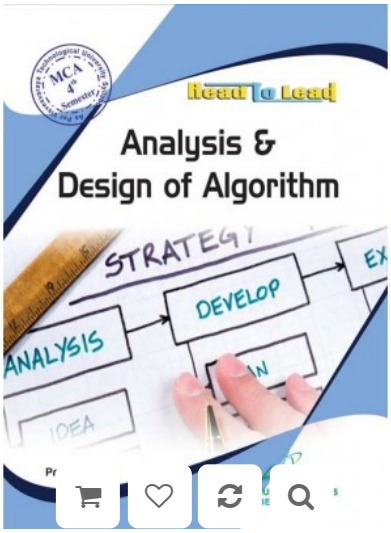


☆ ☆ ☆ ☆ ☆

Advanced Web Progamming

₹170.00

₹170.00 Book



☆ ☆ ☆ ☆ ☆

Analysis and Design of Algorithim

₹120.00

☆ ☆ ☆ ☆ ☆

Enterprise Resour

₹120.00

Subscribe

Whataspp Live Chat

Stay connect

Information

Extras

My account

About Us

Contact us

Popular Tags

Dr. Alka Gupta Jhansi Akhtar Hussain 4th semester first year 3 semester solve series 4 semester Digital Marketing fourth semester GNM third semester Prof. Urmila Devi Bhardwaj first semester bba 1 YEAR Bundelkhand University MCQ Booklet Dr. Farukh Khan Decision Making And Risk Managem lucknow university BTECH Indian Nursing Council Entrepreneurship And Small Busin Production And Operation Managem aryabhatta knowledge university Human Resource Management Functi b.ed 1 semester Savitribai Phule Pune University

Whataspp Live Chat

CHILDREN'S EDUCATION SOCIETY (Regd.)
THE OXFORD COLLEGE OF ENGINEERING
(Recognised by the Govt. of Karnataka, Affiliated to Visvesvaraya Technological University, Belagavi.
Approved by A.I.C.T.E. New Delhi.
Recognised by UGC Under Section 2(f)
Bommanahalli, Hosur Road, Bangalore - 560 068.
Ph: 080-61754601/602, Fax: 080 - 25730551
E-mail: engprincipal@theoxford.edu Web: www.theoxfordengg.org

Sl.NO	Name of the teacher	Title of the book/chapters published	Title of the paper	Title of the proceedings of the conference	Year of publication	ISBN/ISSN number of the proceeding	Department Name	Name of the publisher	Weblink
1	Dr. Preethasharan	Digital Communication Lab Manual			2016		ECE	CBS, Publications, Delhi.	https://www.flipkart.com/advanced-digital-communication-laboratory-manual-1st/p/itmdf2k9dnutgsws
2	R.Bhargava Rama Gowd		Real Time Implementation of Multimedia Traffic Unicast and Multicast groups using Optical Network	Advanced Communication, Control& Computing Technologies	2016	I978-1-4673-9544-1	ECE	Syed Ammal Engineering college, Ramanathpuram,Tamilnadu.	https://ieeexplore.ieee.org/document/7831595
3	Gunjan Thakur Vemana Institute of Technology, Bangalore, Karnataka ,Preeta Sharan; Mrinal Sarvagya		A digital Cross Connect (DCS) switch for multicast and broadcast traffic	2016 IEEE Annual India Conference (INDICON)	2016	2325-9418	ECE	IEEE Explorer	https://ieeexplore.ieee.org/document/7838949
4	Indira Bahaddur, P.C. Srikanth, and Preetha Sharan		Photonic crystal nano cavity pressure sensor	13th International Conference on Fiber Optics and Photonics	2016	978-1-943580-22-4	ECE	Optical Society of America	https://www.osapublishing.org/abstract.cfm?uri=Photonics-2016-Tu4A.69

5	Gunjan Thakur; Ambika Gumpe; Mrinal Sarvagya; Preeta Sharan		An area efficient multiplexer for crossbar arbiter design using quantum dot cellular automata	2016 IEEE International Conference on Recent Trends in Electronics, Information & Communication Technology (RTEICT)	2016	978-1-5090-0774-5	ECE	IEEE Explorer	https://ieeexplore.ieee.org/document/7807970
6	Savitha; K. Srinivas Rao; Preeta Sharan		Detection of oncological cell for breast cancer by using SPR technology	2016 3rd International Conference on Computing for Sustainable Global Development (INDIACom)	2016	978-9-3805-4421-2	ECE	IEEE Explorer	https://ieeexplore.ieee.org/document/7724763
7	Gunjan Thakur Vemana; Mrinal Sarvagya; Preeta Sharan		Wireless digital cross connects SOC for optical networks using FPGA	2016 3rd International Conference on Computing for Sustainable Global Development (INDIACom)	2016	978-9-3805-4421-2	ECE	IEEE Explorer	https://ieeexplore.ieee.org/document/7724762
8	H. A. Navyashree; Preeta Sharan		An optical storage device by surface plasmon resonance	2016 3rd International Conference on Computing for Sustainable Global Development (INDIACom)	2016	978-9-3805-4421-2	ECE	IEEE Explorer	https://ieeexplore.ieee.org/document/7724761
9	S.K. Pratibha; T.N. Vinay		An efficient design of QCA based memory	2016 3rd International Conference on Computing for	2016	978-9-3805-4421-2	ECE	IEEE Explorer	https://ieeexplore.ieee.org/document/7724764

	Kumar; Preeta Sharan			Sustainable Global Development (INDIACom)					
10	Samyukta A Hassan; Preeta Sharan		Low power quantum gates for the implementation of reversible memory elements using quantum dot cellular automata	2016 3rd International Conference on Computing for Sustainable Global Development (INDIACom)	2016	978-9-3805-4421-2	ECE	IEEE Explorer	https://ieeexplore.ieee.org/abstract/document/7724758
11	Sandip Kumar Roy; M Harshitha; Preeta Sharan		A comparative study of saline and non-saline water in application of tomato yield by using photonic sensor	2016 3rd International Conference on Computing for Sustainable Global Development (INDIACom)	2016	978-9-3805-4421-2	ECE	IEEE Explorer	https://ieeexplore.ieee.org/document/7724759/similar#similar
12	Indira Bahaddur; P C Srikanth; Preeta Sharan		A photonic crystal based pressure sensor	2016 International Conference on Electrical, Electronics, and Optimization Techniques (ICEEOT)	2016	978-1-4673-9939-5	ECE	IEEE Explorer	https://www.researchgate.net/publication/311252459_A_photonic_crystal_based_pressure_sensor
13	Mrs.Nisha c Rani		Modular phase DC-DC converter with soft switching high frequency isolation		2016	ISSN (Online): 2347 - 2812	EEE	IJRAET	http://www.irdindia.in/journal_ijraet/pdf/vol4_iss9/8.pdf
14	Dr.B.K.Manjunatha and Divakara R		Propyl 4-(3-oxo-1,3-dihydro-2H-benzo[g]indazol-2-yl) benzoate an novel bioactive	Proceedings of the 10th INDIA Com-2016, 16th -18th march 2016, ISSN:0973-7529	2016		Biotechnology	INDIAOM	https://www.researchgate.net/publication/298743987_Propyl_4-3-oxo-1_3-dihydro-2H-benzogindazol-_2-yl_Benzoate_an_Novel_Bioa

			compound from Streptomyces species, RHC-1, isolated from soil of Western Ghats, Karnataka, India						ctive_Compound_Isolated_from_Streptomyces_Species_RHC-1_Isolated_from_Soil_of_Western_Ghats_Karnataka_India
15	Prof A.Sahana	Transforming management education for sustainable tomarrow	A competency model for determining the profile of b-school faculty in bangalore		2016		MBA	AIMA	https://www.researchgate.net/publication/299512650_Transforming_Management_Education_for_Sustainable_tomorrow
16	Dr.James Thomas	Innovation in marketing, E Commerce ,information technology and banking (IMEIB-2016)	Innovation in marketing, E Commerce ,information technology and banking (IMEIB-2016)	Business sustainability	2016	ISSN :0254-8755	MBA	IMEIB2016	
17	P.Chandrika reddy	Managerial Communications			2016	ISBN:978-93-86232-83-0	MBA	Thakur Publications	https://www.tppl.org.in/2020/first-sem/1720-managerial-communication-9789389516548.html
18	Dr. M S Shashidhara	Data warehousing and Data Mining			2016		MCA	Thakur Publications	https://www.tppl.org.in/2020/fourth-sem/1932-data-warehousing-data-mining-9789351634898.html

CHILDREN'S EDUCATION SOCIETY (Regd.)
THE OXFORD COLLEGE OF ENGINEERING
(Recognised by the Govt. of Karnataka, Affiliated to Visvesvaraya Technological University, Belagavi.
Approved by A.I.C.T.E. New Delhi.
Recognised by UGC Under Section 2(f)
Bommanahalli, Hosur Road, Bangalore - 560 068.
Ph: 080-61754601/602, Fax: 080 - 25730551
E-mail: engprincipal@theoxford.edu Web: www.theoxfordengg.org

Sl.NO	Name of the teacher	Title of the book/chapters published	Title of the paper	Title of the proceedings of the conference	Name of the conference	National / International	Year of publication	ISBN/ISSN number of the proceeding	Affiliating Institute at the time of publication	Name of the publisher
1	Dr Preeta Sharan	Advanced Mobile Technologies for Secure Transaction Processing: Emerging Research and Opportunities					2017		The Oxford College of Engineering	IGI Global
2	Debpriyo Roy; Dhruva R Beltur; Preeta Sharan		Detection of Marijuana in blood using GaAs substrate based photonic sensor	2017 International Conference on Circuits, Controls, and Communications (CCUBE)	CCUBE 2017	International	2017	978-1-5386-0615-5	The Oxford College of Engineering	IEEE Explorer
3	S. Chaitra; C. Veena; K. Srinivas Rao; Preeta Sharan		SPR based biosensor for the detection of abnormal growth of tissues	2017 International Conference on Nextgen Electronic Technologies: Silicon to Software (ICNETS2)	ICNETS2	International	2017	978-1-5090-5913-3	The Oxford College of Engineering	IEEE Explorer

4	Manjula.C		Command Driven Scalable & Programmable FPGA Based Digital Test Pattern Generator	International Conference on Electrical, Electronics, Communication, Computer, and Optimization Techniques (ICEECCOT)	ICEECCOT-2017	International	2017	978-1-5386-2361-9	GSSS Institute of Engineering and Technology for Women, Mysore	IEEE Explorer
5	Someswari.T		Probing the Efficiency of Research contribution towards Fuzzy Sliding mode Controller	· International Conference on Circuits, Controls, and Communications (CCUBE)	CCUBE-2017	International	2017	978-1-5386-0615-5	The Oxford College of Engineering	IEEE Explorer
6	Dr B Raju	Dry sliding wear properties of ZA alloy containing impurities with and without treatment		Emerging Trends in Mechanical Engineering Proceedings of the International Conference,	ETME-2017,	International	2017	2321-3051	The Oxford College of Engineering	International Journal of Aeronautical and Mechanical Engineering

Advanced Mobile Technologies for Secure Transaction Processing: Emerging Research and Opportunities

Raghvendra Kumar (/affiliate/raghvendra-kumar/321745/) (LNCT Group of Colleges, India), Preeta Sharan (/affiliate/preeta-sharan/320736/) (The Oxford College of Engineering, India) and Aruna Devi (/affiliate/aruna-devi/320737/) (Surabhi Software, India)

Release Date: August, 2017
Copyright: © 2018
Pages: 177
DOI: 10.4018/978-1-5225-2759-6
ISBN13: 9781522527596
ISBN10: 1522527591
EISBN13: 9781522527602

Detection of Marijuana in blood using GaAs substrate based photonic sensor

Debpriyo Roy ; Dhruva R Beltur ; Preeta Sharan All Authors

Abstract: Marijuana apart from its slight usage in certain medical departments is a very harmful drug if consumed on a regular basis. Detection of Marijuana in blood is a must to i... **View more**

Metadata

Abstract:
Marijuana apart from its slight usage in certain medical departments is a very harmful drug if consumed on a regular basis. Detection of Marijuana in blood is a must to identify the addicted person and provide treatment. In current study, we have proposed detection and analysis of drugs in blood by using the Photonic Crystal (PHC) based sensor. A two-dimensional PHC based double ring resonator structure is thereby used to detect its presence. Here, we have used GaAs (Gallium Arsenide) substrate. The objective is to provide fabricator an ideal basis for the production ready design. While designing our emphasis was not compromise on efficiency and sensitivity of the device. MEEP Simulation tool was used for implementation of Finite Difference Time Domain (FDTD) method for modelling the double ring resonator structure. Output transmitted spectrum shows shift in frequency because of change in refractive index due to presence of Marijuana in blood (analyte). The sensor can differentiate between the signature of normal and drug infected blood. A high quality factor obtained of 27,692 for normal blood and 17,149 for marijuana contaminated blood. The novelty of the work is use of GaAs and double ring resonator structure.

Published in: 2017 International Conference on Circuits, Controls, and Communications (CCUBE)

Date of Conference: 15-16 Dec. 2017 **INSPEC Accession Number:** 17862303

Date Added to IEEE *Xplore*: 25 June 2018 **DOI:** 10.1109/CCUBE.2017.8394161

ISBN Information:
Electronic ISBN:978-1-5386-0615-5
Print on Demand(PoD) ISBN:978-1-5386-0616-2

Publisher: IEEE

Conference Location: Bangalore, India

Contents

I. Introduction

Substance abuse, otherwise called drug manhandle, is a designed utilization of a drug in which the user consumes the substance in sums or with techniques which are destructive to themselves or others, and is a type of substance-related turmoil. Drug addiction may be an inveterately reversion disorder that has been characterized by the compulsive use of addictive substances despite adverse consequences to the individual and society. Some of these substances are obtained from natural sources while others are synthetic or designer drugs. The particular reason for substance manhandle is not clear, with hypotheses including one of two: either a hereditary manner which is found out from others, or a propensity which if compulsion creates, it shows itself as a ceaseless weakening disease. In 2010 about 5% of people (230 million) used an illicit substance. Of these 27 million have high-risk drug use otherwise known as recurrent drug use causing harm to their health, psychological problems, or social problems or puts them at risk of those dangers. [1]

SPR based biosensor for the detection of abnormal growth of tissues

S. Chaitra ; C. Veena ; K. Srinivas Rao ; Preeta Sharan All Authors

Abstract: Detection of cancer in early stage is what the top priority in the field of medical. This early stage detection of cancer can lead to much added benefits and also a life ... **View more**

Metadata

Abstract:
Detection of cancer in early stage is what the top priority in the field of medical. This early stage detection of cancer can lead to much added benefits and also a life saving technique. In this paper, a 2-dimensional SPR based sensor is designed for thorough spectral analysis of “Leukemia”. As dielectric properties of the cancer cells differ from the normal cell, they can be differentiated and detected using photonic approach. In the present work, SPR technique is done and the simulation is done to analys the sensor using Eand H fields. The shifts in the output waveforms and frequencies have been observed for a normal blood cell and that with a cancerous cell. Its clear from simulation that for minor change of RI of the biosample taken into consideration there will be shift in the resonant frequency therefore exhibiting an biosensor. The designed sensor can distinguish between normal and cancerous cell. This indicates its high sensitiveness even for minute change in refractive index. The achieved sensor has an sensitivity of 343 nm/RIU.

More Like This

Published in: 2017 International Conference on Nextgen Electronic Technologies: Silicon to Software (ICNETS2)

Date of Conference: 23-25 March 2017

Date Added to IEEE *Xplore*: 16 October 2017

ISBN Information:
Electronic ISBN:978-1-5090-5913-3
CD:978-1-5090-5912-6
Print on Demand(PoD)
ISBN:978-1-5090-5914-0

INSPEC Accession Number: 17245511

DOI: 10.1109/ICNETS2.2017.8067918

Publisher: IEEE

Conference Location: Chennai

Contents

1. Introduction

Sensors based on surface plasmons exhibit high sensitivity which does not require the need for labelling of molecules [1]. It is highly employed in the field of science which act as powerful tool for the characterizing and studying the interaction of biomolecule. Although conventional SPR sensors are simple, compact, robust and highly sensitive prism coupled the device dimensions and its optical components are too large that they are not suitable for the miniaturization and integration [2] [3], thus making it out of lab on chip application. Advancement in the development of high sensitive optical fibre and waveguide based surface plasmons as resulted in the development of a sensor based on silicon which has an increased refractive index material system which miniaturized.

Command Driven Scalable & Programmable FPGA Based Digital Test Pattern Generator

Manjula C
Department of Electrical and Electronics Engineering
The Oxford College of Engineering , Bangalore,
Karnataka, India
manjulacmoksha@gmail.com

Jayadevappa D
Department of Electronics & Instrumentation Engineering
JSS Academy of Technical Education, Bangalore,
Karnataka, India
devappa.22@gmail.com

***Abstract*– The proposed FPGA based digital Automatic Test Equipment (ATE) consists of two main design modules i.e., Digital Test Pattern generator (DTPG) & Digital Logic Analyzer. In this paper, novel FPGA approach is explained and the design and functionality COMMAND DRIVEN DTPG modules – 6 channels Frequency Synthesis block (FSB), 8x8 switch matrixes, 24 bit COMMAND Pattern Register are discussed. For all the design modules of DTPG, coding is done using Verilog HDL and simulated using Xilinx (FPGA) ISE simulator.**

Keywords - Digital Test Pattern Generator; Digital Logic Analyzer (DLA); Device under Test (DUT); ATE, Frequency Synthesis; Switch Matrix; Pattern Register; Scalable etc.

I. INTRODUCTION

As a part of my ongoing research on FPGA based scalable & programmable Digital ATE, I have conducted exhaustive survey covering- Testing principle, Levels, Types, Process, VLSI or Chip testing, Automatic Test equipment (ATE) – configuration, evolution, three case studies of FPGA interfaced with ATE, FPGA generating ATG for ATE & FPGA used with PC scope for VLSI / Chip testing etc. and published a survey paper [1].

I also undertook in-depth survey into very important & popular research nearest to my work on FPGA based Built In Self Test (BIST), Logic Simulator, ATPG, Fault Detection and Emulation, TPG, Test scan, Frequency synthesizer, Multiple clock generation, Memory testing & RISC processor testing covering their various block diagram, architecture, functionality, approaches, modules, strategies etc. and I have published a case study paper [2].

Making use of the above two survey papers, I am able to formulate my research design and a part of that, I have already published in my technical paper [3]. Other researchers have used hardware, software and embedded design methodologies and approaches. Each has its own merits and demerits - which have to be surveyed, studied & experimented. But I am using FPGA design methodology owing to its standard technology advantages.

II. DIGITAL AUTOMATIC TEST EQUIPMENT

The Logic Analyzers and Pattern Generators are very expensive, as they run into Lakhs of Rupees (more expensive than the Design cost itself). Hence there is a need to evolve low cost, indigenous and accurate PC based equipment, which can perform the Test Vector Generation and provide Synchronous or Asynchronous Signals over 8/16/32/64 channels or bus widths, required to test ICs, Circuits or PCBs.

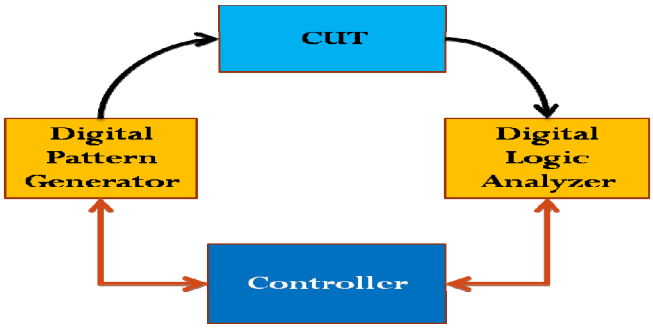


Fig.1: Generic Digital ATE [1]

The main components of the digital ATEs include Test Pattern Generator and Logic Analyzer as shown in figure1.

A. Digital Test Pattern Generator

Digital Test Pattern Generator is used for functional testing; to debug the new designs and failure analysis of existing designs. Pattern register stores the different patterns of waveforms and the signals with different

978-1-5386-2361-9/17/$31.00 ©2017 IEEE

frequencies supplied by the Frequency synthesis block. A switch matrix routes high frequency signals between the device under test (DUT/CUT) & measurement equipment; Input signals are controlled by control signals (command).

B. Digital Design of Digital Test Pattern Generator (DTPG)

The proposed novel design & block diagram of Digital Test Pattern generator (DTPG) is shown in figure2. DTPG generates the programmable digital patterns to test the digital circuit or Design under test (DUT). DTPG consists of three main blocks namely frequency synthesis block (FSB), Switch Matrix (SM) and Command Pattern Register.

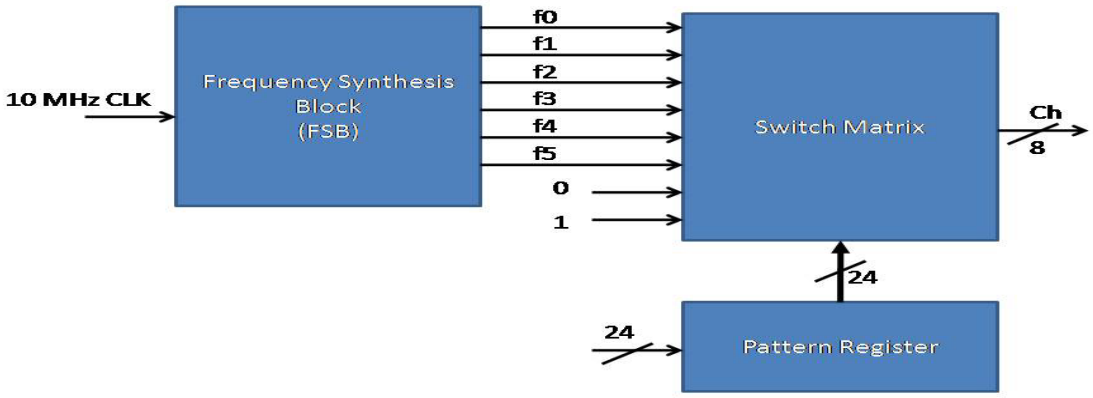


Fig.2: My Novel approach towards FPGA based Digital Test Pattern Generator (DTPG)

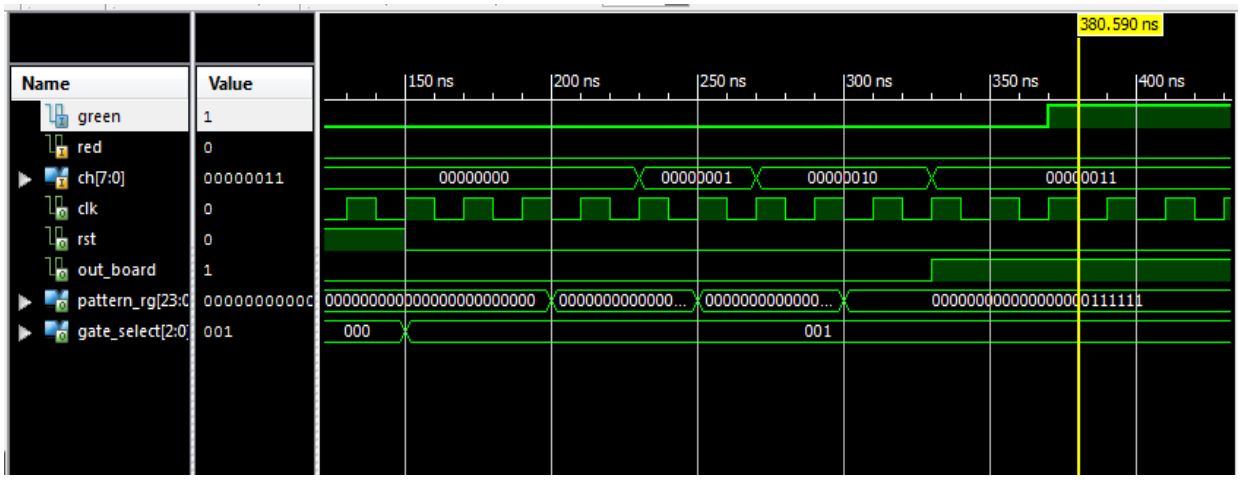


Fig.3: Simulation result of top Level of complete DTPG functionality

DTPG sub system & its sub modules are designed and simulated using Xilinx ISE EDA tool. Verilog HDL is used to implement all these 3 sub modules of DTPG.

