IN THE LOOP

A QUARTERLY NEWSLETTER
OF
IEEE BOMBAY SECTION

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INDEX

TITLE

PAGE NO.

PODIUM

Dr. Satyanarayana Bheesette
Chair, IEEE Bombay Section

At the outset, I would like to wish you and to your families a very happy and prosperous Diwali. May this festival of lights symbolically mark win of human perseverance – armed with innovations in science, technology, medicine, and pharmacy – over the Covid-19 demon. Taking advantage of easing of the Covid situation – but yet ensuring the prevailing norms and guidelines – the student branches, the chapters/societies as well as the Section started organising many events in the hybrid mode. It was felt fantastic to be able to interact in person – even though with masks on!

Bombay Section is known for its SIGHT activities. We won the 2021 R10 Humanitarian Technology Activities Outstanding Section Award by R10 Awards and Recognition Committee. The Faculty Development Program on Artificial Intelligence for Electrical Engineering in collaboration with Industry Experts in the domain by the EAC and RIT Rajaramnagar was funded by the 2021 Region-10 Call for Capacity Building Workshop under Educational Activity. Our Technical & Professional Activities Committee (TPAC), in collaboration with the IEEE Student Branch of DBCE-Goa, NIT-Raipur and SBJITMR-Nagpur organised a National Level Coding Competition called CodeChef.

IEEE Day events were organised by a large number of students branches over an extended period by organising many creating events and engagements. The Section rewarded the best branches among them with cash prizes.

The Section has done exceedingly well over the past quarter and has also won many awards and accolades. It was the undiminished enthusiasm, careful planning and excellent organisation of various events – small and big- which kept the scope ticking continuously. You will find brief reports on some of these events in the following pages. I would like to mention below a few of them.

Prof. Vijayalaxmi Kumbhar (PCCOER), Dr. Lochan Jolly (TCET) were appointed as the IEEE STEM Ambassadors recognising their outstanding contributions to the pre-university students. The Section is embarking on more ambitious initiatives in this area capitalising on their pioneering efforts. SIES GST, Nerul and Don Bosco College of Engineering, Goa have won the IEEE Regional Exemplary Student Branch Awards 2021. Anjali Masur and Shivam Grover won the IEEE Computer Society's Richard E. Merwin Student Scholarship for spring 2021. Pooja Verma, awarded the IEEE Region10 Young Professionals ambassador by the IEEE Region 10 Young Professionals REVOL 2021. Biju Balakrishnan and Shubham Mishra (Techopedia 9.0) and Atharva Dhananjay and Vedant Behel (IEEE CIS #PowerEveryone) were declared the Bronze winners of the IEEE Student Awards Committee & IEEE MGA Student Activities Committee's 2021 Darrel Chong Student Activity Award.

We are all set for the next edition of IBSSC, flagship conference of our Section to be held in hybrid mode in IIITM Gwalior during November 18-20, 2021.

INTERVIEW

Prof. Shrikrishna V. Kulkarni, FINAE, FIEEE

Department of Electrical Engineering, IIT Bombay

Prof. Kulkarni has had an illustrious history with academia. Having studied at the prestigious institutions of VJTI Mumbai and IIT Bombay, he went on to serve as a professor at his alma mater. Today, he is the Institute Chair Professor and Dean (Administrative Affairs) at IIT Bombay. Excerpts from an enlightening interview we had with him:

1. You not only completed your M.Tech and Ph.D from IIT Bombay but also went on to serve the institute on various capacities. How is your experience at IIT Bombay after joining the Institute after a long industrial stint?

Yes, IIT Bombay is my alma mater. I did M. Tech from IIT Bombay in 1988-1989 and joined an industry in Mumbai (Transformer Division, Crompton Greaves Limited) in March 1990. Later, I registered for PhD program at IIT Bombay from January 1996 and defended my PhD thesis in 2000. I gradually developed and nurtured interest in academics and research during my industrial tenure. I regularly published my practical research in journals and conferences at that time and my inclination towards academia was reinforced during the PhD period. I joined IIT Bombay in 2001 and immediately embarked upon writing a book on transformers, in which I tried to have an appropriate blend of theory and practice. My industrial stint helped me to do practical and applied research. Through research work done by my postgraduate and doctoral students, insight into many intricate practical phenomena was obtained. I was quite occupied in the beginning for about 10 years doing teaching, research, educational outreach, and industry consultancy. In 2015, I was given the first administrative responsibility as Associate Dean (Infrastructure and Planning) by the Institute. It was certainly challenging assignment and I learned many aspects of administration including procurement of equipment/ services and human resource management. In this tenure, Institute's 1 MW Rooftop Solar project was completed. I finished my term as Associate Dean in March 2018 and for next two years I got a good break from administrative duties to concentrate on my teaching and research again and I also delivered an NPTEL MOOC Course on 'Electrical Equipment and Machines: Finite Element Analysis'. In August 2020, I was again asked by the Institute to take the role of Dean – Administrative Affairs. I look at these administrative positions as opportunities to contribute to the Institute. These positions offer a valuable experience in which one has to interact with different stakeholders of the Institute and take decisions with due diligence in consultation with colleagues in administration.

2. You have expertise over the hard-core aspect of Electrical Engineering such as transformer design, electromagnetics, and high voltage. What has inspired you to choose these difficult topics? What are the emerging trends you see in this domain?

My research areas are mostly industry-relevant and it is important that there should be at least some researchers in our country working in so called 'mature' areas. This would ensure that optimization and/or quality enhancement of corresponding equipment continue to happen. Electromagnetics is generally perceived as difficult-to-teach subject by teachers and difficult-to-understand subject by students.
 I like to teach such subjects because you can derive immense satisfaction when you make difficult concepts simple and observe that students start enjoying and liking the subject. My expertise in these areas has helped me to take up research in today's some of the most relevant areas including 1. Electromagnetics in electric vehicles and 2. Dielectric materials for energy storage.

3. You have guided more than 15 Ph.D students and have about 200 publications with close to 4000 citations along with several books and book chapters. What advice would you like to give to our young professionals who aspire to have their own work published?

I would like to say that young professionals should develop the habit of reading good reference books/ monographs and technical papers on topics of their interest and of relevance today. When one starts reading literature, many concepts/ involved formulations may not be understood initially. However, after reading sizable numbers of papers, understanding and learning will get slowly and steadily consolidated and research ideas would start to emerge