First, all the three sub blocks are individually designed, simulated and verified using the Verilog test bench. In the top module, the three modules are instantiated and connected with respective inputs and outputs of the other modules. The inputs of the DTPG block are clock, reset, input pattern to pattern register and only output is 8 channel outputs. Here 8 output channels are used to test the DUT. Any of the 8 input channels can be mapped to the output of DTPG. Hence, to select any of the 8 channels & to map them into 8 outputs, we need 24 select lines. So total 24 bits of input signals called COMMAND signals are applied to the COMMAND Pattern

Register to map, any of the required frequency or signal to 8 switch matrices to be output from DTPG.

Above figure 3 shows the simulation results of the DTPG. In the simulation, different inputs of the DTPG blocks are provided using the verilog test bench such as clock, reset and digital pattern to pattern register. Different logic gates such as AND, OR, EXOR etc. are used as a DUT to verify the DTPG. In the above figure, different signals are used such as Green LED, Red LED signals and the channel Ch [7:0] - 8 channels, two channels are used to verify the two inputs of the AND gate. Out_board signal is the output of the DUT which verifies the reference value and based on the value, it tells whether the DUT output is proper by making green signal and red signal high or low. From the simulation result it shows that, four different input patterns are applied to the combinational gates and response is compared with the reference value and if the real output and reference are matched for all the possible combination then output green will be high otherwise red will be high.

C. Design of DTPG Frequeny Synthesis Block (FSB)

The block diagram of the frequency synthesis block is shown in the figure 4. The reference clock frequency is used to generate the different frequency signal. In this experiment, reference clock frequency is 10MHz. So 10MHz is down converted into 6 different frequencies by dividing the reference clock frequency by 10 several times & the divided frequency is used as a reference for the next frequency converter logic.

The RTL schematic diagram of the FSB is shown in the figure 5. The clock input is used to drive the FSB block (which is referred as a master or reference clock) and the reset initializes and resets the FSB at its initial state. The output of the FSB is 6 different frequency signals.

The simulation result of the FSB is shown in the figure 5 which includes four simualtion images of 6 different frequency signal. The first two signals in all figurere present reference clock and reset. In figure 5(a) 1MHz and 100KHz frequency signals are shown, in figure 5(b) 100KHz and 10KHz are shown, in figure 5(c) 10KHz and 1K Hz are shown and figure 5(d) 1KHz, 100Hzand 1Hz.

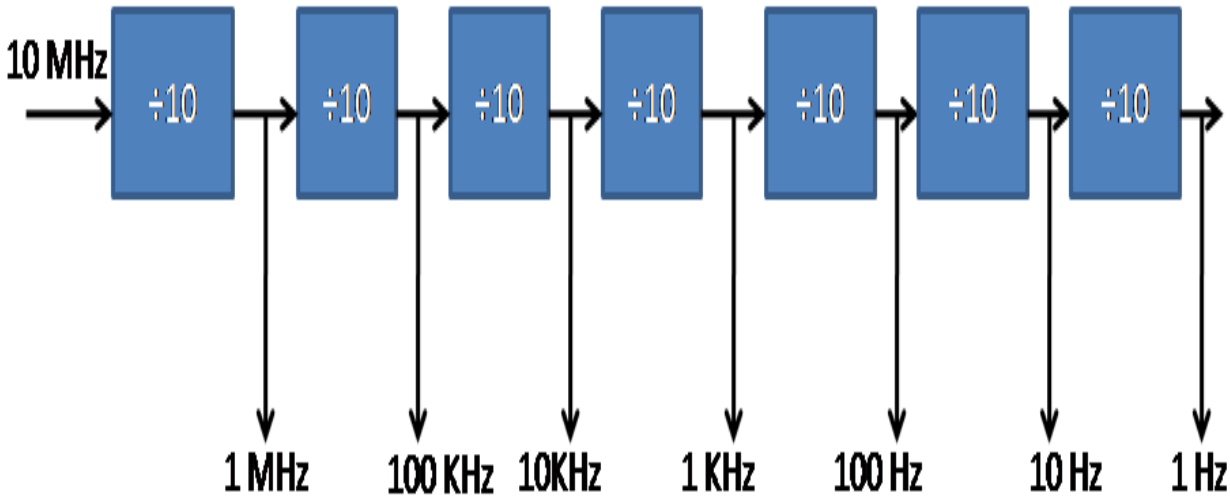


Fig.4 : Digital Design of Frequency Synthesis Block (FSB)

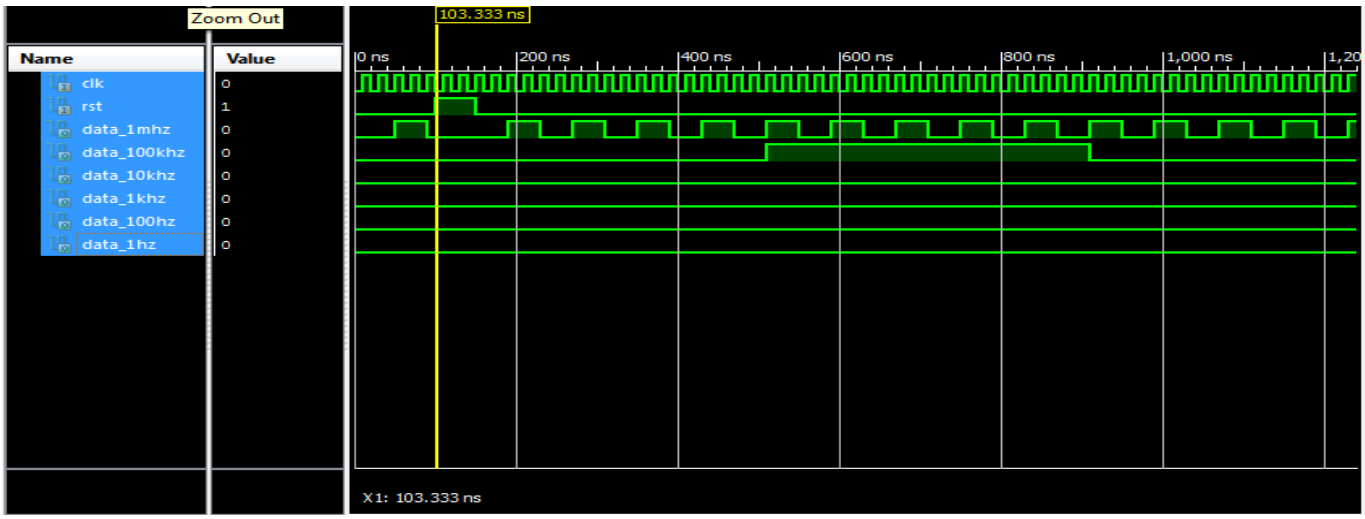


Fig.5(a): FSB generating the 1MHz and 100Khz

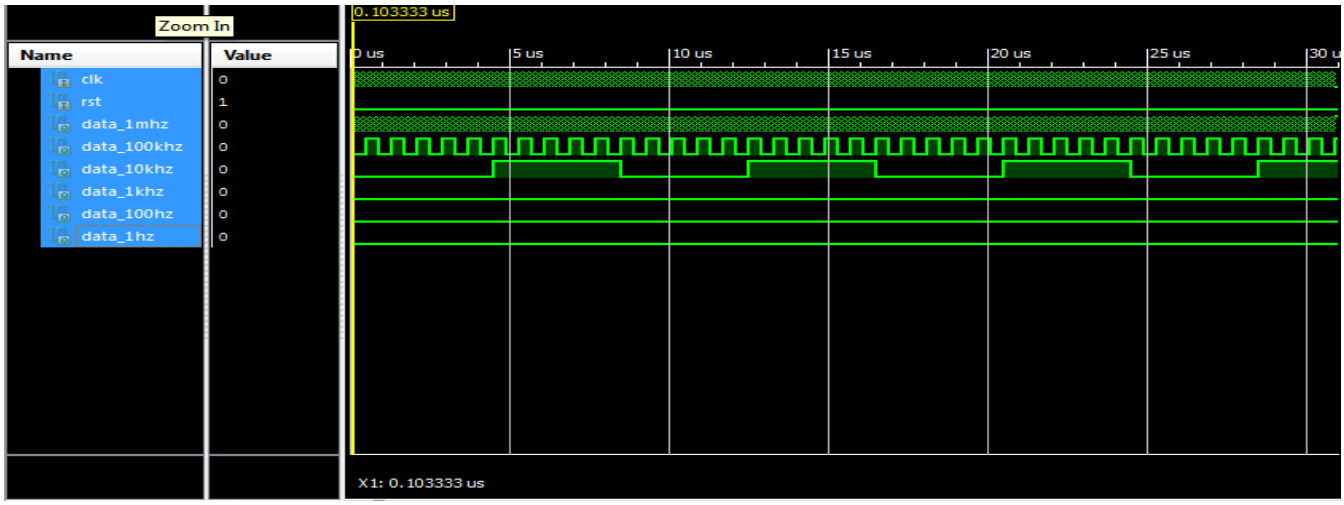


Fig. 5(b): FSB generating 100Khz and 10Khz

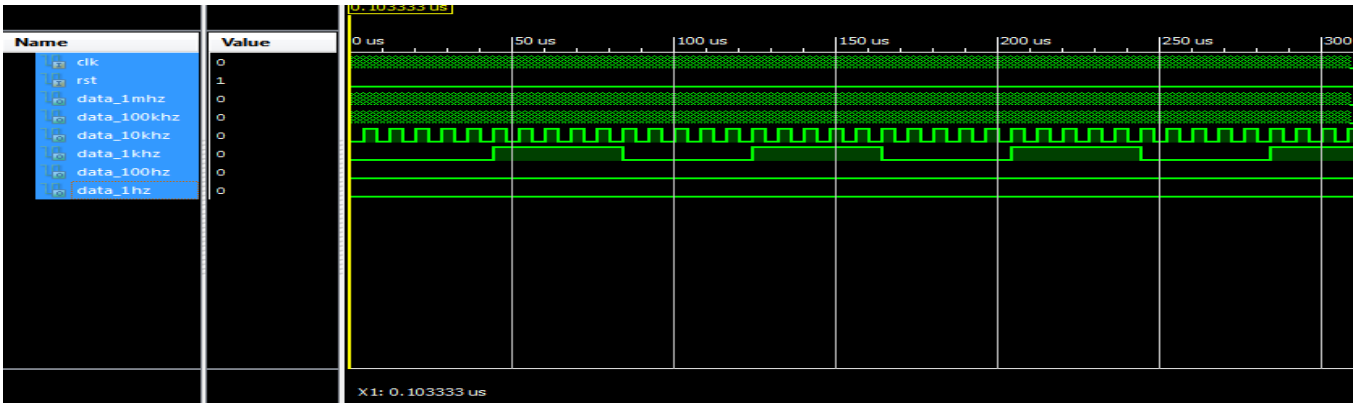


Fig.5(c): FSB generating 10KHz and 1KHz

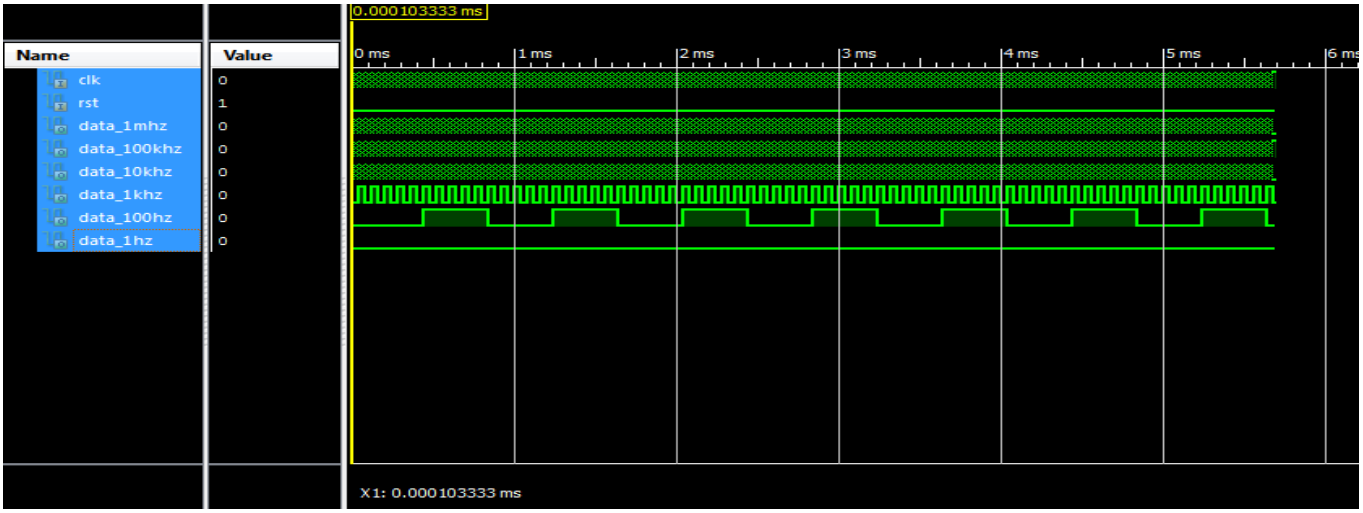


Fig. 5(d): FSB generating 1Khz, 100Hz and 1Hz

Figure 5: Figure (a) shows the 1MHz and 100Khz freuency, Figure (b) shows the 100Khz and 10Khz frequency signal, Figure (c) shows the 10KHz and 1KHz, Figure (d) shows the 1Khz, 100Hz and 1Hz.

D. Design of DTPG Switch Matrix

The block diagram of the switch matrix is shown in the figure 6. Switch matrix selects one input signal from the 8 different frequency signals coming from the FSB. Total 8 different inputs are given to the switch matrix out of which one signal is selected as per the requirement. Three select lines are used to select one signal out of 8 different input signals.

The select lines are controlled by the pattern register, by applying the input pattern to the pattern register. When the three bit input sequence is applied, the select lines selects the required input signal from the eight input signals. Figure 7 shows the RTL schematic of the switch matrix and figure 8 is the simulation result. In the simulation result, signal 3 is the input signal coming from the FSB which is 5 down to 0 i.e., total 6 signal. Here 8 channel switch matrix is implemented so total 8 select lines S0 to S7 are used and each select line is of 2 down to 0 i.e., three select lines for one channel. In this experiment 24 COMMMAND lines are used to select 8 channel.

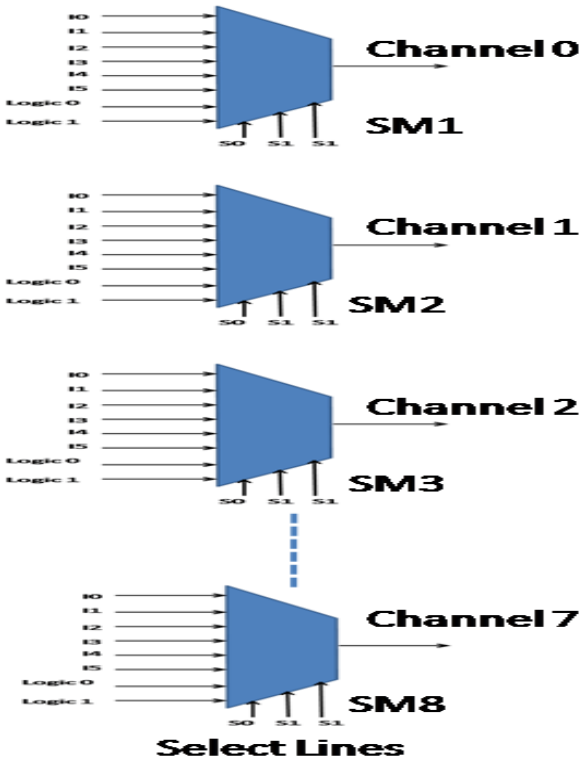


Fig.6: Switch Matrix 8 x 8 - Block Diagram

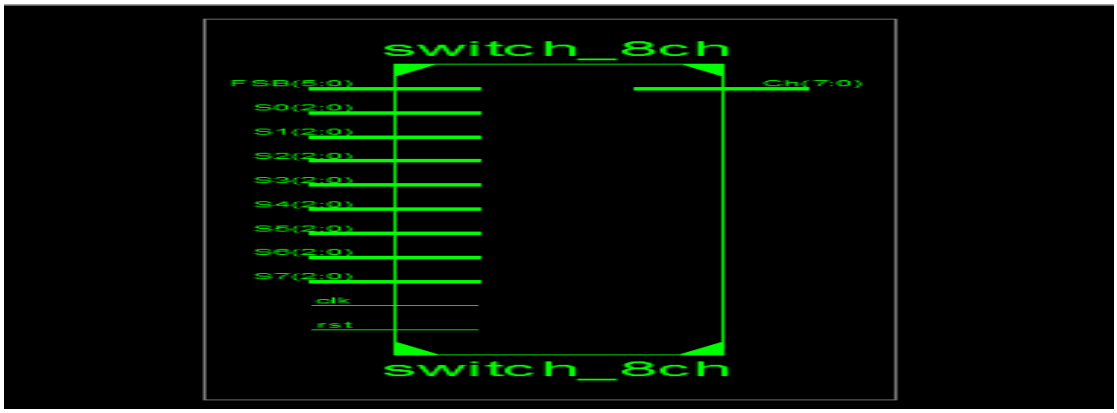


Fig.7: RTL Schematic of 8 x 8 Switch Matrix

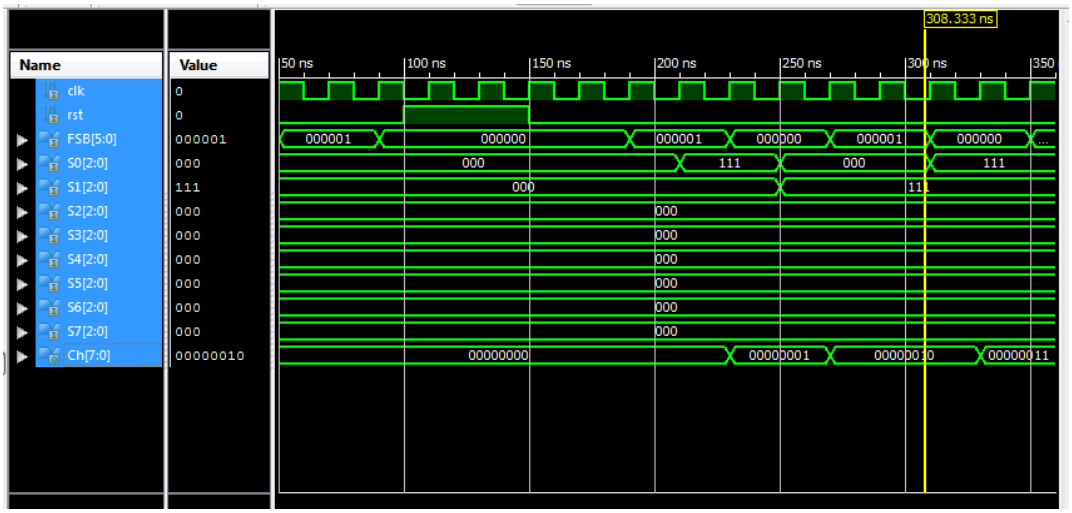


Fig.8: Simulation Result of 8 x 8 Switch Matrix

Figure 8 shows the simulation result of the switch matrix. It indicates that when reset is applied all the inputs and outputs are initialized to zero. Output of FSB, logic 1 and logic 0 is connected as the input to the switch matrix and either logic 1 or logic 0 is selected based on the specific purpose or design. Another signal in the switch matrix is select line S0 to S7 and Ch is the channel output. Based on the sequence given to the select lines respective input get selected and applied to the respective channel. The above figure shows that, by applying 000 000, 000 111, 111 000, 111 111 two channels of the switch matrix is selected and the sequence 00 01 10 11 will be produced at the output of the two channel.

E. Design DTPG COMMAND Pattern Register (TPR)

Block diagram of the pattern register is shown in the figure9. Pattern register captures the input COMMAND manually from the sources such as hyper terminal or through keypad or keyboard and provides a specific input bit pattern called COMMAND, to the respective select lines of the switch matrix.

It has multiple input and multiple output. Output of the pattern register is the select line which is connected as the input for 8x8 switch matrix which selects the respective output channel of the switch matrix. RTL schematic of pattern register is shown in the figure 10. Inputs of the pattern register include 24 bit pattern_rg signal, clock and reset and 8-output lines S0 to S7 and each line is a 3 bit signal. Simulation result of the pattern register is shown in the Figure 11. The input is of 24 bit COMMAND sequence which is assigned to the particular output signal of S0 to S7. The simulation result shows that, input pattern is assigned to S0 and S1 output lines i.e., input is given only for the two channel.

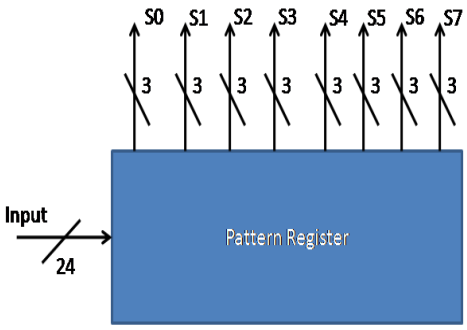


Fig.9: Digital Design of Test Pattern Register – TPR

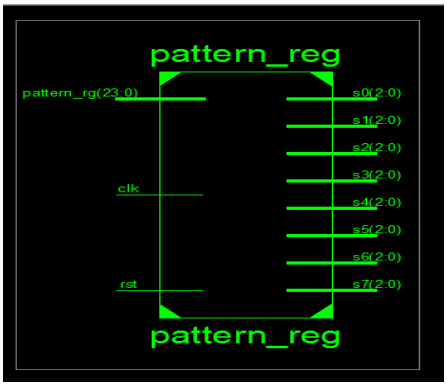


Fig. 10: RTL Block Diagram of Test Pattern Register

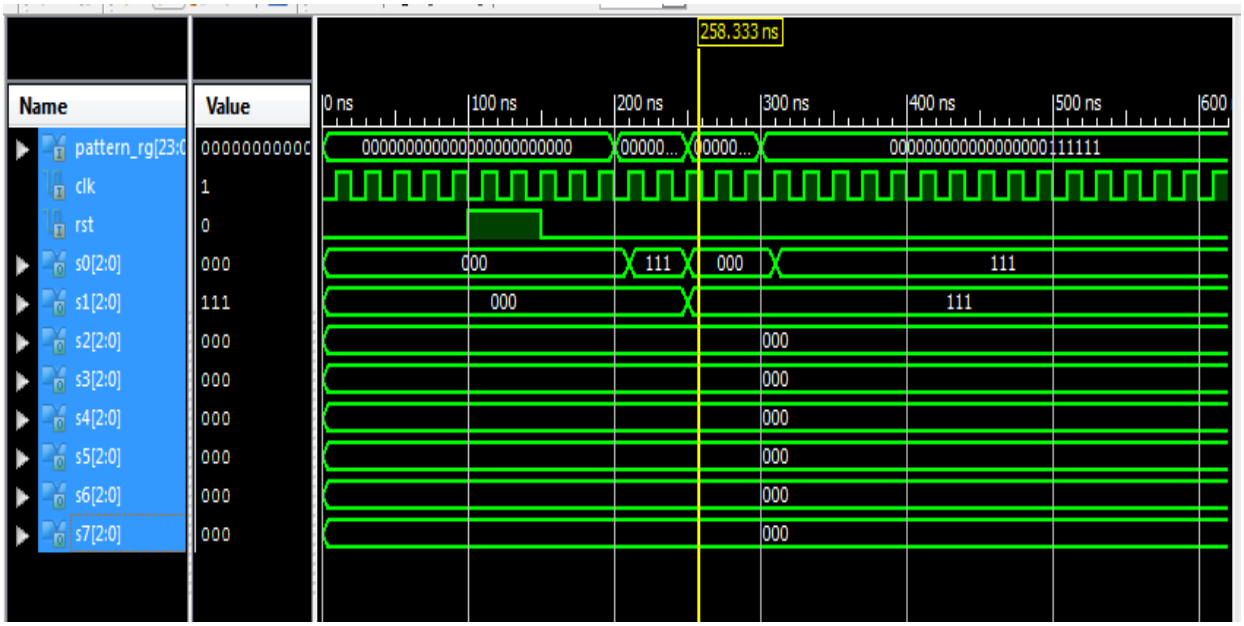


Fig.11: Simulation Results of the Pattern Register.

III CONCLUSION

After in depth analysis of all those several Research efforts on DTPG, I have developed this novel architecture of FULLY SCALABLE PROGRAMMBALE & COMMAND CONTROLLED FPGA based DTPG using Verilog HDL, to be implemented & tested on Xilinx FPGA. In this Paper, I have explained top level block diagram of DTPG & its 3 sub modules–Frequency Synthesis Block, Switch Matrix, Test Pattern Register. I have used VERILOG HDL & XILINX ISE Design suite v14 for Simulation & RTL extraction. I included snap shot of the simulation waveforms & RTL schematics in this paper.

REFERENCES

[1] Manjula. C, D. Jayadevappa, "Survey of Electronic hardware Testing types, ATE evolution & case studies" IJERT, October 2017

[2] Manjula. C, D. Jayadevappa, "Survey of Electronic hardware Testing types, ATE evolution & case studies" IJERT, October 2017

[3] Manjula. C, D. Jayadevappa," Case studies of various FPGA based BIST, ATPG, Processor and Memory Testing" IJETAE, October 2017

[4] Manjula C, D Jayaevappa,, "FPGA BASED WIRELESS UNIVERSAL DIGITAL AUTOMATED TEST EQUIPMENT", , International Journal of Computer Technology and Applications – IJCTA, Jan 2017.

[5] Milan Stork, "Multiple Outputs Frequency Synthesizer", 5th Mediterranean Conference on Embedded Computing, MECO 2016 Bar, Montenegro

[6] Yann Deval and François Rivet, "A balanced logic routing block for Factorial-DLL based frequency generation" , 2016 IEEE

[7] “Development Synthesizer of Stable High-Frequency Signal”, Vladimir A. Skolota, Irina A. Belova, Miroslav V. Martinovich, 17th international conference on micro/nanotechnologies and electron devices EDM 2016
[8] K Jamal, Dr. P.Srihari “Analysis of Test Sequence Generators for Built-In Self-Test Implementation”, , 2015 International Conference on Advanced Computing and Communication Systems (ICACCS -2015), Jan. 05 – 07, 2015, Coimbatore, INDIA
[9] Mihaela Radu, “Testing Digital Circuits Using a Mixed-Signal Automatic Test Equipment”, 978-1-4799-3732-5/14, 2014 IEEE
[10] H. Alper, “Developing New Automatic Test Equipments (ATE)using Systematic Design Approaches”, TOKU, 978-1-4673-5683-1/13, 2013 IEEE
[11] Orkun Alp, Özden Erdem Kiliç, Ali Ayvalik, Zafer Savas Aselsan “ATE Design And Development For I-Level Maintenance And Production Line Of RCIED Jammer Systems”, Inc, 978-1-4799-8190-8/15, 2015 IEEE
[12] Nor Zaidi Haron, Masrullizam Mat Ibrahim, Amir Shah Abdul Aziz “VHDL Design and Implementation of FPGA Based Logic Analyzer: Work in Progress”,
[13] Michael George, Jagadeesh Kumar, Mini M.G “Implementation of Digital Stimulus GenerationSystem for a Passive Programmable Medical Implant”, , 978-1-4799-1823-2/15, 2015 IEEE

Probing the Efficacy of Research Contribution towards Fuzzy Sliding Mode Controller

T. Someswari
Asst. Prof: Dept of Electrical & Electronics Engg
The Oxford College of Engineering,
Bangalore, India
E-Mail: someswari.t@gmail.com

Dr. Anil Kumar Tiwari**
** Director, Amity School of Engineering,
AmitySchool of Engineering, Lucknow, India
Dr.Nagaraj.R***
*** Director, The Oxford College of Engineering,
Bangalore, India

***Abstract*— The evolution of sliding mode controller is more than five decade old and at present its functionality has been further more improvised with an aid of fuzzy logic giving rise to a Fuzzy Sliding Mode Controlling System (FSMC). From practical utility viewpoint, it is found that usage of controller is very common in majority of commercial products in current scenario; however, it has not received the stage of excellence by incorporating peak intelligence system using fuzzy logic. Therefore, the present manuscript highlights the research contribution using FSMC towards evolution of various forms of controller design and performs quantitative analysis of the existing research trends to identify certain hidden traits in the existing approaches. The main contribution of this paper is to let a novel researcher working on control system know about the true picture of progress being made by utilizing FSMC and also put forwards certain sets of unaddressed problems in the form of research gap.**

Keywords-Fuzzy Logic, Sliding Mode Controller, Uncertainty, Chattering ,Stability

I. INTRODUCTION

Basically, a sliding mode controller is a particular system of variable structure in control system that has been widely investigated for more than a five decade [1]. It is characterized by implementation simplicity and better resistivity against any form of fluctuation generated [2]. The important of sliding mode controller is that the directionality of the velocity vector associated with the state trajectory in controlled manner is found towards manifold of switching under the proximity of the recommended switching manifold [3]. Such forms of the motion are generated due to control actions of discontinuous type that are quite frequent in any strategies of switching controls. When the dynamic equation of the control system is satisfied by the system state than only it represents an existence of the sliding mode. In order to achieve such condition, sliding motion can be only ensured through endless switching events. Inspite of increasing number of research activity in sliding mode Controller till date, the topic is still shrouded by certain ongoing problems i.e. adaptive learning, uncertainties, chattering, enhancement of sustainability towards unstable system, disturbances, elimination of artifacts of dynamic system, etc. These set of problems has not been addressed with full solution as till date, majority of research work still attempts to minimize such fundamental problems in sliding mode controller apart from other related stability problems in controller design. There is no full-proof solution towards any of the existing research work till date. Slowly, it has been found that such problems could be We could still find recent studies where all these 50 year old problems are still being attempted to minimize, which is a direct indication of lack of robust technique to permanently deal with such issues effectively tackled if other technologies are also considered in this scenario. This leads to evolution of a trend where fuzzy logic [4], neural network [5], genetic algorithm [6], chaos theory [7] became the most preferred techniques that when integrated with sliding mode controller offers effective results. Out of all these techniques, fuzzy logic-based approach is found to be the most dominant solution till date due to its usage of human-based reasoning for dealing with uncertainties of matched and unmatched type. It makes use of experience of human expert in order to perform controlling over the complicated design system [8][9]. The frequent used approaches of using fuzzy logic in sliding mode controller is in using low pass filter to reduce signal of sliding mode controller and fuzzification of sliding mode controller for minimizing chattering effect [10]. The present research paper outlines the discussion of existing techniques of fuzzy sliding mode controller system in order to scale the effectivity with respect to control system. Section 1.1 discusses about the background where different frequently used techniques are discussed for fuzzy sliding mode controller schemes used in control system lines followed by discussion of research problems in Section 1.2 and proposed solution in 1.3. Section 2 discusses about existing research work towards using fuzzy sliding mode controller followed by discussion of research trends in Section 3. Section 4 outlines the identified open research issues and finally, the conclusive remarks are provided in Section 5

1.1 Background

At present, there has been various research works being carried out towards control system using Fuzzy logic [11]. Existing studies have therefore harnessed potential of fuzzy logic within the design of sliding mode controller system in order to incorporate addictiveness. There are studies where Fuzzy Sliding Mode Controller (FSMC) is used for designing gyroscope [12], solving uncertainty problems [13], trajectory tracking of nonlinear system [14], Single Input Single Output system [15], electromechanical actuator [16], mobile robots

978-1-5386-0615-5/17/$31.00 ©2017 IEEE

[17], boiler drum of ship [18], robot manipulator [19], controlling autonomous underwater vehicle [20] etc. There are multiple cases of such control system where it is proven that Fuzzy logic and sliding mode controller has significant contribution in terms of minimizing chattering effect and gaining enhanced stability condition. Both of these are essentially required in order to deal with uncertainty problems that are potentially associated with non-linear system in practical life. However, such problems doesn't behave in similar way in different design mechanism of controller owing to various forms of sub-problems associated with stability parameters associated with it. The next section outlines the research problems towards the usage of FSMC in controller design followed by proposed aim of the present manuscript.

1.2 Research Problem

FSMC has become the most preferred means in order to design any form of controller at present. It has been used in motor drives, hydraulics, converters, robotic control, satellite path control, harmonic suppression, etc. The existing research papers are published since more than a decade is one evidence of its usage. However, there are some open end question regarding this research topic viz. i) Does the same FSMC always offers similar stability performance to all the controller design? ii) what the scale of effectiveness of existing controller design using FSMC, iii) what are the scale of novelty in implementing FSMC in improving the outcome, and iv) what could be the possible research issues that may be still unaddressed. Therefore, the research problem of the study is to explore the research trend where FSMC is used for controller design and identify the open research issues.

1.3 Proposed Solution

The primary aim of the proposed study is to perform an an exhaustive review of existing usage of FSMC towards the controller design in order to understand the research technique being adopted in each cases. Owing to lack of existing review work towards exploring the similar problem, the proposed study investigates various ranges of problems that have been addressed till date by adopting the design methodology of FSMC. Another significant contribution of the proposed study is to evaluate the patterns of research work being carried out till date. Therefore, we consider only the research papers published during 2010 to 2017 for discussing only the updated work. As the number of work towards the usage of FSMC is considerable more in control system, it is quite evident that there must be certain problems that have positively being addressed as well as there may also be some set of problems which are yet to even initiate investigation. Therefore, our research manuscript is meant of assisting the researchers by providing a quick snapshot of the varied research problems being solved using FSMC in order to withdraw a conclusive remarks about the open end problems that needs immediate attention among the research community. The next section discusses about the existing research techniques where FSMC is used to design wide ranges of controllers.

II. Studies On Fuzzy Sliding Mode Control

At present there is various work research techniques towards enhancing the design of Fuzzy Sliding Mode Control (FSMC) system as well as existing studies also focused on applying this on multiple form of applications. Usage of FSMC towards harmonic suppression is seen in the work of Cao and Fei [21] where an active power filter is used for faster tracking the instruction by incorporating adaptiveness in the design of FSMC. The compensation of reactive power can also be done using FSMC. Study in this direction was carried out by Mohanty et al. [22] where a controller is designed using fuzzy sliding mode for enhancing the transient performance. The work carried out by Rajendiran et al. [23] has designed a controller using FSMc for enhancing the driving experience using single/double actuator. The authors have adopted fractional order FSMC to design the feedback controller. Dasmahaputra et al. [24] have developed a design of hydraulic system using FSMC. Further, Wang et al. [25] have addressed the problem of Takagi-Sugeno fuzzy system with an aid of delta operator approach for representing the non-linear system with discrete time. Wang et al. [26] have integrated radial-basis function along with the FSMC in order to incorporate adaptive feature towards suppressing harmonic distortion. Adoption of dynamic FSMC is found in the work carried out by Wen et al. [27] in order to effectively control the active suspension mechanism of non-linear form. Liu et al. [28] for regulating output voltage using type-2 fuzzy logic. Various uncertain coefficients were controlled using the presented adaptive technique. Zhang et al. [29] have addressed the problem associated with Tagaki-Sugeno fuzzy system by presenting a sliding surface with memory-based considering both the state of past and present of control system. FSMC is also found to be used for harnessing maximum level of wind power as seen in the work of Yin et al. [30]. The technique results in extracting of maximum current and double integral FSMC for monitoring the current flow. Soltanpour et al. [31] have presented a modeling of a robotic system whose control system was framed up by using adaptive FSMC in order to minimize the uncertainties over system stability of closed loop. Similar mechanism of control strategy on induction motor was seen in the work of Saghafina et al. [32] where adaptive FSMC has been utilized for controlling speed associated with the indirect control system of field. Patre et al. [33] have presented a mechanism for controlling nuclear reactors using FSMC for controlling the spatial factor associated with reactors. The technique performs approximation of the discontinuous control system for addressing the chattering issue. Nair et al. [34] have addressed the problem of path planning for multiple satellites using SMC along with hybrid potential field technique. The chattering effect is minimized using fuzzy logic that has also assisted in achieveing further stability.

The works carried out by Li et al. [35] have used delta operator method for addressing the problem associated with Takagi-Sugeno fuzzy system along with singular value decomposition. The study outcome is found to offer better Uniformly Ultimately Bound (UUB). Yang et al. [36] have addressed the problem of design control system of master-slave pertaining to tele-operation system using a fast terminal based FSMC with enhanced precision system. The technique also used adaptive fuzzy logic system for dealing with the uncertainties. Lian [37] have implemented radial basis function in order perform regulation of fuzzy-based parameters by addressing the problem of dynamic coupling effect arising

between robotic control system and degree of freedom. Khanesar et al. [38] have presented a study for networked-based control system by introducing fuzzy system in order to compute the amount of non-linear requirements induced y delay from networks. Farhoud and Erfanian [39] have developed a control mechanism for paraplegic pedaling using fuzzy logic and sliding mode controller of higher order for better control over pulse amplitude and pulse width. Investigation towards stochastic system with non-linearity was carried out by Gao et al. [40][41] who has addressed universal integral SMC issue by incorporating dynamic behaviour in it. Huang et al. [42] have presented a model for enhancing the power control for improving the ability to discard the disturbances. The technique also develops a switching state using FSMC that results in better digitization of the controller system. Lin and Li [43] have developed a model-independent control mechanism using neural network and FSMC for compensating the error caused due to approximation. The technique also introduces an adaptive learning mechanism. Non-linearity issues arising from chaotic system are addressed in the work of Niknam et al. [44]. Lian [45] have presented a self-organizing fuzzy controller to address its stability issues. The fuzzy components were enhanced by adaptive law in order to testify on the case study of suspension system. Yeh et al. [46] have developed a controller for an attitude of airborne vehicle in presence of white noise. Similarly, there are various researchers that has used FSMC for different problems e.g. speed controller for synchronous motor [47], controller for real-time application [48], stabilizing optical image [49], and controlling electrical drive [50]. Therefore, there are various ways that the existing researchers have exploited the potential of FSMC for designing and improving different forms of controllers. Table 1 highlights the summary of existing techniques of FSMC.

Table 1 Summary of Existing Techniques

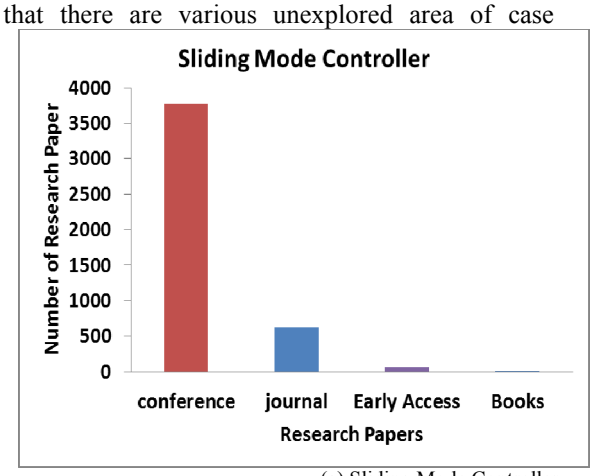
Author	Problem	Technique	Advantage	Limitation
Cao and Fei [21]	Harmonic suppression	Simulation-based	Minimal Total harmonic distortion	No benchmarking
Mohanty et al. [22]	Voltage stability, reactive power management	Mathematical Modelling	Enhanced stability	Doesn't meet dynamic uncertainties in transmission network
Rajendiran et al. [23]	Assessing ride quality	Fractional FSMC	Better than conventional FSMC	Doesn't consider non-linear problems with uncertainties.
Dasmahaputra et al. [24]	Hydraulic design	Adative controller design in FSMC	Better performance	System complexity not considered.
Wang et al. [25]	Discrete time Takagi-Sugeno fuzzy system	Delta Operator	Highly fault tolerance	Minimal assessment scenario
Wang et al. [26]	Harmonic suppression	Radial basis function, FSMC	Minimize chattering effect	No benchmarking
Wen et al. [27]	Active suspension system of vehicle	Dynamic mode, FSMC	Effective study of non-linear	Lacks complexity analysis
Liu et al. [28]	Regulating output voltage of converters	Interval Type-2 FSMC	Ensures reachability in finite time	Is not applicable on power distribution line
Zhang et al. [29]	Memory management	Mathematical modelling	Adaptive & robust	Only applicable for matched certainties
Yin et al. [30].	Maximizing DC-DC current	Elimination of harmonic current, FSMC, experimental	Enhance quality of power	No benchmarking, System complexity not considered.
Soltanpour et al. [31]	Robotic control	Adaptive FSMC	Better stability	Doesn't consider full round of control strategy.
Saghafina et al. [32]	Controlling induction motor	Experimental Approach, FSMC,	Better stability	No benchmarking, system complexity not assured.
Patre et al. [33]	Controlling nuclear reactors	FSMC, approximation	Enhance system performance	Specific to water reactors only
Nair et al. [34]	Path formation of multiple satellites	Adaptive FSMC	Effective path formation in shortest time	No comparative analysis, system complexity not addressed

Li et al. [35]	Incorporate adaptivity in SMC	Mathematical Modelling, Delta Operator Method, FSMC, Singular value decomposition	Good UUB performance	Method is case specific
Yang et al. [36]	Control design problem in teleoperation system	Adaptive FSMC	Higher precision	No Comparative Analysis.
Lian [37]	Dynamic coupling effective	Radial basis function, adaptive FSMC	Offer better stabilization	Accuracy depends on large epoch
Khanesar et al. [38]	Packet loss, Delay in time-varying network	Pade approximation, Adaptive FSMC	Effective controlling of dynamic attributes	No benchmarking
Farhoud and Erfanian [39]	Controller for paraplegic pedaling	FSMC, functional electrical simulation	Minimal error	Result specific to limited duration of usage of controller.
Gao et al. [40][41]	Universal integral SMC problem	Stochastic TS fuzzy approximation	Ensure stochastic stability	No comparative analysis
Huang et al. [42]	Controlling direct power in rectifier, harmonic suppression	Switching state controller by FSMC, experimental	Minimal transient setting time.	No comparative analysis, narrowed scope of experiment
Lin and Li [43]	Chattering, tracking trajectories	Asymmetric Gaussian, FSMC, adaptive learning, experimental	Minimize tracking error	No comparative analysis, narrowed scope of experiment
Niknam et al. [44]	Uncertain non-linear system	TS-fuzzy SMC	Reduced chattering	No comparative analysis, narrowed scope of experiment
Lian [45]	Stability issues in fuzzy controller	Experimental	Better performance of control	Complexity is associated.
Yeh et al. [46]	White noise, attitude controller of unmanned vehicle	FSMC, experimental	Ensure better stability	No comparative analysis, narrowed scope of experiment
Leu et al. [47]	Stability problem in synchronous motors	Experimental, torque load observer	Effective speed tracking	Doesn't minimize chattering effect
Manceur et al. [48]	Uncertainties in realtime application	Second order FSMC	Better stability performance, benchmarked	Computational effectiveness is not computed
Li et al. [49]	Stability in optical imagery (sensor-based)	Experimental, Voice-coil method, gyroscope, FSMC	Removes hysteresis non-linearities	No comparative analysis, narrowed scope of experiment
Kowalska et al. [50]	Controlling electrical drive	Linear controller+FSMC	Eliminates uncertainty, disturbances	Experiment limited to specific drive

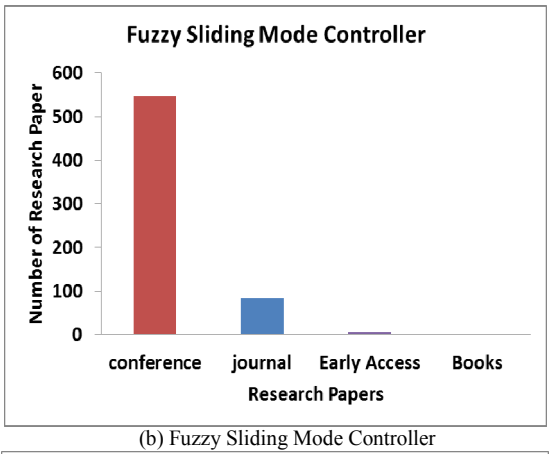
III. EXISTING RESEARCH TREND

We have reviewed the existing system and performed quantitative analysis of the existing research trend to find out certain extra-ordinary facts. Fig.1 highlights the research trend by considering the research papers published only during 2010-2017. The studies towards using conventional sliding mode and fuzzy based sliding mode converter is nearly equivalent (Fig.1(a)(b)), which will mean that there has been good pace of adoption of fuzzy logic towards sliding mode controllers. However, it is equally important to understand that there are equivalent existing approaches where neural network (Fig.1(c)) has been adopted. Study toward adoption of another typical optimization technique called as Genetic Algorithm is found somewhat less as compared to fuzzy logic and neural network (Fig.1(d). At the same time, we find that there is also a peculiar pattern of case study consideration. From Fig,1(e), we find that majority of the research work has addressed the problem associated with adaptivity and stability problems with an usage of FSMC in existing system. At the same time, specific problems towards chattering as well as uncertainty is lower compared to stability and adaptivity problems in existing research work. This is a clear indication that there are not enough solution towards chattering and uncertainty problems even when the Type-2 Fuzzy logic has been reported to be used already. The underlying problem in this has never been explored in any studies till date. We also find that study pertaining to this topic has also adopted various forms of case

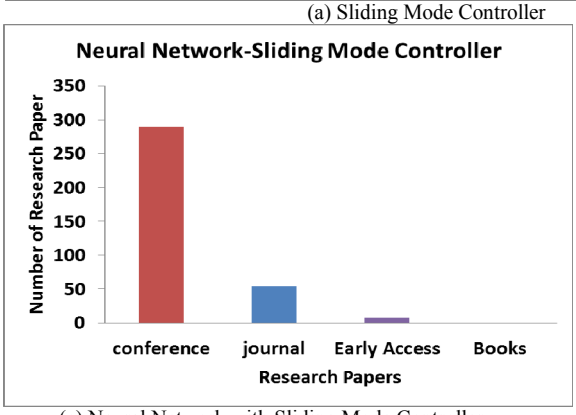
studies or application where FSMC has been implemented (Fig.1(f)). We find that majority of the targeted case study application has considered robotics controlling system. Similarly, vehicular application has also been potentially found to be adopted considered some cases e.g. travel experience etc. However, majority of work towards vehicular application has also used motor drives to achieve certain objectives. The studies towards converter as well harmonic suppression using active power filter has also been reported to be considered. Apart from this frequently considered case studies, the other unique case studies that have been used in tabulated in Table 1 in prior section. This research trend also highlights that there are various unexplored area of case studies of application where FSMC could play a potential role in enhancing the capability of the control system. Hence, from past 50 years, there has been slow progress in sliding mode controllers in terms of specific application with more scope of enhancing the FSMC. The research trend shown in Fig.1 highlights the most frequently used cases of application where there is further scope of exploring more number of critical and essential controllers using FSMC. It also suggests that research problems pertaining to chattering and uncertainty could be further more investigated for effective outcomes. The numerical outcomes of Fig.1 is considered from research papers published in IEEE, Springer, and Elsevier.



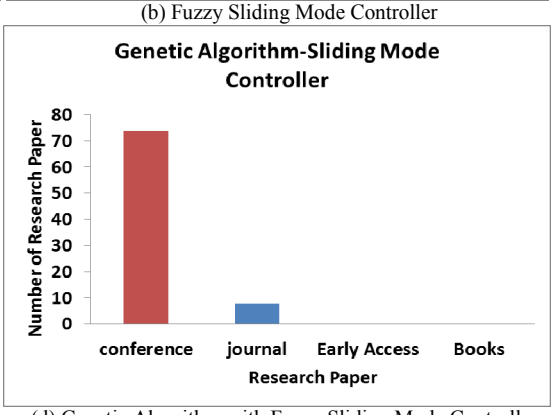
(a) Sliding Mode Controller



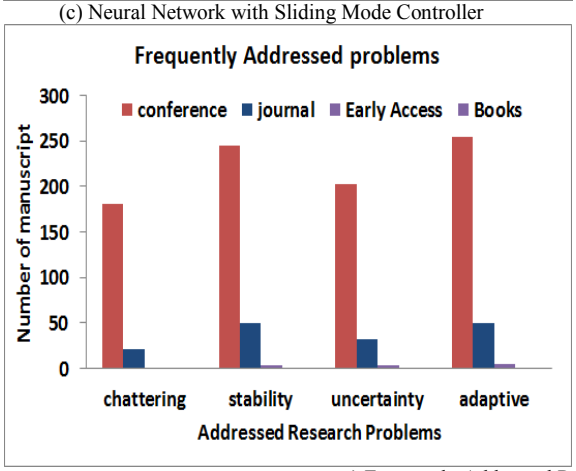
(b) Fuzzy Sliding Mode Controller



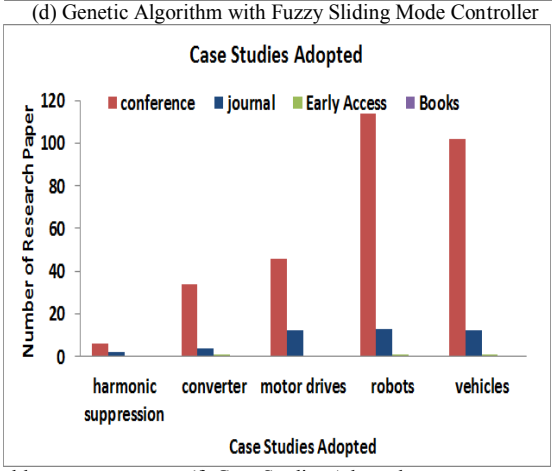
(c) Neural Network with Sliding Mode Controller



(d) Genetic Algorithm with Fuzzy Sliding Mode Controller



e) Frequently Addressed Problem



(f) Case Studies Adopted

Figure 1 Quantitative Analysis of Research Trend

IV. Open Research Issues

After reviewing the existing research work towards FSMC, it is found that there are still some open research issues that stay unaddressed at present. Following are the highlights of the open research issues:

- **Lesser Extent of Reusability**: Although, it is always a good idea to be explicitly design a problem-specific controller using FSMC, but there are certain things that every controller system has in common i.e. voltage, current, power, orientation, etc. From computational viewpoint, the extent of reusability of any of the component design of controller is extremely less for which reason the cost of the product will be tentatively very expensive. It has also been noticed that even the same problem of controller design is addressed using different design attributes that emphasizes that there should be more reusable components among the different set of controller to make cost effective design.
- **Lesser Novelty in FSMC Implementation**: It is explored that majority of the existing studies are carried out without any form of significant changes in the conventional design of FSMC in order to include adaptiveness. Majority of the existing studies has just used the same conventional FSMC over different problem scenario of controller design, which is highly case specific. Therefore, there are less amount of investigation being carried out towards exploring the new form of enhancement towards FSMC.
- **Unexplored Area of Controller Design**: Existing studies have used various forms of controller design of wider ranges of application, but at present there is no research work towards vehicular navigational system, where the use of controller for an effective road guidance system is highly required. At present, the vehicular navigational system uses GPS and internet for guiding that is not so reliable means of navigation as it has many dependencies on external factors that don't reside within the vehicle.
- **Less Focus on Computational Efficiency**: A closer look into existing research studies will show that there is increasing number of adoption of experimental-based approaches. Unfortunately, none of the experimental-based approaches has proved to offer the similar performance when exposed to more dynamic scenario of uncertainties. At present, experimental scenarios are highly controlled manner that tends to lowers the scope of the experiment in real-time application

• Conclusion

At present, there are many electrical and electronics devices that has a direct dependencies on controllers. More the robust of controller design, more is the effectiveness of application. The smartness of the controller-based application can be enhanced by incorporating fuzzy logic, which is widely used in many commercial-based controller sytem. This success of using fuzzy logic has led to get it integrated with sliding mode controller to deal with certain issues like chattering, stability, interference, uncertainty, etc. By observing all the research work being done till date, it motivates to further adopt FSMC; however by taking some more non-conventional case study that has been never being considered in the past. This research paper gives the insight that all the existing system does have advantages as well as limitation. It also suggests that there are more critical problems by which FSMC is implemented as discussed in research gap. We also find that controllers have been increasingly used in vehicular application but never in navigational system. Therefore, our future direction of work will be towards evolving up with a novel MEMS based advanced navigation system that redefines the existing controller system in very cost effective manner.

The future direction of the work will be towards designing a framework that can design a novel vehicle navigational system using fuzzy logic and sliding mode controller. The study will focus on developing a novel coupled INS/GPS navigational system along with minimization of chattering problem while using sliding mode controller

References

[1] Sundarapandian Vaidyanathan, Chang-Hua Lien, Applications of Sliding Mode Control in Science and Engineering, Springer-Computers, 2017

[2] Nabil Derbel, Jawhar Ghommam, Quanmin Zhu, Applications of Sliding Mode Control, Springer-Technology & Engineering, 2016

[3] Jinkun Liu, Xinhua Wang, Advanced Sliding Mode Control for Mechanical Systems: Design, Analysis and MATLAB Simulation, Springer Science & Business Media, 2012

[4] Timothy J. Ross, Fuzzy Logic with Engineering Applications, John Wiley & Sons, 2016

[5] Ivan Nunes da Silva, Danilo Hernane Spatti, Rogerio Andrade Flauzino, Artificial Neural Networks: A Practical Course, Springer, 2016

[6] Oliver Kramer, Genetic Algorithm Essentials, Springer-Computers, 2017

[7] Lena C. Zuchowski, A Philosophical Analysis of Chaos Theory, Springer, 2017

[8] Wendy Santos, Fuzzy Control Systems: Design, Analysis and Performance Evaluation, Nova Science Publishers, 2017

[9] John H. Lilly, Fuzzy Control and Identification, John Wiley & Sons, 2011

[10] Didier J. Dubois, Henri Prade, Ronald R. Yager, Readings in Fuzzy Sets for Intelligent Systems, Morgan Kaufmann, 2014

[11] Y.Jiang, C. Yang, and H. Ma, "A review of fuzzy logic and neural network based intelligent control design for discrete-time systems", Discrete Dynamics in Nature and Society, pp. 11, 2016.

[12] J. Ren, R. Zhang, and B. Xu, "Adaptive Fuzzy Sliding Mode Control of MEMS Gyroscope with Finite Time Convergence." Journal of Sensors, pp .7,2016

[13] T.H. Yan, B. Wu, B. He, W. H. Li, and R. B. Wang, "A Novel Fuzzy Sliding-Mode Control for Discrete-Time Uncertain System", Mathematical Problems in Engineering, pp. 9, 2016

[14] F. Baklouti, S. Aloui, and A. Chaari, "Adaptive Fuzzy Sliding Mode Tracking Control of Uncertain Underactuated Nonlinear Systems", Journal of Control Science and Engineering, pp.12, 2016

[15] A. Ayadi, S. Hajji, M. Smaoui, and A. Chaari, "Adaptive Moving Sliding Mode Control for SISO Systems: Application to an Electropneumatic System", Journal of Control Science and Engineering, pp.10, 2016

[16] D. Ma, H. Lin, and B. Li, "Chattering-Free Sliding-Mode Control for Electromechanical Actuator with Backlash Nonlinearity", Journal of Electrical and Computer Engineering, pp. 8, 2017

[17] H. Navabi, S. Sadeghnejad, Sepehr Ramezani, and Jacky Baltes. "Position Control of the Single Spherical Wheel Mobile Robot by Using the Fuzzy Sliding Mode Controller." Advances in Fuzzy Systems, pp. 10, 2017

[18] S. Liu, S. Zhao, and Y. Wang, "Smooth Sliding Mode Control and Its Application in Ship Boiler Drum Water Level", Mathematical Problems in Engineering, pp.7, 2016

[19] J-H.Hwang, Y-C. Kang, J-W. Park and D.W. Kim, "Advanced Interval Type-2 Fuzzy Sliding Mode Control for Robot Manipulator", Computational intelligence and neuroscience, pp.11, 2017.

[20] D. Qi, J. Feng, and J. Yang, "Longitudinal motion control of AUV based on fuzzy sliding mode method", Journal of Control Science and Engineering, pp.7, 2016

[21] D. Cao and J. Fei, "Adaptive Fractional Fuzzy Sliding Mode Control for Three-Phase Active Power Filter," in *IEEE Access*, vol. 4, no. , pp. 6645-6651, 2016.

[22] A. Mohanty, S. Patra and P. K. Ray, "Robust fuzzy-sliding mode based UPFC controller for transient stability analysis in autonomous wind-diesel-PV hybrid system," in *IET Generation, Transmission & Distribution*, vol. 10, no. 5, pp. 1248-1257, 4 7 2016.

[23] S. Rajendiran, P. Lakshmi and B. Rajkumar, "Fractional order fuzzy sliding mode controller for the quarter car with driver model and dual actuators," in *IET Electrical Systems in Transportation*, vol. 7, no. 2, pp. 145-153, 6 2017.

[24] S. Dasmahapatra, B. K. Sarkar, R. Saha, A. Chatterjee, S. Mookherjee and D. Sanyal, "Design of an Adaptive Fuzzy-Bias SMC and Validation for a Rugged Electrohydraulic System," in *IEEE/ASME Transactions on Mechatronics*, vol. 20, no. 6, pp. 2708-2715, Dec. 2015.

[25] J. Wang, Y. Gao, J. Qiu, and C.K. Ahn, "Sliding mode control for non-linear systems by Takagi–Sugeno fuzzy model and delta operator approaches", IET Control Theory & Applications, 2016

[26] T. Wang and J. Fei, "Adaptive Neural Control of Active Power Filter Using Fuzzy Sliding Mode Controller," in *IEEE Access*, vol. 4, no. , pp. 6816-6822, 2016.

[27] S. Wen, M. Z. Q. Chen, Z. Zeng, X. Yu and T. Huang, "Fuzzy Control for Uncertain Vehicle Active Suspension Systems via Dynamic Sliding-Mode Approach," in *IEEE Transactions on Systems, Man, and Cybernetics: Systems*, vol. 47, no. 1, pp. 24-32, Jan. 2017.

[28] J. Liu, Y. Gao, W. Luo and L. Wu, "Takagi–Sugeno fuzzy-model-based control of three-phase AC/DC voltage source converters using adaptive sliding mode technique," in *IET Control Theory & Applications*, vol. 11, no. 8, pp. 1255-1263, 5 12 2016.

[29] J. Zhang, Y. Lin and G. Feng, "Analysis and Synthesis of Memory-Based Fuzzy Sliding Mode Controllers," in *IEEE Transactions on Cybernetics*, vol. 45, no. 12, pp. 2880-2889, Dec. 2015.

[30] X. X. Yin, Y. G. Lin, W. Li, H. W. Liu and Y. J. Gu, "Fuzzy-Logic Sliding-Mode Control Strategy for Extracting Maximum Wind Power," in *IEEE Transactions on Energy Conversion*, vol. 30, no. 4, pp. 1267-1278, Dec. 2015.

[31] M. R. Soltanpour, P. Otadolajam and M. H. Khooban, "Robust control strategy for electrically driven robot manipulators: adaptive fuzzy sliding mode," in *IET Science, Measurement & Technology*, vol. 9, no. 3, pp. 322-334, 5 2015.

[32] A. Saghafinia, H. W. Ping, M. N. Uddin and K. S. Gaeid, "Adaptive Fuzzy Sliding-Mode Control Into Chattering-Free IM Drive," in *IEEE Transactions on Industry Applications*, vol. 51, no. 1, pp. 692-701, Jan.-Feb. 2015.

[33] B. M. Patre, P. S. Londhe and R. M. Nagarale, "Fuzzy Sliding Mode Control for Spatial Control of Large Nuclear Reactor," in *IEEE Transactions on Nuclear Science*, vol. 62, no. 5, pp. 2255-2265, Oct. 2015.

[34] R. R. Nair, L. Behera, V. Kumar and M. Jamshidi, "Multisatellite Formation Control for Remote Sensing Applications Using Artificial Potential Field and Adaptive Fuzzy Sliding Mode Control," in *IEEE Systems Journal*, vol. 9, no. 2, pp. 508-518, June 2015.

[35] H. Li, J. Wang and P. Shi, "Output-Feedback Based Sliding Mode Control for Fuzzy Systems With Actuator Saturation," in *IEEE Transactions on Fuzzy Systems*, vol. 24, no. 6, pp. 1282-1293, Dec. 2016.

[36] Y. Yang, C. Hua and X. Guan, "Adaptive Fuzzy Finite-Time Coordination Control for Networked Nonlinear Bilateral Teleoperation System," in *IEEE Transactions on Fuzzy Systems*, vol. 22, no. 3, pp. 631-641, June 2014.

[37] R. J. Lian, "Adaptive Self-Organizing Fuzzy Sliding-Mode Radial Basis-Function Neural-Network Controller for Robotic Systems," in *IEEE Transactions on Industrial Electronics*, vol. 61, no. 3, pp. 1493-1503, March 2014.

[38] M. A. Khanesar, O. Kaynak, S. Yin and H. Gao, "Adaptive Indirect Fuzzy Sliding Mode Controller for Networked Control Systems Subject to Time-Varying Network-Induced Time Delay," in *IEEE Transactions on Fuzzy Systems*, vol. 23, no. 1, pp. 205-214, Feb. 2015.

[39] A. Farhoud and A. Erfanian, "Fully Automatic Control of Paraplegic FES Pedaling Using Higher-Order Sliding Mode and Fuzzy Logic Control," in *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, vol. 22, no. 3, pp. 533-542, May 2014.

[40] Q. Gao, L. Liu, G. Feng and Y. Wang, "Universal Fuzzy Integral Sliding-Mode Controllers for Stochastic Nonlinear Systems," in *IEEE Transactions on Cybernetics*, vol. 44, no. 12, pp. 2658-2669, Dec. 2014.

[41] Q. Gao, G. Feng, Z. Xi, Y. Wang and J. Qiu, "A New Design of Robust ${rm H}_{infty}$ Sliding Mode Control for Uncertain Stochastic T-S Fuzzy Time-Delay Systems," in *IEEE Transactions on Cybernetics*, vol. 44, no. 9, pp. 1556-1566, Sept. 2014.

[42] J. Huang, A. Zhang, H. Zhang, Z. Ren, J. Wang, L. Zhang, and C. Zhang, "Improved Direct Power Control for Rectifier Based on Fuzzy Sliding Mode," in *IEEE Transactions on Control Systems Technology*, vol. 22, no. 3, pp. 1174-1180, May 2014.

[43] C. M. Lin and H. Y. Li, "Adaptive Dynamic Sliding-Mode Fuzzy CMAC for Voice Coil Motor Using Asymmetric Gaussian Membership Function," in *IEEE Transactions on Industrial Electronics*, vol. 61, no. 10, pp. 5662-5671, Oct. 2014.

[44] T. Niknam and M. H. Khooban, "Fuzzy sliding mode control scheme for a class of non-linear uncertain chaotic systems," in *IET Science, Measurement & Technology*, vol. 7, no. 5, pp. 249-255, September 2013.

[45] R. J. Lian, "Enhanced Adaptive Self-Organizing Fuzzy Sliding-Mode Controller for Active Suspension Systems," in *IEEE Transactions on Industrial Electronics*, vol. 60, no. 3, pp. 958-968, March 2013.

[46] F. K. Yeh, "Attitude controller design of mini-unmanned aerial vehicles using fuzzy sliding-mode control degraded by white noise interference," in *IET Control Theory & Applications*, vol. 6, no. 9, pp. 1205-1212, June 14 2012].

[47] V. Q. Leu, H. H. Choi and J. W. Jung, "Fuzzy Sliding Mode Speed Controller for PM Synchronous Motors With a Load Torque Observer," in *IEEE Transactions on Power Electronics*, vol. 27, no. 3, pp. 1530-1539, March 2012.

[48] M. Manceur, N. Essounbouli and A. Hamzaoui, "Second-Order Sliding Fuzzy Interval Type-2 Control for an Uncertain System With Real Application," in *IEEE Transactions on Fuzzy Systems*, vol. 20, no. 2, pp. 262-275, April 2012.

[49] T. H. S. Li, C. C. Chen and Y. T. Su, "Optical image stabilizing system using fuzzy sliding-mode controller for digital cameras," in *IEEE Transactions on Consumer Electronics*, vol. 58, no. 2, pp. 237-245, May 2012.

[50] T. Orlowska-Kowalska, M. Kaminski and K. Szabat, "Implementation of a Sliding-Mode Controller With an Integral Function and Fuzzy Gain Value for the Electrical Drive With an Elastic Joint," in *IEEE Transactions on Industrial Electronics*, vol. 57, no. 4, pp. 1309-1317, April 2010

IJRAME

INTERNATIONAL JOURNAL OF RESEARCH IN AERONAUTICAL AND MECHANICAL ENGINEERING
WWW.IJRAME.COM
ISSN (ONLINE): 2321-3051

Emerging Trends in Mechanical Engineering Proceedings of the International Conference, ETME-2017, 27 & 28 December, 2017, Pg: -217-226

DRY SLIDING WEAR PROPERTIES OF ZA-ALLOY CONTAINING TRACES OF IMPURITIES WITH AND WITHOUT HEAT TREATMENT

Gurunagendra G R [1], Ravikeerthi C[1], Dr. B R Raju[2]

[1]Associate Professor, Department of Mechanical Engineering, Global Academy of Technology, Bangalore, India
Assistant Professor, Department of Mechanical Engineering, Academy of Technology, Bangalore, India
[2]Professor and Head Department of Automobile Engineering, TOCE Bangalore

ABSTRACT

ZA-8,ZA-12,ZA-27 are the family of ZA alloys widely used as Low cost Bearing materials in High load and Low speed applications. These alloys with low cost, low energy requirement for shaping, excellent cast ability, and high strength properties are better than some bronze bearing alloys, but they still have restricted application especially due to the deterioration of mechanical and wear resistance properties at temperatures exceeding 100°C. Aluminium is one of the major alloying elements in Zn alloy systems where it imparts fluidity to the alloys. In practice, the amount of Al added to Zn-based alloys in order to attain good engineering properties varies over a wide range. Against this background, the present research work has been undertaken with an objective to explore the potential of ZA alloys as a bearing material and to investigate the effect of alloying elements at room temperature on the Tribological behaviour of the ZA alloy. Zinc and aluminium are low cost bearing materials compared to conventional bearing material and this work is an attempt to find a possible use of such economical materials which might gainfully be employed as low cost, high strength and wear resistant alloys.

***KEYWORDS*:** High load, Low speed, bearing materials

1. INTRODUCTION

The group of zinc-aluminium (ZA) alloys was developed in 1970s and became a substitute for brass and cast malleable iron to produce the wear-resistant parts. These alloys with low cost, low energy requirement for shaping, excellent cast ability, and high strength properties are equivalent or better than some standard bronze bearing alloys, but they still have limited application especially due to the deterioration of mechanical and wear resistance properties at temperatures exceeding 100°C. Aluminium is one of the major alloying elements in Zn alloy systems where it imparts fluidity to the alloys. In practice, the amount of Al added to Zn-based alloys in order to

IJRAME

INTERNATIONAL JOURNAL OF RESEARCH IN AERONAUTICAL AND MECHANICAL ENGINEERING
WWW.IJRAME.COM
ISSN (ONLINE): 2321-3051

Emerging Trends in Mechanical Engineering Proceedings of the International Conference, ETME-2017, 27 & 28 December, 2017, Pg: -217-226

attain good engineering properties varies over a wide range. The effect of different Al contents (namely 8, 12, 20 and 27) on the microstructure and tensile properties of Zn based alloy has increased strength and wear resistance. Zinc-Aluminium alloys are known to possess excellent bearing properties particularly at high load and low speed. They have found increasing use for many applications and have competed effectively against copper, aluminium and iron-base foundry alloys. However, the elevated temperature (> 100°C) properties of zinc aluminium alloys are unsatisfactory and restrict their use in some applications. One promising approach to improve the elevated temperature properties was reinforcing the alloys with SiCfibers or particles, alumina particles and fibres, glass fibres etc.

All the zinc-aluminium alloys have excellent resistance to corrosion in a variety of environments. However, there has been a lack of specific corrosion data of zinc-aluminium based MMCs and their corrosion resistance to date, because of very limited use of zinc-aluminium alloys as matrix material for MMCs. Most of the commercial work on MMCs has focused on aluminium as the matrix metal. The combination of light weight, environmental resistance and favourable mechanical properties has made aluminium alloys very popular for use as a matrix metal. Aluminium and its alloys have been used as a matrix for a variety of reinforcements: continuous boron, Al2O3, SiC and graphite fibers, various particles, short fibers and whiskers. As a result, advanced metal matrix composites with improved mechanical, physical and tribological characteristics, were obtained. The ZA alloys are suitable for casting by sand, permanent mould, shell mould and high-pressure die casting methods. These alloys exhibit mechanical properties equal to or exceeding those of conventional zinc die casting alloys and those of cast iron, aluminium and copper alloys. In addition, they have excellent bearing properties, wear resistance and machinability. Advantage of cast properties include low melting temperatures and hence low melting energy consumption, increased die life and mould stability. They can be readily cast in thin sections in sand moulds .It is also appreciated that the microstructure of ZA alloys, as it is true for any alloy, is associated with various factors such as compositions of alloy, production techniques adopted etc., and that even a very small change in one of these factors can seriously affect the quality, performance of the material. Hence, this leads to the argument that the field of microstructure, phase formation and wear properties of ZA alloys with different compositions still remains open for investigation for various purposes in industry.

IJRAME

INTERNATIONAL JOURNAL OF RESEARCH IN AERONAUTICAL AND MECHANICAL ENGINEERING
WWW.IJRAME.COM
ISSN (ONLINE): 2321-3051

Emerging Trends in Mechanical Engineering Proceedings of the International Conference, ETME-2017, 27 & 28 December, 2017, Pg: -217-226

2. EXPERIMENTAL PROCEDURE OF WEAR TEST:

The Alloy was prepared using Liquid Metallurgy route using Pure Zinc (99% pure) and Aluminium (99% pure) using Weight method. Composition as shown in the Table 1.

Obtained by optical emission spectrum with traces of Impurities.												
Composition	Zn	Al	Sn	Cd	Cu	Fe	Pb	Bi	Mg	Ag	Sb	Si
Percentage	88.480	9.8	0.094	0.007	0.01	0.600	0.032	0.08	0.236	0.008	0.264	0.353

Dry sliding wear tests for different number of specimens was conducted by using a pin-on disc machine (Model: Wear & Friction Monitor TR-20) supplied by DUCOM is shown in Figure 1.

SPECIFICATIONS

APPARATUS : TRIBOMETER (DUCOM PVT LTDBANGALORE)

DISC ROTATION SPEED : 200-2000 RPM

SLIDING SPEED : 0.5-10 M/S

TRACK DIAMETER : 50-100 MM

WEAR RANGE : 1-2000 µ

LOAD : 5-200 N

POWER : 2KVA, 230V

SPECIMEN STANDARD : ASTM G99

IJRAME

INTERNATIONAL JOURNAL OF RESEARCH IN AERONAUTICAL AND MECHANICAL ENGINEERING
WWW.IJRAME.COM
ISSN (ONLINE): 2321-3051

Emerging Trends in Mechanical Engineering Proceedings of the International Conference, ETME-2017, 27 & 28 December, 2017, Pg: -217-226

Figure 1: Pin on Disc Machine

The pin was held against the counter face of a rotating disc (EN31 steel disc) with wear track diameter 100 mm. The pin was loaded against the disc through a dead weight loading system. The wear test for all specimens was conducted under the normal loads of 1kg, 2kg and a sliding velocity of 2 and 4 m/s.

Wear tests were carried out for a total sliding distance of approximately 1250 m under similar conditions as discussed above. The pin samples were 30 mm in length and 6 mm in diameter. The surfaces of the pin samples were slides using emery paper (80 grit size) prior to test in order to ensure effective contact of fresh and flat surface with the steel disc. The samples and wear track were cleaned with acetone and weighed (up to an accuracy of 0.0001 gm using microbalance) prior to and after each test. The wear rate was calculated from the height loss technique and expressed in terms of wear volume loss per unit sliding distance.

In this experiment, the test was conducted with the following

Parameters:

- Load
- Speed
- Distance

In the present experiment the parameters such as speed, time and load are kept constant throughout for all the experiments. These parameters are given in Table.

IJRAME

INTERNATIONAL JOURNAL OF RESEARCH IN AERONAUTICAL AND MECHANICAL ENGINEERING
WWW.IJRAME.COM
ISSN (ONLINE): 2321-3051

Emerging Trends in Mechanical Engineering Proceedings of the International Conference, ETME-2017, 27 & 28 December, 2017, Pg: -217-226

Table 2: Parameter taken constant during sliding wear test

Pin material	ZA-alloy
Disc material	EN 31 steel
Pin dimension	Cylinder with diameter 6 mm height 30 mm
Sliding speed (rpm)	400
Normal load (kg)	1, 2, 3
Sliding distance (m)	1250

3. PIN-ON-DISC TEST

In this study, Pin-on-Disc testing method was used for tribological characterization. The test procedure is as follows:

- Initially, pin surface was made flat such that it will support the load over its entire cross-section called first stage. This was achieved by the surfaces of the pin sample ground using emery paper (80 grit size) prior to testing
- Run-in-wear was performed in the next stage/ second stage. This stage avoids initial turbulent period associated with friction and wear curves
- Final stage/ third stage is the actual testing called constant/ steady state wear. This stage is the dynamic competition between material transfer processes (transfer of material from pin onto the disc and formation of wear debris and their subsequent removal). Before the test, both the pin and disc were cleaned with ethanol soaked cotton (Surappa et al 2007)

Before the start of each experiment, precautionary steps were taken to make sure that the load was applied in normal direction. Figure represents a schematic view of Pin-on-Disc setup.

IJRAME

INTERNATIONAL JOURNAL OF RESEARCH IN AERONAUTICAL AND MECHANICAL ENGINEERING
WWW.IJRAME.COM
ISSN (ONLINE): 2321-3051

Emerging Trends in Mechanical Engineering Proceedings of the International Conference, ETME-2017, 27 & 28 December, 2017, Pg: -217-226

Table 3: Process parameters and levels

Sl no.	Load (N)	Sliding Speed, S (rpm)	Sliding Distance, D (m)
1	10	400	1250
2	20	400	1250
3	30	400	1250

WEAR TEST

Dry sliding wear tests for the ZA have been conducted using pin-on-disc Tribometer(m/s Ducom Bengaluru). The test have been conducted in air. Wear test have been conducted using cylindrical sample (ϕ12mm*30mm) that had flat surface in contact region and the rounded corner. The pin is held stationary against counterface of 100mm diameter rotating disc made of En-32 steel having HRC65.

The wear test have been conducted under three normal loads 1kg, 2kg, 3kg and at fixed sliding speed of 2.094m/s. Each wear test have been carried out for the sliding distance of 1.8km. Tangential force has been monitored continuously. Height was is measured from graph using slope and converted to volume loss data and wear rate is determined.

4. WEAR CALCULATION

1. Area, Cross sectional Area=$A = \frac{\pi d^2}{4}$
2. Volume loss,
Volume loss = Cross sectional Area x Height loss
3. Wear rate
Wear rate = Volume loss / Sliding distance
4. Wear resistance,
Wear resistance = 1/ Wear rate
5. Specific wear rate,

Specific wear rate = Wear rate/load

IJRAME

INTERNATIONAL JOURNAL OF RESEARCH IN AERONAUTICAL AND MECHANICAL ENGINEERING
WWW.IJRAME.COM
ISSN (ONLINE): 2321-3051

Emerging Trends in Mechanical Engineering Proceedings of the International Conference, ETME-2017, 27 & 28 December, 2017, Pg: -217-226

Table 4: Wear rate Results at as Cast condition

Sl No	Load		Height Loss			Time	Distance covered	Wear Rate	Friction Force	Coefficient of Friction
	Kg	N	H_1 µm	H_2 µm	H_1-H2 µm	Sec	m	(mm³/m) ×10⁻³	N	
1	1	10	53.5	49.7	3.85	50	104.71	1.03	2.98	0.298
2	2	20	51.08	38.26	12.82	50	104.71	3.46	10.1	0.505
3	3	30	88.44	77.95	10.49	50	104.71	2.83	14.27	0.475

Load(N)	Wear resistance (m /mm³)
10	970.87
20	288.91
30	353.09

Load(N)	Specific wear rate ×10⁻⁴ mm³/ N m
10	1.03
20	1.73
30	0.943

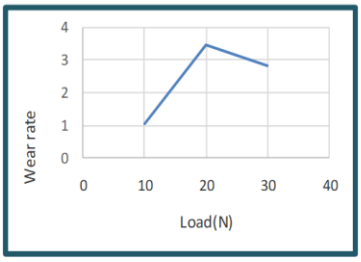


Figure 1: Load vs Wear Rate

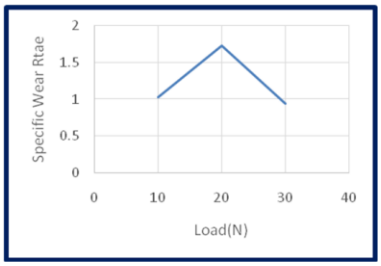


Figure 2: Load vs Specific Wear rate

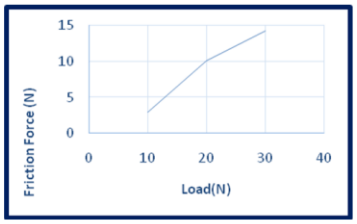


Figure 3: Load vs Friction Force

IJRAME

INTERNATIONAL JOURNAL OF RESEARCH IN AERONAUTICAL AND MECHANICAL ENGINEERING
WWW.IJRAME.COM
ISSN (ONLINE): 2321-3051

Emerging Trends in Mechanical Engineering Proceedings of the International Conference, ETME-2017, 27 & 28 December, 2017, Pg: -217-226

Table 5: Wear rate Results after Heat Treatment

Sl No	Load		Height Loss			Time	Distance covered	Wear Rate	Friction Force	Coefficient of Friction
	Kg	N	H_1 µm	H_2 µm	H_1-H_2 µm	Sec	m	(mm³/m) ×10⁻³	N	
1	1	10	44.78	42.22	2.56	50	104.71	0.691	4.72	0.21
2	2	20	58.96	43.92	15.04	50	104.71	4.06	8.71	0.22
3	3	30	93.85	70.52	23.33	50	104.71	6.29	13.62	0.22

Load	Wear resistance (m /mm³)
1	1447.17
2	246.3
3	158.98

Load	Specific Wear rate ×10⁻⁴(mm³/Kg-m)
1	0.691
2	2.03
3	2.09

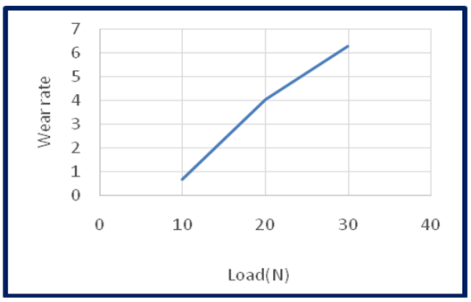


Figure 1: Load vs Wear Rate

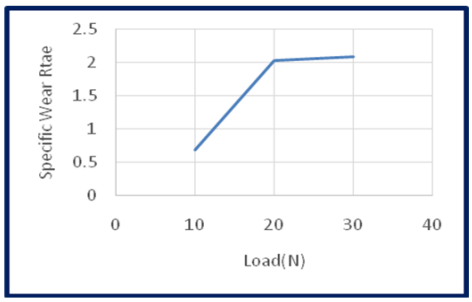


Figure 2: Load vs Specific Wear rate

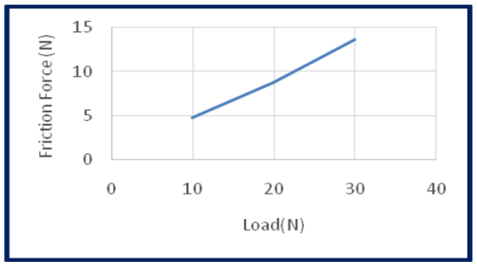
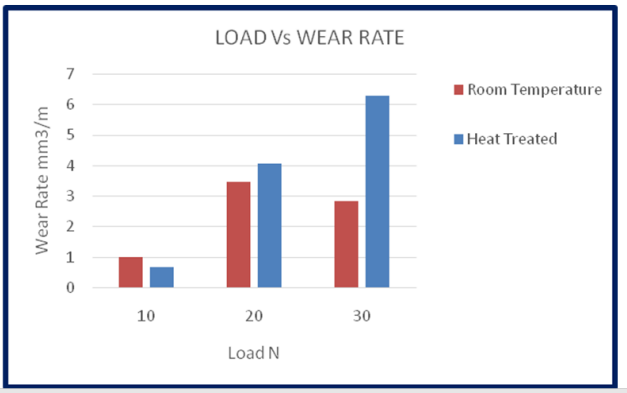


Figure 3: Load vs Friction Force

INTERNATIONAL JOURNAL OF RESEARCH IN AERONAUTICAL AND MECHANICAL ENGINEERING
WWW.IJRAME.COM
ISSN (ONLINE): 2321-3051

Emerging Trends in Mechanical Engineering Proceedings of the International Conference, ETME-2017, 27 & 28 December, 2017, Pg: -217-226

COMPARISON CHART:



5. CONCLUSION

ZA alloy is a competitive Bearing alloy that shows improvement in both Mechanical and Tribological properties compared with phosphor bronze, SAE 660 alloy and Cast Iron. As a First step towards developing a new material for the tribological applications for component used in various industrial applications.

Finally, at the end of completing the dry sliding wear test on the developed Low Aluminium and High Zinc alloy (ZA) there is a very low wear rate observed for heat treated alloy when compared to room temperature for Normal load of 10N, but wear rate increases at higher loaded for heat treated alloy.

There is more scope for further research by changing the process of fabrication of alloy and also Reinforcing with hard phase Reinforcements like Sic, $Al_20_{3,}$ graphite, MoS_2etc.

INTERNATIONAL JOURNAL OF RESEARCH IN AERONAUTICAL AND MECHANICAL ENGINEERING
WWW.IJRAME.COM
ISSN (ONLINE): 2321-3051

Emerging Trends in Mechanical Engineering Proceedings of the International Conference, ETME-2017, 27 & 28 December, 2017, Pg: -217-226

BIBLOGRAPHY

1.S.Rajasekaran,N.K.Udayashankar,andJagannathNayak:T4andT6Treatmentof6061Al-15Vol.%SiCPCompositeInternational Scholarly Research Network ISRN Materials Science Volume 2012, Article ID 374719, 5 pages doi:10.5402/2012.

2. Prasad, B. K. A.K.Patwardhan, A.H.Yegneswaran "Dry sliding wear characteristics of some Zinc-aluminium alloys: a comparative study with a conventional bearing bronze at a slow speed", Wear, Volume199, 1996, 142-151

3. B.K. Prasad, A.K. Patwardhan, and A.H. Yegneswaran, "Characterization of the wear response of a modified Zinc-based alloy Vis-Avis a conventional Zinc-based alloy and a bearing bronze", Metall. Mater. Trans., Vol 27A, 1996, 3513-3523

4. Yuanyuan, Tungwai,WeiXia,Wen Zhang "Effect of Mn content on the tribological behaviour of ZA27%Al-2%Cu alloy" Wear, Volume 198, 1996, 129-135.

5 B. Bobic, S. Mitrovic, M. Babic, I. Bobic: Corrosion of Aluminium and Zinc-Aluminium Alloys Based Metal-Matrix Composites, Tribology in Industry, Vol. 31, No. 3&4, pp. 44-52,2009.

6. Kubel, E.J.: Expanding horizons for ZA alloys. Adv. Mater. Process. Inc. Met. Prog. 7, 51–57 (1987)

7. Goodwin, F., Ponikvar, A.: Engineering properties of zinc alloys, 3rd edn. ILZRO, Durham (1989)

8. Barnhurst, R.J.: Designing zinc alloy bearings. J. Mater. Des. 12, 279–285 (1990)

9. Pandey, J.P., Prasad, B.K.: Sliding wear response of a zinc-based alloy compared to a copper-based alloy. Metall. Mater. Trans. 29, 1245–1255 (1989)

10. Rac, A., Babic ´, M., Ninkovic ´, R.: Theory and practice of Zn-Al sliding bearings. J. Balkan Tribol. Assoc. 7, 234–240 (2001).

11. Babic, M., Ninkovic, R.: Zn-Al alloys as tribomaterials. Tribol. Ind. 26, 3–7 (2004)

12. Babic, M., Ninkovic, R., Rac, A.: Sliding wear behavior of Zn-Al alloys in conditions of boundary lubrication. The Annals of University ''Duna ˘rea De Jos'' of Galat¸i Fascicle VIII. Tribology, 60–64 (2005)

13. Choudhury, P., Das, S., Datta, B.K.: Effect of Ni on the wear behavior of a zinc-aluminum alloy. J. Mater. Sci. 37, 2103–2107 (2002). doi:10.1023/A:1015297904125

14. Sharma, S.C., Girish, B.M., Kamath, R., Satish, B.M.: Graphite particles reinforced ZA-27 alloy composite materials for journal bearing application. Wear 219, 162–168 (1998). doi:10.1016/ S0043-1648(98)00188-4

15. Gervais, E., Barnhurst, R.J., Loong, C.A.: An analysis of selected properties of ZA alloys. J. Met. 37, 43–47 (1985)

16. Zhu, Y.H., Biao, Y., Wei, H.: Bearing wear resistance of monotectoid Zn-Al based alloy (ZA-35). J. Mar. Sci. Technol. 11, 109–113 (1995)

17. Lyon, R.: High strength zinc alloys for reengineering applications in the motor car. Met. Mater. 1, 55–57 (1985)

18. Bobic, I., Ninkovic, R., Babic, M.: Structural and mechanical characteristics of composites with base matrix of RAR27 alloy reinforced with Al2O3 and SiC particles. Tribol. Ind. 26, 21–26 (2004)

19. Prasad, B.K., Patwardhan, A.K., Yegneswaran, A.H.: Microstructure–property characterization of some Zn-Al alloys: effects of heat treatment parameters. Z. Metallk. 87, 967–972 (1996)

20. Prasad, B.K.: Influence of heat treatment parameters on the lubricated sliding wear behavior of a zinc-based alloy. Wear 257, 1137–1144 (2004). doi:10.1016/j.wear.2004.07.006

CHILDREN'S EDUCATION SOCIETY (Regd.)
THE OXFORD COLLEGE OF ENGINEERING
(Recognised by the Govt. of Karnataka, Affiliated to Visvesvaraya Technological University, Belagavi.
Approved by A.I.C.T.E. New Delhi.
Recognised by UGC Under Section 2(f)
Bommanahalli, Hosur Road, Bangalore - 560 068.
Ph: 080-61754601/602, Fax: 080 - 25730551
E-mail: engprincipal@theoxford.edu Web: www.theoxfordengg.org

Sl.NO	Name of the teacher	Title of the book/chapters published	Title of the paper	Title of the proceedings of the conference	Year of publication	ISBN/ISSN number of the proceeding	Department Name	Name of the publisher	Weblink
1	Dr Preeta Sharan	Advanced Mobile Technologies for Secure Transaction Processing: Emerging Research and Opportunities			2017		ECE	IGI Global	https://www.igi-global.com/book/advanced-mobile-technologies-secure-transaction/178715
2	Debpriyo Roy; Dhruva R Beltur; Preeta Sharan		Detection of Marijuana in blood using GaAs substrate based photonic sensor	2017 International Conference on Circuits, Controls, and Communications (CCUBE)	2017	978-1-5386-0615-5	ECE	IEEE Explorer	https://ieeexplore.ieee.org/document/8394161
3	S. Chaitra; C. Veena; K. Srinivas Rao; Preeta Sharan		SPR based biosensor for the detection of abnormal growth of tissues	2017 International Conference on Nextgen Electronic Technologies: Silicon to Software (ICNETS2)	2017	978-1-5090-5913-3	ECE	IEEE Explorer	https://ieeexplore.ieee.org/document/8067918

4	Manjula.C		Command Driven Scalable & Programmable FPGA Based Digital Test Pattern Generator	International Conference on Electrical, Electronics, Communication, Computer, and Optimization Techniques (ICEECCOT)	2017	978-1-5386-2361-9	EEE	IEEE Explorer	https://ieeexplore.ieee.org/document/8284545
5	Someswari.T		Probing the Efficiency of Research contribution towards Fuzzy Sliding mode Controller	· International Conference on Circuits, Controls, and Communications (CCUBE)	2017	978-1-5386-0615-5	EEEE	IEEE Explorer	https://www.researchgate.net/publication/325993592_Probing_the_efficacy_of_research_contribution_towards_fuzzy_sliding_mode_controller
6	Dr B Raju	Dry sliding wear properties of ZA alloy containing impurities with and without treatment		Emerging Trends in Mechanical Engineering Proceedings of the International Conference,	2017	2321-3051	Automobile	International Journal of Aeronautical and Mechanical Engineering	http://www.ijrame.com/wp-content/uploads/2019/02/20.pdf

CHILDREN'S EDUCATION SOCIETY (Regd.)
THE OXFORD COLLEGE OF ENGINEERING
(Recognised by the Govt. of Karnataka, Affiliated to Visvesvaraya Technological University, Belagavi.
Approved by A.I.C.T.E. New Delhi.
Recognised by UGC Under Section 2(f)
Bommanahalli, Hosur Road, Bangalore - 560 068.
Ph: 080-61754601/602, Fax: 080 - 25730551
E-mail: engprincipal@theoxford.edu Web: www.theoxfordengg.org

Sl.NO	Name of the teacher	Title of the book/chapters published	Title of the paper	Title of the proceedings of the conference	Name of the conference	National / International	Year of publication	ISBN/ISSN number of the proceeding	Affiliating Institute at the time of publication	Name of the publisher
1	Arvind Raju; Aditya Prakash; Anup M Upadhyaya; Preeta Sharan		Design and Analysis of Pipeline Leakage Detection Using Fibre Bragg Grating Sensor	2018 3rd International Conference on Communication and Electronics Systems (ICCES)	ICCES 2018	International	2018	978-1-5386-4765-3	The Oxford College of Engineering	IEEE Exlorer
2	Rajinder Tiwari; Anil Kumar; Preeta Sharan		Design and Implementation of 4:1 Multiplexer for Reversible ALU Using QCA	2018 2nd International Conference on Micro-Electronics and Telecommunication Engineering (ICMETE)	ICMETE 2018	International	2018	978-1-5386-6918-1	The Oxford College of Engineering	IEEE Exlorer
3	Bishwajeet Pandey; Preeta Sharan; Lubna Luxmi Dhirani; D M Akbar Hussain		Role of Scaling of Frequency and Toggle Rate in POD IO Standards Based Energy Efficient ALU Design on Ultra Scale FPGA	2018 10th International Conference on Computational Intelligence and Communication Networks (CICN)	CICN 2018	International	2018	2472-7555	The Oxford College of Engineering	IEEE Exlorer
4	Ketan Pandit; Karthik Rao; Preeta Sharan; Anup Upadhyaya		MOEMS based sensor for tire carcass deflection monitoring in automobile using photonic crystals	2018 Second International Conference on Advances in Electronics, Computers and Communications (ICAECC)	ICAECC 2018	International	2018	:978-1-5386-3785-2	The Oxford College of Engineering	IEEE Exlorer

Design and Analysis of Pipeline Leakage Detection Using Fibre Bragg Grating Sensor

Publisher: IEEE

Arvind Raju ; Aditya Prakash ; Anup M Upadhyaya ; Preeta Sharan **All Authors**

Abstract:A Pipeline is the main transportation of liquid and gases, chemically stable substance. A leakage can be disastrous. FBG uses an optical fibre to detect changes in strain... **View more**

Metadata

Abstract:
A Pipeline is the main transportation of liquid and gases, chemically stable substance. A leakage can be disastrous. FBG uses an optical fibre to detect changes in strain along the length of the pipeline and prevent it before it happens. In this paper we considered FBG analysis for leakage detection pipe. Maximum burst pressure in pipe obtained at zones of pipe during the flow analysis and topographical data obtained during flow analysis in standard pipe is considered for FBG analysis. Remarkable wavelength shift is obtained for each increase in burst pressure in the pipe. Proposed work will beneficial in petrochemical industries future.

Published in: 2018 3rd International Conference on Communication and Electronics Systems (ICCES)

Date of Conference: 15-16 Oct. 2018 **INSPEC Accession Number:** 18724000

Date Added to IEEE *Xplore*: 30 May 2019 **DOI:** 10.1109/CESYS.2018.8724113

ISBN Information:
Electronic ISBN:978-1-5386-4765-3
Print on Demand(PoD) ISBN:978-1-5386-4766-0

Publisher: IEEE

Conference Location: Coimbatore, India

Contents

Precious liquids and chemical gasses [1] are transported in pipes throughout the world. There are pipes that carry refined petroleum pipes that carry other fuels such as biofuels, oils and natural gas [2]. If the transportation of these liquids were to stop, the world as we know it would stop. Man would not be able to go about his day to day duties and his life would come to a standstill. One problem manufacturers face is that it is hard to keep a track of the pipes once they are installed. This is mainly because the pipes are laid underground and it can't be monitored. even after they realise that there is a leak, they have to dig up large areas of land to find where the leak is coming from. This demanded for something to keep track and monitor the underground pipelines. That's where the Fibre Bragg Grating Sensor [3] comes into play.

Design and Implementation of 4:1 Multiplexer for Reversible ALU Using QCA

Publisher: IEEE

Rajinder Tiwari ; Anil Kumar ; Preeta Sharan All Authors

Abstract: The simulation tool which is quite common in use for the design and implementation of the digital circuits is QCA i.e. Quantum Dot Cellular Automata. This software enable... **View more**

Metadata

Abstract:
The simulation tool which is quite common in use for the design and implementation of the digital circuits is QCA i.e. Quantum Dot Cellular Automata. This software enables the designer to study the behavior of the charge carriers in cells at very root level. Due to this approach of the root level features of QCA, the circuit elements overall performance gets enhanced with an optimization in the characteristics of the system. This technique of the quantum computing provides advances in the characterization of the devices which eliminates the limitation of the VLSI technology i.e. minimal impact of the heat generation by the components due to heat dissipation. In the today's era of the upcoming technology of the quantum computing, tremendous works has been carried out in the reverse logic domain that enhances the overall of the quantum processors with an innovative design of the ALU in terms of the size, delay and cost. In this paper, the author has presented the design of a 4:1 multiplexer which enhances the overall computational capabilities of ALU. In this discussion, the author ha put the emphasis on the size, delay and accuracy of the multiplexer. The simulation of the 4:1 MUX been carried out with the help of QCA tool that provides an highly optimized parameters for the circuit with a better characteristics in terms of size, speed and delay.

Citations
Keywords
Metrics
More Like This

Published in: 2018 2nd International Conference on Micro-Electronics and Telecommunication Engineering (ICMETE)

Date of Conference: 20-21 Sept. 2018 **INSPEC Accession Number:** 18791787

Date Added to IEEE *Xplore*: 24 June 2019 **DOI:** 10.1109/ICMETE.2018.00050

ISBN Information:
Electronic ISBN:978-1-5386-6918-1
Print on Demand(PoD) ISBN:978-1-5386-6919-8

Publisher: IEEE

Conference Location: Ghaziabad, India

Contents

I. INTRODUCTION

The characterization and scaling of the mixed signal processing circuits are converging towards the range of nanoscale design i.e. from microns to nano scale. Due to this phenomenon, the domain of the fabrication of the device is growing at a quite fast rate. A lot of research is going on now a days to find the solution for this and then we have come out an innovative approach which is based on the quantum computing techniques i.e. with the migration of size of the component from microns to nano scale. This technology is called as the nanotechnology which is based on the nano scale of the device and makes the use of light or photons as its basic principle of operation. Now the researchers are looking for some sophisticated tool with which one can carry out the simulation of the characterization of the components in nao range. Finally, researchers come out with one of the most proficient tool of simulation i.e. QCA i.e. Quantum Cellular Automata. The most dominant module of this tool is the quantum dots which are responsible for the probable transition of the charge carriers of the digital circuits. With the use of this tool, one can design various Boolean logics as well as the universal gates which in turn are responsible for the further development of processors. The Reversible logic is another very promising and upcoming computing design that presents various techniques of designing the computers which are capable of executing the task without any heat dissipation. This approach is basically an extension of the concepts of the quantum which is applied in the design of latest machines in digital domain. The operational performance of this approach is somewhat dependent on the concepts of the quantum electrodynamics i.e. the availability of the charge carriers within a particular time of transition of the carrier. In addition to this, the basic difference in between the traditional logic and the reversible logic approach of the implementation of the various circuits is that in this later approach, the device has got individual lines for input and output purpose with a negligible amount of heat dissipation. On the other hand, in the traditional approach i.e. in irreversible logic there is a considerable amount of heat dissipation with other limitations.

Role of Scaling of Frequency and Toggle Rate in POD IO Standards Based Energy Efficient ALU Design on Ultra Scale FPGA

Publisher: IEEE

Bishwajeet Pandey ; Preeta Sharan ; Lubna Luxmi Dhirani ; D M Akbar Hussain **All Authors**

Abstract: In this work, we are using frequency scaling, toggle rate scaling and of POD IO standard to design and implement energy efficient 64-bit ALU on ultra scale FPGA. We have ... **View more**

Metadata

Abstract:
In this work, we are using frequency scaling, toggle rate scaling and of POD IO standard to design and implement energy efficient 64-bit ALU on ultra scale FPGA. We have analyzed both static and dynamic power for three different toggle rate, three different frequencies, and three different POD IO standards. Scaling of toggle rate is directly proportional to dynamic power but it does not make any effect on static power. Scaling of frequency and changes in IO standards have the significant impact on both dynamic and static power. POD10 is the most energy efficient IO standard. Power is lowest when the device is operating on the lowest frequency of 0.1 GHz. When toggle rate is 3.125%, dynamic power is the lowest in comparison of 12.5% toggle rate. There is 81.55% power saving with POD10 IO standards along with 0.1 GHz frequency and the 3.125% toggle rate in comparison to POD12_DCI IO standards with the 10 GHz and 12.5% toggle rate. There is 63-80% saving in power with frequency scaling only.

More Like This

Published in: 2018 10th International Conference on Computational Intelligence and Communication Networks (CICN)

Date of Conference: 17-19 Aug. 2018

Date Added to IEEE *Xplore*: 14 October 2019

ISBN Information:
Electronic ISBN:978-1-5386-2578-1
Print on Demand(PoD) ISBN:978-1-5386-2579-8

ISSN Information:
Electronic ISSN: 2472-7555
Print on Demand(PoD) ISSN: 2375-8244

INSPEC Accession Number: 19048254

DOI: 10.1109/CICN.2018.8864933

Publisher: IEEE

Conference Location: Esbjerg, Denmark

Contents

Every processor has some predefine maximum frequency or clock rate on which chip like central processing unit (CPU), or one core of multi-core processor operates called processor speed. CPU frequency measured in Hertz. Processor speed of the first microprocessor was around 1 MHz (0.001 GHz). The world record of CPU frequency set on 29th August 2014 was 8.723 GHz [1]. The highest clock speeds (requiring cooling through liquid nitrogen) are stuck between 8.5 GHz and 9 GHz [2]. Intel commercial processor delivers more than 3 GHz and AMD commercial processor delivers approx. 5 GHz processor. It is possible to develop a processor with 10 GHz speed. But, power is directly proportional to frequency. With the increase in processing speed, more heat will generate eventually cooling mechanism will not economically feasible for such type of processor. Therefore, we are also not crossing threshold of 10 GHz and operating our ALU design for 0.1 GHz, 1 GHz and 10 GHz processing speed. We also analyzed both dynamic and static power dissipation with scaling of toggle rate (shown in Fig. 1) on these three frequencies in order to check operational stability and power requirement of our design. This analysis confirms computability of our design with the different type of existing processor. Also, we are using POD IO standards in our 64-bit ALU design. As we know that, SSTL IO standard was used in DDR3 memory. This POD has replaced SSTL in DDR4 memory. Figure 1:

Parameters taken for energy efficient ALU design

MOEMS based sensor for tire carcass deflection monitoring in automobile using photonic crystals

Publisher: IEEE

Ketan Pandit ; Karthik Rao ; Preeta Sharan ; Anup Upadhyaya **All Authors**

Abstract: Tire is an essential automotive component, since it plays an important role in safety, mobility, fuel economy and ride comfort. Road irregularities causes deflection of c... **View more**

Metadata

Abstract:

Tire is an essential automotive component, since it plays an important role in safety, mobility, fuel economy and ride comfort. Road irregularities causes deflection of carcass which is an internal layer of tire that sustains load and absorbs shock. This causes tire to generate faulty input to the steering which reduces durability of the automobile in the long run. In this project, MOEMS (Micro Opto-Electro Mechanical System) based sensor associated with photonic crystal is developed to observe carcass deflection and to study its characteristics in order to design a more efficient automobile. The MOEMS device functionality is achieved through micromechanical sub- wavelength inward displacement of the dielectric slabs. The finite-difference time-domain(FDTD) method is used for analysis of the results with the help of MEEP software. Simulation results show that the displacement occurring (of the dielectric slabs) will change the dimensions of the waveguide carved in the photonic crystal having silicon as a substrate. As a result, this change in spacing alters the propagation virtue of electromagnetic waves that run through them, due to periodic modulation of refractive index. Results show that distinct shift in frequency with high quality factor of 37074.566 was obtained by displacing the inclined and vertical slab by keeping horizontal slabs fixed.

Published in: 2018 Second International Conference on Advances in Electronics, Computers and Communications (ICAECC)

Date of Conference: 9-10 Feb. 2018

Date Added to IEEE *Xplore*: 04 October 2018

ISBN Information:
Electronic ISBN:978-1-5386-3785-2
Print on Demand(PoD) ISBN:978-1-5386-3786-9

INSPEC Accession Number: 18133301

DOI: 10.1109/ICAECC.2018.8479484

Publisher: IEEE

Conference Location: Bangalore, India

Contents

A tire is an advanced engineering product made of rubber, fiber, synthetic polymers, steel etc. [1] Tires are the only point of contact with the road and the only means to aid the transfer forces between the ground surface (road) and automobile. They also generate forces necessary to control the automobile. They must provide sufficient traction, excellent road holding capabilities, efficient cornering property, appreciable maneuvering ability, low rolling resistance [1]–[3] and they should also aid the suspension in absorbing road shock. This makes them a very important vehicular component [2].

CHILDREN'S EDUCATION SOCIETY (Regd.)
THE OXFORD COLLEGE OF ENGINEERING
(Recognised by the Govt. of Karnataka, Affiliated to Visvesvaraya Technological University, Belagavi.
Approved by A.I.C.T.E. New Delhi.
Recognised by UGC Under Section 2(f)
Bommanahalli, Hosur Road, Bangalore - 560 068.
Ph: 080-61754601/602, Fax: 080 - 25730551
E-mail: engprincipal@theoxford.edu Web: www.theoxfordengg.org

Sl.NO	Name of the teacher	Title of the book/chapters published	Title of the paper	Title of the proceedings of the conference	Year of publication	ISBN/ISSN number of the proceeding	Department Name	Name of the publisher	Weblink
1	Arvind Raju; Aditya Prakash; Anup M Upadhyaya; Preeta Sharan	-	Design and Analysis of Pipeline Leakage Detection Using Fibre Bragg Grating Sensor	2018 3rd International Conference on Communication and Electronics Systems (ICCES)	2018	978-1-5386-4765-3	ECE	IEEE Exlorer	https://ieeexplore.ieee.org/document/8724113
2	Rajinder Tiwari; Anil Kumar; Preeta Sharan	-	Design and Implementation of 4:1 Multiplexer for Reversible ALU Using QCA	2018 2nd International Conference on Micro-Electronics and Telecommunication Engineering (ICMETE)	2018	978-1-5386-6918-1	ECE	IEEE Exlorer	https://ieeexplore.ieee.org/document/8742880
3	Bishwajeet Pandey; Preeta Sharan; Lubna Luxmi Dhirani; D M Akbar Hussain	-	Role of Scaling of Frequency and Toggle Rate in POD IO Standards Based Energy Efficient ALU Design on Ultra Scale FPGA	2018 10th International Conference on Computational Intelligence and Communication Networks (CICN)	2018	2472-7555	ECE	IEEE Exlorer	https://ieeexplore.ieee.org/document/8864933
4	Ketan Pandit; Karthik Rao; Preeta Sharan; Anup Upadhyaya	-	MOEMS based sensor for tire carcass deflection monitoring in automobile using photonic crystals	2018 Second International Conference on Advances in Electronics, Computers and Communications (ICAECC)	2018	:978-1-5386-3785-2	ECE	IEEE Exlorer	https://ieeexplore.ieee.org/document/8479484

CHILDREN'S EDUCATION SOCIETY (Regd.)
THE OXFORD COLLEGE OF ENGINEERING
(Recognised by the Govt. of Karnataka, Affiliated to Visvesvaraya Technological University, Belagavi.
Approved by A.I.C.T.E. New Delhi.
Recognised by UGC Under Section 2(f)
Bommanahalli, Hosur Road, Bangalore - 560 068.
Ph: 080-61754601/602, Fax: 080 - 25730551
E-mail: engprincipal@theoxford.edu Web: www.theoxfordengg.org

Sl.NO	**Name of the teacher**	**Title of the book/chapters published**	**Title of the paper**	**Title of the proceedings of the conference**	**Name of the conference**	**National / International**	**Year of publication**	**ISBN/ISSN number of the proceeding**	**Affiliating Institute at the time of publication**	**Name of the publisher**
1	Afzal Shaikh; Preeta Sharan; Manju Devi		Power Analysis of Photonic Sensor for Detection of E-coli in Water	2019 Workshop on Recent Advances in Photonics (WRAP)	WRAP 2019	International	2019	978-1-7281-4749-9	The Oxford College of Engineering, Bangalore	IEEE Explorer
2	Indira Bahaddur; M.R. Tejaswini; Santhosh Kumar T.C.; Preeta Sharan; P. C. Srikanth		2D Photonic Crystal Cantilever Resonator Pressure Sensor	2019 Workshop on Recent Advances in Photonics (WRAP)	WRAP 2019	International	2019	978-1-7281-4749-9	The Oxford College of Engineering, Bangalore	IEEE Explorer
3	Patil H.J., Indumathi T.S., Sharan P., Nandi S		Interpretation of Photonic Crystals with Hexagonal Symmetry	International Conference on Innovative Mobile and Internet Services in Ubiquitous Computing	ICIMIUC 2019	International	2019	978-3-030-22262-8	The Oxford College of Engineering, Bangalore	IEEE Explorer
4	Anup M. Upadhyaya; Maneesh C. Srivastava; Preeta Sharan; Yashaswini P.R.Srikanth P.C		Micro mechanical deformation sensor based on ultra sensitive photonic crystal membrane	2019 Workshop on Recent Advances in Photonics (WRAP)	WRAP 2019	International	2019	978-1-7281-4749-9	The Oxford College of Engineering, Bangalore	IEEE Explorer

5	Anup M Upadhyaya; Maneesh Srivastava; Preeta Sharan; T Srinivas		Performance Analysis of Optical MEMS Based Pressure Sensor Using Ring Resonators Structure on Circular Diaphragm	TENCON 2019 - 2019 IEEE Region 10 Conference (TENCON)	TENCON 2019		2019	978-1-7281-1895-6	The Oxford College of Engineering, Bangalore	IEEE Explorer

Power Analysis of Photonic Sensor for Detection of E-coli in Water

Publisher: IEEE

Afzal Shaikh ; Preeta Sharan ; Manju Devi **All Authors**

Abstract: The optical photonic crystal sensor design is proposed, which contains Silicon (Si) circular rods, made in a square lattice structure. The input point has a light source ... **View more**

Metadata

Abstract:
The optical photonic crystal sensor design is proposed, which contains Silicon (Si) circular rods, made in a square lattice structure. The input point has a light source of wavelength 1.55um and has two output points to observe the output. The paper proposed different Photonic Crystal structure and power analysis for the same. The calculation for change in Refractive index value and power - wavelength shift for Water(1.33 RI) and E-coli (1.388 RI bacteria in water) analyte is analyzed and plotted. The procedure repeated for proposed different structures. Using a new design of 2D slab, we have observed the power output, amplitude and quality factor for different structure. The quality factor for proposed structure is observed and Cantilever structure is giving very high quality factor of 25954.

Published in: 2019 Workshop on Recent Advances in Photonics (WRAP)

Date of Conference: 13-14 Dec. 2019 **INSPEC Accession Number:** 19446606

Date Added to IEEE *Xplore*: 27 February 2020

DOI: 10.1109/WRAP47485.2019.9013691

Publisher: IEEE

ISBN Information:

Electronic ISBN:978-1-7281-4749-9

Print on Demand(PoD) ISBN:978-1-7281-4750-5

Conference Location: Guwahati, India

Contents

The power splitter is a critical component in a silicon chip. The prominent applications of silicon chips include photonic computing, long haul fiber communication, and bio-photonic sensing. Photonic Crystals (PC) are dielectric formation with periodical spatial rotations of the refractive index on the order of the wavelength of the light [1], [2]. Photonic bandgap can be realized and artificially introduce defects to control the light emanation and transmission and trapping of the photons. The photonic bandgap (PBG) formation due to periodicity and the electromagnetic wave propagation gets forbidden for all wave vectors inside this bandgap. Therefore, the detection of the unwanted and harmful content which is present in water is a crucial issue in decimating its adverse impact on public health and hygiene. So the determination of Escherichia coli (E-coli) and observation of the power for a different structure is essential. In the paper, we have used RI value of analyte i.e E-coli with RI value of 1.388, the harmful content present in water. Power splitting technique is performed using 2D and 2D slab PC line defect waveguides by investigating different structure for 1x2. For power splitter experiment, the required components are input and output waveguide channels which act like branches of the splitter. The intersect point from where the branches are coming out is called a junction [2]. From the intersection of power division, one input and two output branches form 120° waveguide bend with each other [3]. Further, the two output branches make an extra 60° bend with the input branch. To perform the function for the power splitter, the transmission of light power should be maximum without suffering any reflection. The efficient and well-executed design of waveguide bends is essential to achieve the above objectives.

2D Photonic Crystal Cantilever Resonator Pressure Sensor

Indira Bahaddur ; M.R. Tejaswini ; Santhosh Kumar T.C. ; Preeta Sharan ; P. C. Srikanth **All Authors**

Abstract: In this work the pressure sensor based two dimensional photonic crystal is proposed and designed with the high quality factor. The sensor is formed by coupling of two pho... **View more**

Metadata

Abstract:
In this work the pressure sensor based two dimensional photonic crystal is proposed and designed with the high quality factor. The sensor is formed by coupling of two photonic crystal waveguides and one nanocavity. A rectangular structure with the triangular lattice of air holes in slab type photonic crystal is considered and the point defect is placed at the centre. For the radius of the holes, optimization is carried out for high Q factor. For the radius of a hole at 165 nm, Q factor obtained is 5355.93.The photonic crystal structure with radius of hole as 165 nm is considered for pressure sensor application.The Refractive index values of the material are calculated for different pressures. Normalized transmission with wavelength shift for different pressure is observed. Through simulation it is noticed that the resonant wavelength of the sensor is shifted linearly towards highest region while increasing the applied pressure. This simulation and analysis is done by software called FDTD Lumerical solution. And the best quality factor is achieved.

Published in: 2019 Workshop on Recent Advances in Photonics (WRAP)

Metrics

More Like This

Date of Conference: 13-14 Dec. 2019

Date Added to IEEE *Xplore*: 27 February 2020

ISBN Information:
Electronic ISBN:978-1-7281-4749-9
Print on Demand(PoD) ISBN:978-1-7281-4750-5

INSPEC Accession Number: 19446630

DOI: 10.1109/WRAP47485.2019.9013843

Publisher: IEEE

Conference Location: Guwahati, India

Contents

The photonic crystal is composed of periodic dielectric or dielectric nanostructure that has both low and high dielectric constant (refractive index) to affect the light wave to pass inside the structure. By introducing line and point defect it is possible to pass the light in the photonic band gap(PBG) The classification mainly consists of one dimensional, two dimensional and three dimensional photonic crystals. The pressure sensor based 2Dimensional photonic crystals are receiving attention because of its simple structure, small size and better confinement of light. [1]

Authors

Figures

References

Keywords

Metrics

DOI: 10.1007/978-3-030-22263-5_86 • Corpus ID: 195353098

Interpretation of Photonic Crystals with Hexagonal Symmetry

Harshada J. Patil, T. Indumathi, Preeta Sharan, Somesh Nandi less •

Published in IMIS 2019 • Computer Science

Photonic crystals provide us excellent opportunity to build sensors and other vital components used in industries or labs because they can block electromagnetic waves propagating through them at certain frequencies and allow few. This property of selective allowance can be exploited by carefully studying the properties of light propagating through them and also the media through which it is travelling. Photonic crystals are well known for their flexibility and it is this convenience of them... Expand

References

SHOWING 1-8 OF 8 REFERENCES

Photonic Crystals: Molding the Flow of Light

J. Joannopoulos, Steven G. Johnson, J. Winn, R. D. Meade • Physics • 1995

7,650 • Save Alert Research Feed

High Transmission through Sharp Bends in Photonic Crystal Waveguides.

Mekis, Chen, Kurland, Fan, Villeneuve, Joannopoulos • Physics, Medicine • Physical review letters • 1996

1,565 PDF • Save Alert Research Feed

Inhibited spontaneous emission in solid-state physics and electronics.

Yablonovitch • Physics, Medicine • Physical review letters • 1987

11,287 PDF • Save Alert Research Feed

SCISSOR solitons and other novel propagation effects in microresonator-modified waveguides

J. Heebner, R. Boyd, Q. Park • Physics • 2002

178 PDF • Save Alert Research Feed

Resonant-enhanced evanescent-wave fluorescence biosensing with cylindrical optical cavities.

S. Blair, Y. Chen • Materials Science, Medicine • Applied optics • 2001

187 • Save Alert Research Feed

Strong localization of photons in certain disordered dielectric superlattices.

John • Physics, Medicine • Physical review letters • 1987

8,163 PDF • Save Alert Research Feed

High-Q whispering-gallery mode sensor in liquids

J. Nadeau, V. Ilchenko, D. Kossakovski, G. Bearman, L. Maleki • Materials Science, Engineering • SPIE LASE • 2002

73 • Save Alert Research Feed

Frontiers of Optical Spectroscopy

B. Bartolo, O. Forte • Materials Science • 2005

15 PDF • Save Alert Research Feed

Related Papers

Show More

2/0

Micro mechanical deformation sensor based on ultra sensitive photonic crystal membrane

Anup M. Upadhyaya ; Maneesh C. Srivastava ; Preeta Sharan ; Yashaswini P.R. ; Srikanth P.C. **All Authors**

Abstract: In the proposed work photonic crystal silicon slab type structure is analyzed with two photonic crystal configuration in line defect with micro cavity in water and air me... **View more**

Metadata

Abstract:
In the proposed work photonic crystal silicon slab type structure is analyzed with two photonic crystal configuration in line defect with micro cavity in water and air medium for monitoring strain sensing capacities of sensing layer. Pressure is applied and temperature of fluid such as air and water is increased from 21 ^{o} C to 31 ^{o} C. From the result it is observed that sensing structure shown better sensing capability in air compare to water. Maximum sensitivity of 0.34nm/RIU is obtained with Q factor of 2356 for holes in slab configuration of air medium. Proposed sensor having tremendous application in biomedical systems.

Published in: 2019 Workshop on Recent Advances in Photonics (WRAP)

Date of Conference: 13-14 Dec. 2019

INSPEC Accession Number: 19446556

Date Added to IEEE *Xplore*: 27 February 2020

DOI: 10.1109/WRAP47485.2019.9013699

Publisher: IEEE

More Like This

ISBN Information:
Electronic ISBN:978-1-7281-4749-9
Print on Demand(PoD) ISBN:978-1-7281-4750-5

Conference Location: Guwahati, India

Contents

Due to growing demand of sensing application in healthcare, security and structural health monitoring, opto mechanical sensors are showing more enhancement towards increasing sensitivity. Since electronic components are most of the time affected by electromagnetic interference in harsh environments sensibility will automatically decreases. Due to properties like insensitivity to EMI and micron level and less circuitry parts involved in optical sensor system, it has been widely used in application for monitoring stress, deformation, temperature, biomolecule detection and many other health care and structural health monitoring applications. Photonic crystal sensor is having significant role in urodynamic and cardiovascular assessment. Better guiding of light wave is made possible by periodic arrangement of micro pillars in photonic crystal pillar configuration or micro holes in hole in silicon slab configurations. Photonic crystal sensor is highly sensitive for its alteration in its periodic arrangement. Reducing slight change in arrangement of crystal brings out the sharp shift in resonant peak wavelength. It has been observed from the literature of opto mechanical sensor based photonic crystal that application of pressure on sensing layer will deflect the position of holes or rods in longitudinal or lateral direction. Change in shape or position of the photonic crystal structure brings out the shift in wavelength. So propagation of light wave in the photonic crystal structure will be altered by many construction parameters like filling ratio such as radius of rod, lattice parameter thickness of perfectly matching layer, intensity of light wave etc. Structural parameters like change in position of holes or pillar, shape of the sensing layer, stiffness of the sensing layer plays major role in deciding the life time of sensor and it has been less explored. Since the sensitivity of any sensing layer is depends on these properties it is very much essential to analyses above factors for various application.

Performance Analysis of Optical MEMS Based Pressure Sensor Using Ring Resonators Structure on Circular Diaphragm

Publisher: IEEE

Anup M Upadhyaya ; Maneesh Srivastava ; Preeta Sharan ; T Srinivas **All Authors**

Abstract: Proposed work here consists of Micro Opto Electro Mechanical System based pressure sensor integrated with ring resonators. Single, double and triple ring resonators are i... **View more**

Metadata

Abstract:
Proposed work here consists of Micro Opto Electro Mechanical System based pressure sensor integrated with ring resonators. Single, double and triple ring resonators are integrated with photonic crystal sensing layer have been investigated for different sensitivity and minimum detectability by coupling FEA modelling with optical system. Photonic crystal sensing layer is modelled using Ansys Multiphysics for modelling and analysis. For applied pressure in the range of 1Mpa to 6Mpa, deformation and Maximum stress developed in different direction is calculated. Influence of mechanical deformation and stress developed during application of pressure for peak resonance wavelength shift is explored for each combination of ring resonators. Minimum observable deformation of 1.0073μm for single ring resonator at pressure of 6.3μPa. Deformation of 1.051μm for double ring resonator at pressure of 6.5 μPa and 1.009 μm deformation for triple ring resonator at pressure of 6.9 μPa is detected. Maximum sensitivity of 450nm/RIU and Quality factor of 12,245 is observed for single ring resonator. Proposed type of sensor investigation having remarkable application in biomedical instruments with appropriate design.

Published in: TENCON 2019 - 2019 IEEE Region 10 Conference (TENCON)

Date of Conference: 17-20 Oct. 2019

INSPEC Accession Number: 19250372

Date Added to IEEE *Xplore*: 12 December 2019

DOI: 10.1109/TENCON.2019.8929302

Publisher: IEEE

ISBN Information:

Electronic ISBN:978-1-7281-1895-6

Print on Demand(PoD)

ISBN:978-1-7281-1896-3

Conference Location: Kochi, India

ISSN Information:

Contents

By Using the Micro Electro Mechanical System Technology with optical component many different types of sensors are projected to the scientific community as well as to people. Foremost important of using optical component along with MEMS is insensitive to electromagnetic interference. Machzendher Interferometer, Fabry perot pressure sensors are the main techniques came up to the practical scenario [1]. MEMS micro sensors built in the past decades having ability to sense the different physical and chemical properties. MEMS based sensor applicable in sensing pressure, temperature, force etc. combination of optical components and mechanical system expected to give good sensitivity, better detection ranges. It is well established concept that microelectronics is furthermost significant technology in this era. Successful of Miro Electromechanical System in engineering industries is mainly because of evolutionary steps took towards the microelectronics. Components under micro system and microelectronics are different. Micro system involves silicon crystals, Gallium Arsenide, Polymers and Quartz. Microelectronics Readily Single Crystal Silicon crystal and polymers. Assembly of microsystem involves many components compared to microelectronics. Micro electro mechanical system based sensor are giving more sophisticated sensing capabilities mainly because of miniatures in size, lighter with less inertia[2]. Due to its miniature size, optical MEMS or MEMS system having ability in exposure to vibration and distortion. In addition to accurate performance of optical MEMS system their miniature size makes it suitable in many biomedical instruments in invasive or non-invasive way. Miniature of optical MEMS may can also shrink size, weight, power and cost. Integration of optical system in MEMS made it applicable in many applications like micro mirrors, adaptive display, optical fibre sensors and in biomedical science. Measurement principal of optical MEMS system involves nano mechanical system coupled to micro nano mechanical devices, where motion of micro mechanical devices measured in micro scale. With the help of local optomechanical interaction precision motion readout is made possible.

CHILDREN'S EDUCATION SOCIETY (Regd.)
THE OXFORD COLLEGE OF ENGINEERING
(Recognised by the Govt. of Karnataka, Affiliated to Visvesvaraya Technological University, Belagavi.
Approved by A.I.C.T.E. New Delhi.
Recognised by UGC Under Section 2(f)
Bommanahalli, Hosur Road, Bangalore - 560 068.
Ph: 080-61754601/602, Fax: 080 - 25730551
E-mail: engprincipal@theoxford.edu Web: www.theoxfordengg.org

Sl.NO	Name of the teacher	Title of the book/chapters published	Title of the paper	Title of the proceedings of the conference	Year of publication	ISBN/ISSN number of the proceeding	Department Name	Name of the publisher	Weblink
1	Afzal Shaikh; Preeta Sharan; Manju Devi	-	Power Analysis of Photonic Sensor for Detection of E-coli in Water	2019 Workshop on Recent Advances in Photonics (WRAP)	2019	978-1-7281-4749-9	ECE	IEEE Explorer	https://ieeexplore.ieee.org/document/9013691
2	Indira Bahaddur; M.R. Tejaswini; Santhosh Kumar T.C.; Preeta Sharan; P. C. Srikanth	-	2D Photonic Crystal Cantilever Resonator Pressure Sensor	2019 Workshop on Recent Advances in Photonics (WRAP)	2019	978-1-7281-4749-9	ECE	IEEE Explorer	https://ieeexplore.ieee.org/document/9013843
3	Patil H.J., Indumathi T.S., Sharan P., Nandi S	-	Interpretation of Photonic Crystals with Hexagonal Symmetry	International Conference on Innovative Mobile and Internet Services in Ubiquitous Computing	2019	978-3-030-22262-8	ECE	IEEE Explorer	https://www.semanticscholar.org/paper/Interpretation-of-Photonic-Crystals-with-Hexagonal-Patil-Indumathi/631aceb0624f4eb4ca34adca2868bc148646e87e
4	Anup M. Upadhyaya; Maneesh C. Srivastava; Preeta Sharan; Yashaswini P.R.Srikanth P.C	-	Micro mechanical deformation sensor based on ultra-sensitive photonic crystal membrane	2019 Workshop on Recent Advances in Photonics (WRAP)	2019	978-1-7281-4749-9	MECHANICAL	IEEE Explorer	https://ieeexplore.ieee.org/document/9013699

5	Anup M Upadhyaya; Maneesh Srivastava; Preeta Sharan; T Srinivas	-	Performance Analysis of Optical MEMS Based Pressure Sensor Using Ring Resonators Structure on Circular Diaphragm	TENCON 2019 - 2019 IEEE Region 10 Conference (TENCON)	2019	978-1-7281-1895-6	MECHANICAL	IEEE Explorer	http://eprints.iisc.ac.in/64448/

CHILDREN'S EDUCATION SOCIETY (Regd.)
THE OXFORD COLLEGE OF ENGINEERING
(Recognised by the Govt. of Karnataka, Affiliated to Visvesvaraya Technological University, Belagavi.
Approved by A.I.C.T.E. New Delhi.
Recognised by UGC Under Section 2(f)
Bommanahalli, Hosur Road, Bangalore - 560 068.
Ph: 080-61754601/602, Fax: 080 - 25730551
E-mail: engprincipal@theoxford.edu Web: www.theoxfordengg.org

Sl.NO	Name of the teacher	Title of the book/chapters published	Title of the paper	Title of the proceedings of the conference	Name of the conference	National / International	Year of publication	ISBN/ISSN number of the proceeding	Affiliating Institute at the time of publication	Name of the publisher
1	Dr.Preeta Sharan		Nonlinear Response of Fiber Bragg Grating for Health Monitoring of Railway Track		INDIACOM	International	2020	978-93-80544-38-0	The Oxford College of Engineering, Bangalore	IEEE
2	V. L. Nandhini, K. Suresh BabuSandip Kumar RoyPreeta Sharan	Multichannel Biosensor for Skin Type Analysis					2020	978-981-15-5242-7	The Oxford College of Engineering, Bangalore	Algorithms for Intelligent Systems, Springer
3	Harshada J. Patil; D S Raksha; Rohit Dattatraya Hegde; V R Ashwini; T S Indumathi; Preeta Sharan		Design and Analysis of Optical Sensor for Detection of Cancer Biomarkers	2020 IEEE International Conference on Electronics, Computing and Communication Technologies (CONECCT)	IEEE CONNECT	International	2020	978-1-7281-6828-9	The Oxford College of Engineering, Bangalore	IEEE Explorer
4	Kishan Shetty; Kiran Saravana; M K Vikas Vinugna; Brinda N Murthy; Seema Patil; Preeta Sharan		Quantum Dot Cellular Automata Based RBG to Gray Scale Conversion in Bio-Medical Applications	2020 7th International Conference on Computing for Sustainable Global Development (INDIACom)	INDIACOM 2020	International	2020	978-93-80544-38-0	The Oxford College of Engineering, Bangalore	IEEE Explorer

5	Sumita Mishra; Aditya Prakash; Sandin Kumar Roy; Preeta Sharan; Nidhi Mathur		Breast Cancer Detection using Thermal Images and Deep Learning	2020 7th International Conference on Computing for Sustainable Global Development (INDIACom)	INDIACOM 2020	International	2020	978-93-80544-38-0	The Oxford College of Engineering, Bangalore	IEEE Explorer
6	Sumeet Kulkarni; Nusra thulla Khan; Preeta Sharan; B Ranjith		Bacterial Analysis of Drinking Water using Photonic Crystal based Optical Sensor	2020 7th International Conference on Computing for Sustainable Global Development (INDIACom)	INDIACOM 2020	International	2020	978-93-80544-38-0	The Oxford College of Engineering, Bangalore	IEEE Explorer
7	Suchandana Mishra ; Preeta Sharan ; Sushma P Kamath ; Saara K		Monitoring of Rail Wheel Impact for Various Train Speeds	2021 7th International Conference on Computing for Sustainable Global Development (INDIACom)	2021 7th International Conference on Computing for Sustainable Global Development (INDIACom)	International	2021	978-93-80544-38-0	The Oxford College of Engineering, Bangalore	IEEE Explorer
8	Amita Asthana ; Anil Kumar ; Sumita Mishra ; Preeta Sharan ; Mohammed Tabrez		Design of Single Bit Low Power Multiply Accumulate (MAC) Unit Using Quantum Dot Cellular Automata	2021 7th International Conference on Computing for Sustainable Global Development (INDIACom)	2021 7th International Conference on Computing for Sustainable Global Development (INDIACom)	International	2021	978-93-80544-38-0	The Oxford College of Engineering, Bangalore	IEEE Explorer
9	Preeta Sharan, Manpreet Singh Manna and Inderpreet Kaur	Smart Monitoring of Flat Wheel in Railway Using Optical Sensors					2021	10.5772/intechopen.97847	The Oxford College of Engineering, Bangalore	Intech Open

Open access peer-reviewed chapter - ONLINE FIRST

Smart Monitoring of Flat Wheel in Railway Using Optical Sensors
By Preeta Sharan, Manpreet Singh Manna and Inderpreet Kaur

Submitted: February 8th 2021 Reviewed: April 22nd 2021 Published: May 28th 2021

DOI: 10.5772/intechopen.97847

Abstract
The need for improved safety, reliability and efficiency is one of the most important aspects of the railway industry worldwide. Optical sensors can be used in smart condition monitoring system that can allow real time and continuous monitoring of the structural and operational conditions of trains. Railway monitoring is carried by the use of Fiber Bragg Grating sensors which measures strain, vibration, temperature, acceleration in continuous manner. This chapter covers

Quantum Dot Cellular Automata Based RBG to Gray Scale Conversion in Bio-Medical Applications

Publisher: IEEE

Kishan Shetty ; Kiran Saravana ; M K Vikas Vinugna ; Brinda N Murthy ; Seema Patil ; Preeta Sha… All Authors

Abstract: In nano-technology, Quantum dot is a new technology that has recently become one among the most prominent research areas that has the caliber of getting applied in constr... **View more**

Metadata

Abstract:
In nano-technology, Quantum dot is a new technology that has recently become one among the most prominent research areas that has the caliber of getting applied in construction of computers in near future. This paper includes additional features of achieving easiness in processing, deriving the features, compressing and storing the discrete images using reversible logic technique in Quantum dot Cellular Automata, over the translation of color space method. Additionally, we are employing the method of aggregation of color stream. The complete circuit is implemented in Quantum Dot Cellular Automata to reduce power dissipation and cell area. Further analysis has been done for delay and simulation time of each of the computing elements involved in the development of architecture of reversible full summer. The standard full summer is a core aspect of the design of aggregation of color stream architecture. This paper focuses on development of new logical circuits for some of the reversible gates that are needed to build a reversible summer. The designs that are being proposed in this paper are very unique, novel and efficient with its associated output waveforms. By using reversible gates, an effective reversible summer can be developed whose circuit diagram is discussed in the lower section. It is a well-known fact that reversible logic can

Conferences > 2021 8th International Confer...

Design of Single Bit Low Power Multiply Accumulate (MAC) Unit Using Quantum Dot Cellular Automata

Publisher: IEEE

Amita Asthana ; Anil Kumar ; Sumita Mishra ; Preeta Sharan ; Mohammed Tabrez All Authors

Abstract: Quantum dot was invented at Bell labs in 1982 as light-emitting nanocrystals that can absorb light of one wavelength and convert it to another. In the nanoscale implement... **View more**

Metadata

Abstract:

Quantum dot was invented at Bell labs in 1982 as light-emitting nanocrystals that can absorb light of one wavelength and convert it to another. In the nanoscale implementation, quantum dot has become a new emerging technology, as one of the most prominent research areas. It has the potential of getting applied in the construction of quantum computers as well as in communication switching networks. The proposed multiply-accumulate operation (MAC) unit can be used to reduce the processing time of the central processing unit (CPU) or arithmetic logical unit (ALU). In this paper the MAC unit has been designed to reduce the complexity of the cross-connect circuits. The complete circuit has been implemented using quantum dot cellular automata to reduce the power dissipation and cell area. The standard AND gate and full adder are the core aspects for the design of MAC architecture. This work involves the design of a low-power MAC unit circuit. The circuit can be used with cross-connect networks with M parallel operations and with N size networks to make M × N operations per unit time.

Springer Link

Multichannel Biosensor for Skin Type Analysis

Advances in Machine Learning and Computational Intelligence pp 611-619 | Cite as

- V. L. Nandhini (1) Email author (sunandi7276@gmail.com)
- K. Suresh Babu (2)
- Sandip Kumar Roy (3)
- Preeta Sharan (4)

1. Department of ECE, Govt. SKSJTI, , Bangalore, India
2. Department of ECE, UVCE, , Bangalore, India
3. Department of ECE, AMC Engineering College, , Bangalore, India
4. Department of ECE, The Oxford College of Engineering, , Bangalore, India

Conference paper
First Online: 26 July 2020

Part of the Algorithms for Intelligent Systems book series (AIS)

Abstract

Skin cancer is the uncontrolled growth of abnormal skin cells, and it may occur due to unrepaired DNA damage to skin cells; some of the common types are squamous cell carcinoma, basal cell carcinoma, melanoma. Squamous cell carcinoma is a type of cancer caused by an uncontrolled growth of abnormal squamous cells. Basal cells produce new skin cells as old ones die. Limiting sun exposure can help prevent these cells from becoming cancerous. The first step toward skin cancer detection is to asses skin type. Photonic crystal (PhC) is a periodic optical nanostructure used in the current work as a biosensor. PhC exhibits optical band gaps which are used for super-prisms, negative refraction, and dispersion compensation. We have created a biosensor with three sensing holes or point defects in PhC. The designed biosensor can sense three refractive indices simultaneously. By changing the properties of the sensing hole, the wavelength shifts and new resonant wavelength can be observed. Using a square lattice structure, we can distinguish between various sensing levels concerning amplitude and different wavelength values for all the three types of skin, namely Asian, Dark, and Caucasian skins. When the nano-sensing hole size is 0.22 um, the result shows a distinctly separable wavelength shift. When the sensing hole size decreases, then we cannot distinguish between Dark and Asian skin as the content of the melanin pigment present is more. We could conclude from the simulation that the designed biosensor can be used as a multichannel biosensor for skin type analysis.

Monitoring of Rail Wheel Impact for Various Train Speeds

Publisher: IEEE

Suchandana Mishra ; Preeta Sharan ; Sushma P Kamath ; Saara K **All Authors**

Abstract: In today's era, monitoring train speed is an important factor in structural health monitoring of trains in railways. In this work, finite element analysis has been done f... **View more**

Metadata

Abstract:
In today's era, monitoring train speed is an important factor in structural health monitoring of trains in railways. In this work, finite element analysis has been done for rail wheel model using ANSYS15.0 software. Simulation of Fiber Bragg Grating sensor is done by GratingMOD. Here train speed varies from 20 to 80kmph to observe the stress and strain response on the rail, with maximum stress, 190.96 MPa, strain of 111.89e-5mm and total deformation of 697.4mm, at constant wagon weight 57.3tons. Shift in Bragg's wavelength is 1551.4845nm at maximum speed, 80 kmph.

Published in: 2021 8th International Conference on Computing for Sustainable Global Development (INDIACom)

Date of Conference: 17-19 March 2021 **DOI:** 10.1109/INDIACom51348.2021.00127

Date Added to IEEE *Xplore*: 03 June 2021 **Publisher:** IEEE

Conference Location: New Delhi, India

Design and Analysis of Optical Sensor for Detection of Cancer Biomarkers

Harshada J. Patil ; D S Raksha ; Rohit Dattatraya Hegde ; V R Ashwini ; T S Indumathi ; Preeta S… All Authors

Abstract: The proposed paper incorporates the modeling and simulation of the highly sensitive photonic crystal-based sensor for breast and cervical cancer infected cell detection. ... **View more**

Metadata

Abstract:
The proposed paper incorporates the modeling and simulation of the highly sensitive photonic crystal-based sensor for breast and cervical cancer infected cell detection. Two structures, regular hexagon, and 180° phase mismatched hexagon are used. For the detection of cancer infected cells, the change in refractive index is considered as the basis and corresponding change in properties of light rays is observed. A comparative study has been done for the sensitivity of the designed sensor. The results are observed with the wavelength shift in the transmitted spectrum. The sensitivity is calculated for both the structures and found that 180° phase mismatch is better than hexagonal shape as regards to cervical cancer detection, hexagonal structure fares better than 180^{0} phase mismatch for breast cancer detection with regards to performance in sensitivity.

Published in: 2020 IEEE International Conference on Electronics, Computing and Communication Technologies (CONECCT)

Date of Conference: 2-4 July 2020 **INSPEC Accession Number:** 20015032

Breast Cancer Detection using Thermal Images and Deep Learning

Publisher: IEEE

Sumita Mishra ; Aditya Prakash ; Sandin Kumar Roy ; Preeta Sharan ; Nidhi Mathur All Authors

Abstract: Breast cancer is indeed a major cause of concern for women in India. There are several detection techniques currently available for breast cancer diagnosis, like mammogra... **View more**

Metadata

Abstract:

Breast cancer is indeed a major cause of concern for women in India. There are several detection techniques currently available for breast cancer diagnosis, like mammography, magnetic resonance imaging, ultrasound, and currently Computerized Thermal Imaging is developing its way to enter this field in conjunction with mammography. Infrared imaging is found to be less harmful as compared to mammography and can give results many years prior to the detection of cancer by mammography. The purpose of the current study is to use Thermography and deep learning combination to provide new insight on how to make better predictions for breast cancer. In this work, the methodology and techniques used are based on a deep Convolutional Neural Network model to predict breast cancer from thermal images. Thermal images are pre-processed, segmented and classified using a deep neural network. The research concludes with the major finding that 95.8% accuracy of prediction is achieved for breast cancer based on the output spectrum using training data of 680 thermograms. The current approach demonstrated a significant improvement over the earlier published accuracy of 93.30% with 50 thermograms. Hence, we can summarize that the

More Like This

proposed deep convolutional Neural Network model is highly effective in the prediction of breast cancer.

Published in: 2020 7th International Conference on Computing for Sustainable Global Development (INDIACom)

Date of Conference: 12-14 March 2020

INSPEC Accession Number: 19629666

Date Added to IEEE *Xplore*: 13 May 2020

DOI: 10.23919/INDIACom49435.2020.9083722

ISBN Information:

Electronic ISBN:978-93-80544-38-0

DVD ISBN:978-93-80544-36-6

Print on Demand(PoD) ISBN:978-1-7281-2958-7

Publisher: IEEE

Conference Location: New Delhi, India

Contents

Bacterial Analysis of Drinking Water using Photonic Crystal based Optical Sensor

Publisher: IEEE

Sumeet Kulkarni ; Nusrathulla Khan ; Preeta Sharan ; B Ranjith **All Authors**

Abstract: In this paper, design of an optical sensor is proposed which can be used for detection of bacteria in contaminated water. We have considered a couple of 2D photonic cryst... **View more**

Metadata

Abstract:
In this paper, design of an optical sensor is proposed which can be used for detection of bacteria in contaminated water. We have considered a couple of 2D photonic crystal structures (A and B). The analysis of both the structures is done with the help of Finite Difference Time Domain i.e. FDTD technique and modelling of these structures is done using OptiFDTD simulation tool. Optical properties of different bacteria in water are studied, and the refractive index values are given as input to OptiFDTD. Final response of different bacteria for the two structures is observed.

Published in: 2020 7th International Conference on Computing for Sustainable Global Development (INDIACom)

Date of Conference: 12-14 March 2020 **INSPEC Accession Number:** 19629668

Date Added to IEEE *Xplore*: 13 May 2020 **DOI:** 10.23919/INDIACom49435.2020.9083711

ISBN Information:

More Like This

Electronic ISBN:978-93-80544-38-0
DVD ISBN:978-93-80544-36-6
Print on Demand(PoD) ISBN:978-1-7281-2958-7

Publisher: IEEE

Conference Location: New Delhi, India

Contents

Nonlinear Response of Fiber Bragg Grating for Health Monitoring of Railway Track

Thammaiah N S
Deptt.of Mech. Engineering
The Oxford College of Engineering
Bangalore, INDIA
thammaiahns@gmail.com

Prajwal P Patil
Deptt. of Elect. and Comm. Engg.
The Oxford College of Engineering
Bangalore, INDIA
prajwalpatil12@gmail.com

Anup M Upadhyaya
Deptt.of Mech. Engineering
The Oxford College of Engineering
Bangalore, INDIA
Research Scholar, Amity University
Lucknow, INDIA
upadhyayaanup74@gmail.com

Preeta Sharan
Deptt.of Elect. and Comm. Engg.
The Oxford College of Engineering
Bangalore, INDIA
sharanpreeta@gmail.com

Maneesh C Srivastava
Deptt.of Mech. Engineering
Amity University
Lucknow, INDIA
mcsrivastava@lko.amity.edu

***Abstract*—Automated system for real-time health monitoring system of railway track is a major need in India to ensure the passenger, a safe journey. The Indian railway system is facing breakthrough problems such as wheel flat spot due to wheel set drag, axle misalignment, bogie performance, rail health and many other geometric faults. In the proposed research work, we analyzed the nonlinear response of the rolling wheel on Indian standard 136 RE rail and observed the wavelength and strain variation during the integration of the Fiber Bragg Grating (FBG) sensor in the web and foot of the rail. Finite Element (FE) results and FBG results have shown consistency with the wheel movement. Wavelength shift obtained for each change in strain step size of 0.5 in the foot part of the rail. Displacement of wheel in for true distance covered data assist in finding the faulty wheel. Obtained sensitivity of designed FBG sensor is 450nm/RIU as per the requirement of high loading capacity. Proposed dynamic wheel analysis of rail and wheel is the very important aspects or need in the current scenario of Indian railway system for automating the safety system.**

Keywords—Fiber Bragg Grating (FBG); finite element model; nonlinear; rail; wheel.

I. INTRODUCTION

The wheel is one of the most important parts of a vehicle. The wheels of a train usually have a conical geometry with a flange towards the inner side[1]. When the face of the wheel rolls over the track, they transmit the load of the train at the point of contact. The flange of the wheel guides the wheel to traverse on the rail and prevents it from falling off the rails. The flange of the wheel is subjected to lateral forces as both the wheel and rail are made of hardened steel[2].

To control the speed or to stop any vehicle, brakes are applied. When the break force applied on the rotating wheel is more than the proportional load, the train comes to a sudden halt. Hence the wheel slides over the track before coming to rest[3]. This damages the perfectly symmetric shape of the wheel thread and creates flat spots due to friction at the point of contact when the wheel slides over the track.A single rotation of the wheel covers up to 8 feet (2.4 meters) of the track. Thus the wheel makes about 264 hits for every kilometer and in every 4 meters there is a welded joint which is considered to be the weakest section of the track[4]. When the flattened wheel hits the track, it causes heavy shock thereby causing cracks and weld failure at the joints. This poses a serious threat to the operation of railways as crack protrudes internally which leads to major disasters.According to Indian railway standard specifications CMI-K003 standards, some other wheel defects are shattered rim, spread rim, thermal crack, shelled thread and disc crack. These wheel defects if gone unnoticed may lead to accidents and endangers many lives[5]. Hence use of various sensors to measure and monitor the various physical condition of the track will provide an effective solution to these problems[6]. According to a recent survey, the volume of goods transported has increased by 23% in the year 2019 and is expected to increase further in the coming years hence there is a need for better monitoring and maintenance of railway track in India[7].

Fibre Bragg Grating is a section in the core of an optical fibre with periodic variations, FBG core has a very small diameter of 4 to 9 μm and it also consists of an outer layer called cladding whose diameter ranges from 80 to 125 μm[8]. Material used to fabricate these sensors are usually silicon whose refractive index is 3.46. Optical FBG sensors are gaining importance because of their sensitivity and versatility.FBG sensors can be used to measure various parameters like strain, temperature, load, acceleration, vibration, inclination, etc.[9]. these kinds of sensors uses the light from the wavelength spectrum to reflect it to higher or lower level to be used as measuring instruments[10-12]. They can be easily installed and are not affected by external

978-93-80544-38-0 /20/$31.00 ©2020 IEEE

disturbances like electromagnetic interference, lightning, and other external disturbances. FBG sensors are fabricated in tiny optical fibres and the sensing signal can be read at a distance more than 100 km away. They can also monitor points that cannot be accessible by traditional electrical sensors as well. In the proposed work we examined the consistency of fiber Bragg grating sensor results positioned in rail web and rail foot portion with nonlinear FEA analysis by considering time variation[13]. The sensor network is assembled by placing FBG sensors on the railway track for real-time monitoring of track to measure displacement and strain, these variables are monitored by the FBG interrogator to find out the changes in these variables[14-16]. FBG sensor's longer life span, stability, costless and ease of installation makes it more useful than the normal strain gauges. The strain induced in the FBG can be used to find the weight and speed of the train, FBG is advance and cost-effective sensor which can be used to monitor the structure and health of the railway track. Proposed work help solves major problems in real-time Indian railway system monitoring[17-19]. Operational passenger railroad with FBG system is investigated in Hong Kong city. FBG sensor are located in the various region of rail with specific measurement system. Hong Kong was anticipated the ever demanding safety, reliability and efficiency required in railway system and brought out the efficient system FBG integration over railway track[20] [21].

FBG sensors are used in different application of train such as temperature measurement in the wheel rail system, measuring tilt angle, acceleration measurement. FBG system is developed for WIM – Weighing in Motion and Wheel Flat Detection (WFD). TWBCS system is developed for measuring strain for vertical direction force. Frequently rail and wheel engagement during the rotation will reduce the life of wheel and gradually increase the flatness due to unexpected heavy loads, vibrational shock[22]. Detecting the flat wheel is highly challenging the in the incase of railway system, FBG sensing system can make the challenging task easier by its high sensitivity to load and period change can be observed in the grating region. Real time safety monitoring of railway system has been simulated and experimented. Physical quantitates and harmful aspects in the railway system is detected in using this real time sensing detection using optical fibre brag grating technology. This technique is designed and proposed by

II. Design Approach and Principle

The dimensions of wheel and rail are obtained from Indian railway standard specifications for wheel and axle assembly for carriages and wagons IRS R-19/93(Part-1). 136 RE rail design is chosen with the wheel.

The section area of the rail, shown in Fig.1, is 86.13 sqmm and its calculated weight is 67.364 K/m. The wheel is designed as per given prescribed dimension of Indian railway, as given in Fig 2.

Based on the given design parameters the 3-D model is designed and assembled using CATIA. The volume mesh of the model is then performed using ANSA. All the physical properties like materials, interactions, boundary conditions, and load were applied and nonlinear analysis was carried out using ANSYS. Material of density 7800 Kg/m3, young modulus of 21e10, and poisons ratio of 0.3is applied to the model. Contact surface interactions were applied along with suitable boundary conditions. Load steps were created and load of 200 KN was applied on the wheel during the analysis. Fig. 3 shows standard track dimension of Indian railway.

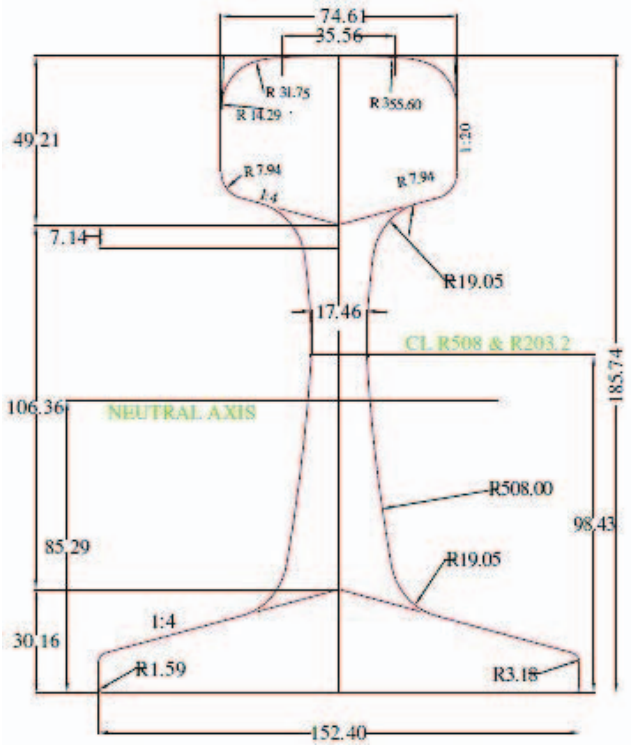


Fig. 1. Design parameters of rail

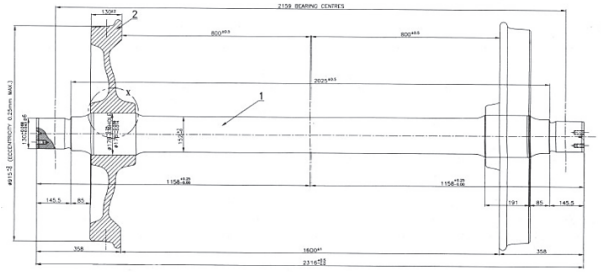


Fig. 2. Design parameters of wheel

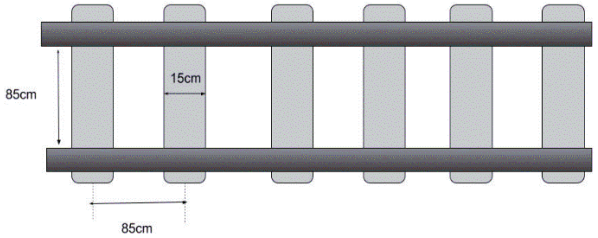


Fig. 3. Standard dimensions of Indian Railway track

III. Model Description

Based on the given design parameters the 3-D model was designed and assembled (Fig. 4 and Fig. 5) using CATIA v5 R20 and the assembled model was meshed using ANSA.

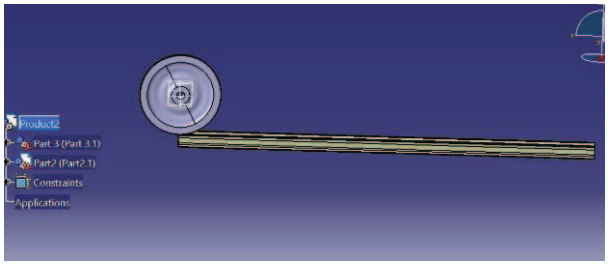


Fig. 4. Design and assembly of model using CATIA v5 R20

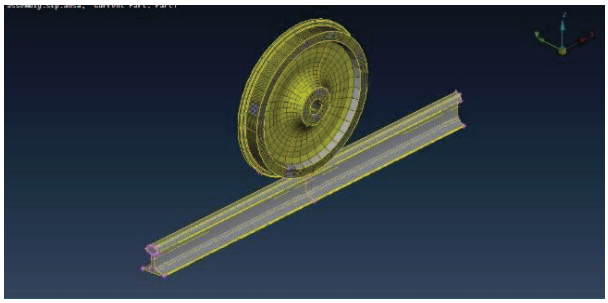


Fig. 5. Model after volume mesh done using ANSA

All the physical properties like materials, interactions, boundary conditions, and load were applied and nonlinear analysis was carried out using ANSYS.

Material of density 7800 Kg/m3, young modulus of 21e10, and poisons ratio of 0.3 was fed to the model. Contact surface. Interactions were applied along with suitable boundary conditions were applied. Load steps were created and load of 200 KN was applied on the wheel. And the result was obtained.

After the fabrication of FBG sensor, the sensor can be placed in the web or the foot region of the track, but because of larger stress concentration in the web region it is more preferable to place the sensor that area. FBG are placed at a distance of 960cm apart. These FBG are interconnected to a fibre optic junction box, it is a device which is used to connect different FBG devices. The system also consists of a FBG interrogator which acts as a measuring device whichallows the FBG output to be used as static and dynamic monitoring as shown in Fig. 6. It represents the layout of the proposed work through which the monitoring can be implemented in the Indian railway system.

IV. Result and Discussion

Fig.7 shows the propagation of stress when the wheel is in motion over the track. Fig. 8 demonstrates the concentration of stress on the rail due to the wheel movement. Changes in the displacement of rail along the specified path of rail are shown in Fig. 9. It is observed from the graph (Fig. 9) that for 0.5 increments of distance on rail their sharp dip indicates the wheel load on a specific position of rail. Peak strain value is observed in Fig.10, which indicates the change in dimension during the movement of the wheel on the rail. During the consideration of specific measuring point of rail, there is an increase in strain when the wheel comes in contact with that point and again there is a decrease in strain when the specific point overcomes the wheel load. In this way, rail will act like elastic material to withstand the higher load.

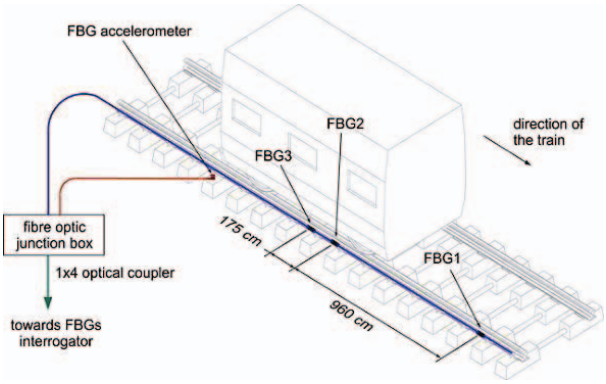


Fig. 6. Placement of FBG sensor in a railway track[8]

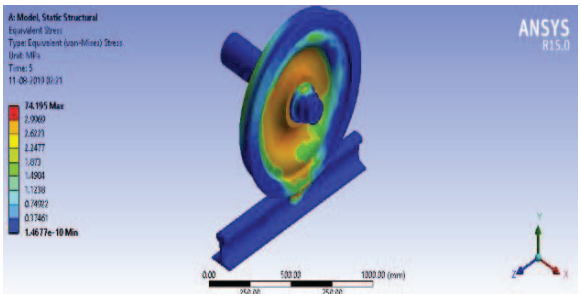


Fig. 7. Propagation of stress from wheel to rail

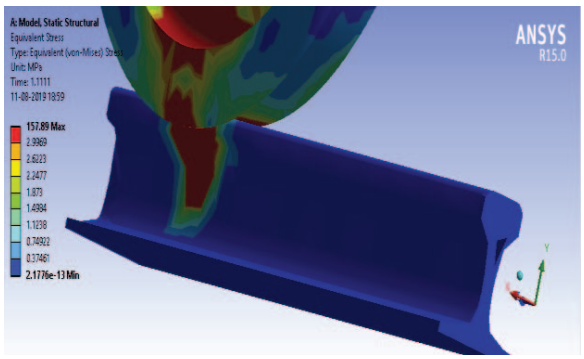


Fig. 8. Stress concentration on the rail due to wheel

The displacement of rail with time variation is shown in Fig. 11. During the movement of the wheel on the rail, there is a consistency of displacement in the rail. When the wheel movement slows down between 0.1 to 0.2 seconds there is a sharp fall in displacement.

Fig.12 shows the FBG results obtained for time variation there is a change in wavelength during the wheel movement. This result is obtained when the FBG sensor is positioned in

the foot portion of the wheel. Fig.13 shows the FBG sensor results obtained when the sensor located in the web portion of the rail. Fig.15 shows the designed FBG sensor in R-Soft and Fig.14 shows the wavelength change for variation of strain values obtained during the fiber Bragg grating analysis. Neutral fiber located in the web portion of rail will make the rail to withstand the fluctuation load. This causes the FBG sensor to present plot with variation in strain value, as shown in Fig.15.

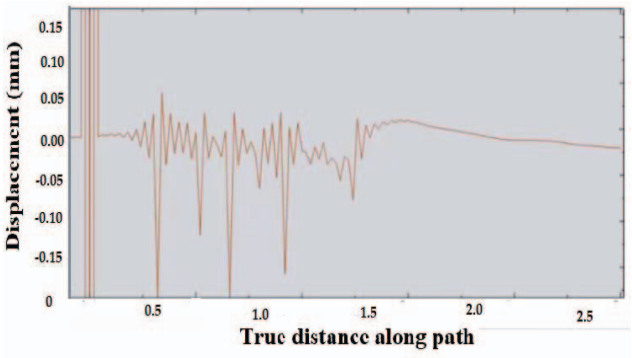


Fig. 9. Displacement of rail due to wheel movement along specified path on 136RE rail

Knowing the displacement of wheel in the path of travelling of wheel is important aspect in nonlinear or dynamic analysis of the rail and wheel. If the wheel is flat mode frequency obtained will be sharp peak. There will be always change in resonance peak frequency for change abrupt change in displacement for flat wheel.

Designed FBG and its nonlinear analysis procedure not only assists in detecting the faulty wheel but also useful in counting the axle of rail during the motion of rail. Fig. 13 is special aspect in the nonlinear analysis of flat wheel aspects. Figure has shown inbuilt design aspect of the rail such increase in the strain in the region of web. High strain value is observed only during the presence of wheel in specific region of rail. Load exerted by wheel on the rail shows high strain the chosen region. Strain gradually decreased in the center of rail. Rail is designed in such a way the it should be able to absorb the heavy vibrational shock during the wheel rotation

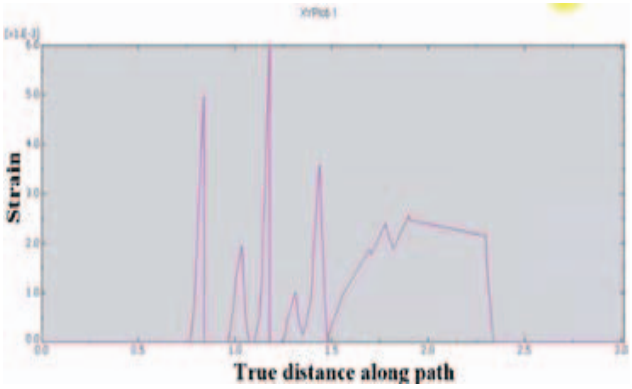


Fig. 10. Strain variation in 136RE rail due to wheel movement along the specified path on rail

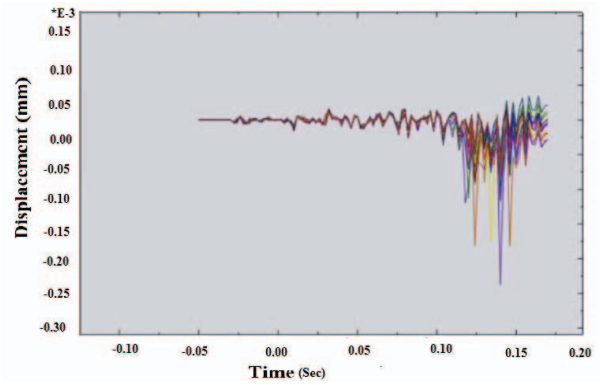


Fig. 11. Displacement of rail due to wheel movement with respect to time

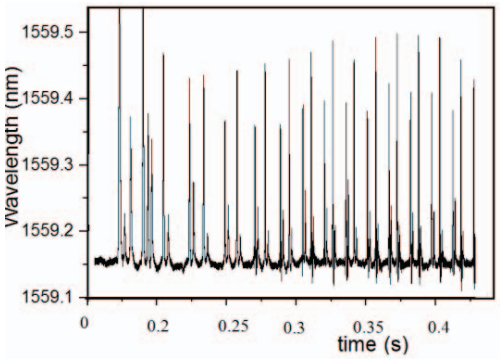


Fig. 12. Wavelength variation in foot region of 136RE rail obtained for FBG sensor integration

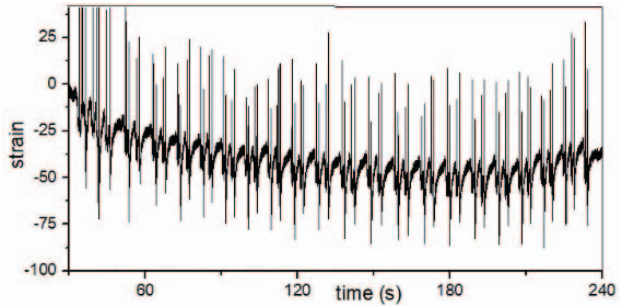


Fig. 13. Strain variation in web region of 136 RE rail

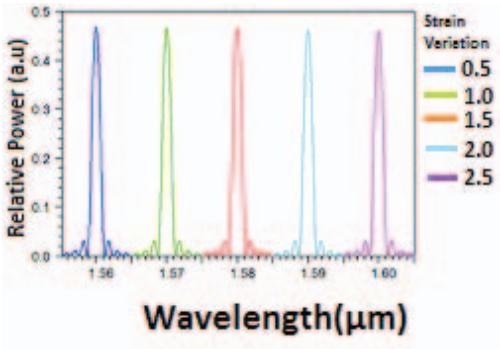


Fig. 14. Relative power variation due to change in wavelength and strain

FBG sensor designed as simulated for different obtained strain value from nonlinear analysis of wheel and rail. Each obtained value of strain is applied on FBG sensing system. During this design process FBG sensor is optimized for different length and width of core and cladding. Thickness of FBG coating is used is also optimized for each load application of FBG senor. Change in pitch is obtained for each load application on the FBG sensor. There is change in overall refractive index obtained for change is pressure on FBG sensing structure. Gradually change in reflective is observed for change in modulation depth and length of fibre. Length of fibre specified in the work is obtained by iterating the FBG sensing structure for each step increment in length. Application of load on fibre induces strain and changes the period of grating inscribed on the fibre. Reflectivity obtained for specified length is 98.9%. This reflectivity of spectrum obtained indirectly assisted in obtaining the resonance peak wavelength in the transmission spectrum shown in Fig. 14. Sensitivity is obtained by measuring the change in peak wavelength and change in effective refractive index of respective peak wavelength. 450nm/RIU sensitivity value is realistic to withstand and sense the heavy load application especially in case of rail and wheel fault detection system.

Fig. 15. FBG sensing structure

V. Conclusion

The proposed research work consists of nonlinear response and FBG sensing system investigation for health monitoring of Indian railway track. Standard dimension of Indian rail 136 RE and wheel is considered during the analysis. FBG sensor is embedded in the foot and web portion of the rail. Displacement of rail with respect to time for rotation of the wheel on rail is obtained. Change in strain along the specified length of the track is monitored. Strain obtained from the nonlinear analysis of rail and wheel show consistency with strain obtained from the FBG sensor with a shift in wavelength. Position embedded FBG sensor in the foot and web portion of rail has shown a distinct result. Sensor embedded in foot portion has shown a consistent shift in wavelength, but sensor embedded in web region has shown larger strain value at the beginning with gradual decrement and strain values will increase as it reaches the endpoint. This indicates that neutral line within the web portion of rail effectively designed can withstand the highly fluctuating load during the movement of the wheel on the rail. Proposed research work carried out here will be helpful to analyze the problem arising in the railway system due to wheel flat spot and axle counting and many other geometric alignment indications. It can also be helpful in avoiding accidents and mishaps. Hence makes transportation by train much safer.

Acknowledgments

The author wishes to thank all the students along with the faculties who assisted in getting real-time data and suggesting ideas for accomplishing the research work. And we would like to thank our university for their constant help and support during the execution of this work in the lab.

References

[1] R. U. A. Uzzal, W. Ahmed, and S. Rakheja, "Dyanamic analysis of railway vehicle-track interactions due to wheel flat with a pitch plane vehicle model," Journal of Mechanical Engineering, vol. 39, no. 2, pp. 86-94, 2008.

[2] A. Guemes and T. B. Messervey, "Smart textile and polymer fibre for structural health monitoring," in *Textiles, Polymers and Composites for Buildings*, Woodhead Publishing, 2010, pp. 330-350.

[3] C. E. Campanella, A. Cuccovillo, C. Campanella, A. Yurt, and V. Passaro, "Fibre Bragg grating based strain sensors: review of technology and applications," *Sensors*, vol. 18, no. 9, 2018.

[4] M. L. Filograno, P. Corredera, M. Rodriguez-Plaza, A. Andres-Alguacil, and M. Gonzalez-Herraez, "Wheel flat detection in high-speed railway systems using fiber Bragg gratings," *IEEE Sensors Journal*, vol. 13, no. 12, pp. 4808-4816, 2013.

[5] S. J. Buggy, S. W. James, S. Staines, R. Carroll, P. Kitson, D. Farrington, L. Drewett, J. Jaiswal, and R. P. Tatam, "Railway track component condition monitoring using optical fibre Bragg grating sensors," *Measurement Science and Technology*, vol. 27, no. 5, 2016.

[6] S. Hussaini, B. Indraratna, and J. Vinod, "Application of Optical-Fiber Bragg Grating Sensors in Monitoring the Rail Track Deformations," *Geotechnical Testing Journal*, vol. 38, no. 4, pp. 387-396, 2015.

[7] Y. Zhang, F. Liu, Y. Jing, and W. Li, "Application of FBG sensing technique for monitoring and early warning system of high-speed railway track conditions," in *Proc. of the IEEE 25th International Conference on Optical Fiber Sensors, 23 April 2017*, pp. 1-4.

[8] A. Milojević, M. Tomić, and N. T. Pavlović, "Application of FBG sensors in smart railway," in Proc. of thr XV International Scientific-Expert Conference on Railways, RAILCON'12, 2012.

[9] F. Mennella, A. Laudati, M. Esposito, A. Cusano, A. Cutolo, M. Giordano, S. Campopiano, and G. Breglio, "Railway monitoring and train tracking by fiber Bragg grating sensors," in Proc. of the Third European Workshop on Optical Fibre Sensors, 2 July 2007, vol. 6619.

[10] H. Naderi and A. Mirabadi, "Railway track condition monitoring using FBG and FPI fiber optic sensors," in Proc. of the IET International Conference on Railway Condition Monitoring, 2006, pp. 198-203.

[11] G. Laffont, N. Roussel, S. Rougeault, J. Boussoir, L. Maurin, and P. Ferdinand, "Innovative FBG sensing techniques for the railway industry: application to overhead contact line monitoring," in Proc of the 20th International Conference on Optical Fibre Sensors, 5 October 2009.

[12] C. Wei, Q. Xin, W. H. Chung, S. Y. Liu, H. Y. Tam, and S. L. Ho, "Real-time train wheel condition monitoring by fiber Bragg grating sensors," *International Journal of Distributed Sensor Networks*, vol. 8, no. 1, 2011.

[13] B. Liang, S. D. Iwnicki, Y. Zhao, and D. Crosbee, "Railway wheel-flat and rail surface defect modelling and analysis by time–frequency techniques," *International Journal of Vehicle Mechanics and Mobility*, vol. 51, no. 9, pp. 1403-1421, 2013.

[14] B. Jagadeep, P. K. Kumar, and K. V. Subbaiah, "Stress Analysis on Rail Wheel Contact," *International Journal of Research in Engineering, Science and Management*, vol. 1, no. 5, pp. 47-52, 2018.

[15] G. Kouroussis, D. Kinet, E. Mendoza, J. Dupuy, V. Moeyaert, and C. Caucheteur, "Edge-filter technique and dominant frequency analysis for

high-speed railway monitoring with fiber bragg grating," *Smart Materials and Structures*, vol. 25, no. 7, 2016.

[16] F. Yang, D. He, T. Wang, and Y. Wang, "The real-time safety monitoring of railway condition by FBG sensor," in *Proc. of the IEEE 9th International Conference on Electronic Measurement & Instruments,August, 2009*.

[17] K. Vinnarasi and S. Sundaravadivelu, "Strain Measurement Using Fiber Bragg Granting Sensor for Crack Detection," *International Journal of Advanced Engineering Research and Science*, vol. 4, no. 3, pp. 219-223, 2017.

[18] W. Zhaoxia, Y. Dongmei, L. Zhiquan, "Bridge structure monitoring system based on practical FBG," in *Proc. of the IEEE International Conference on Automation and Logistics, September, 2008,* pp. 2714-2717.

[19] V. Shekar, S. H. Petro, and H. V. GangaRao, "Fiber-reinforced polymer composite bridges in West Virginia," *Transportation Research Record*, vol. 1819, no. 1, pp. 378-384, 2003.

[20] A. Kerrouche, J. Leighton, W. Boyle, Y. M. Gebremichael, T. Sun, K. T. Grattan, and B. Taljsten, "Strain Measurement on a Rail Bridge Loaded to Failure Using a Fiber Bragg Grating-Based Distributed Sensor System," *IEEE Sensors Journal*, vol. 8, no. 12, pp. 2059-2065, 2008.

[21] R. F. Wright, P. Lu, J. Devkota, F. Lu, M. Ziomek-Moroz, and P. R. Ohodnicki, "Corrosion Sensors for Structural Health Monitoring of Oil and Natural Gas Infrastructure: A Review," *Sensors*, vol. 19, no. 18, 2019.

[22] R. Chen, W. Liu, G. Huang, D. Wang, X. Qin, and W. Feng, "Hydrogen sulfide sensor based on tapered fiber sandwiched between two molybdenum disulfide/citric acid composite membrane coated long-period fiber gratings," *Applied Optics*, vol. 57, no. 33, pp. 9755-9759, 2018.

CHILDREN'S EDUCATION SOCIETY (Regd.)
THE OXFORD COLLEGE OF ENGINEERING
(Recognised by the Govt. of Karnataka, Affiliated to Visvesvaraya Technological University, Belagavi.
Approved by A.I.C.T.E. New Delhi.
Recognised by UGC Under Section 2(f)
Bommanahalli, Hosur Road, Bangalore - 560 068.
Ph: 080-61754601/602, Fax: 080 - 25730551
E-mail: engprincipal@theoxford.edu Web: www.theoxfordengg.org

Sl.No	Name of the teacher	Title of the book/chapters published	Title of the paper	Title of the proceedings of the conference	Year of publication	ISBN/ISSN number of the proceeding	Department Name	Name of the publisher	Weblink
1	Dr. Preeta Sharan		Nonlinear Response of Fiber Bragg Grating for Health Monitoring of Railway Track	INDIACOM 2020	2020	978-93-80544-38-0	ECE	IEEE	https://ieeexplore.ieee.org/document/9083699
2	V. L. Nandhini, K. Suresh BabuSandip Kumar RoyPreeta Sharan		Multichannel Biosensor for Skin Type Analysis	2020 7th International Conference on Computing for Sustainable Global Development (INDIACom)	2020	978-981-15-5242-7	ECE	Algorithms for Intelligent Systems, Springer	https://www.researchgate.net/publication/343223308_Multichannel_Biosensor_for_Skin_Type_Analysis
3	Harshada J. Patil; D S Raksha; Rohit Dattatraya Hegde; V R Ashwini; T S Indumathi; Preeta Sharan		Design and Analysis of Optical Sensor for Detection of Cancer Biomarkers	2020 IEEE International Conference on Electronics, Computing and Communication Technologies (CONECCT)	2020	978-1-7281-6828-9	ECE	IEEE Explorer	https://ieeexplore.ieee.org/document/9198421
4	Kishan Shetty; Kiran Saravana; M K Vikas Vinugna; Brinda N Murthy; Seema Patil; Preeta Sharan		Quantum Dot Cellular Automata Based RBG to Gray Scale Conversion in Bio-Medical Applications	2020 7th International Conference on Computing for Sustainable Global Development (INDIACom)	2020	978-93-80544-38-0	ECE	IEEE Explorer	https://ieeexplore.ieee.org/abstract/document/9083702

5	Sumita Mishra; Aditya Prakash; Sandin Kumar Roy; Preeta Sharan; Nidhi Mathur		Breast Cancer Detection using Thermal Images and Deep Learning	2020 7th International Conference on Computing for Sustainable Global Development (INDIACom)	2020	978-93-80544-38-0	ECE	IEEE Explorer	https://ieeexplore.ieee.org/abstract/document/9083722
6	Sumeet Kulkarni; Nusrat hulla Khan; Preeta Sharan; B Ranjith		Bacterial Analysis of Drinking Water using Photonic Crystal based Optical Sensor	2020 7th International Conference on Computing for Sustainable Global Development (INDIACom)	2020	978-93-80544-38-0	ECE	IEEE Explorer	https://ieeexplore.ieee.org/abstract/document/9083711
7	Suchandana Mishra ; Preeta Sharan ; Sushma P Kamath ; Saara K		Monitoring of Rail Wheel Impact for Various Train Speeds	2021 7th International Conference on Computing for Sustainable Global Development (INDIACom)	2021	978-93-80544-38-0	ECE	IEEE Explorer	https://ieeexplore.ieee.org/document/9441456
8	Amita Asthana ,Anil Kumar, Sumita Mishra, Preeta Sharan, Mohammed Tabrez		Design of Single Bit Low Power Multiply Accumulate (MAC) Unit Using Quantum Dot Cellular Automata	2021 7th International Conference on Computing for Sustainable Global Development (INDIACom)	2021	978-93-80544-38-0	ECE	IEEE Explorer	https://ieeexplore.ieee.org/document/9441289
9	Preeta Sharan, Manpreet Singh Manna and Inderpreet Kaur	Smart Monitoring of Flat Wheel in Railway Using Optical Sensors			2021	10.5772/intechopen.97847	ECE	Intech Open	https://www.intechopen.com/online-first/76932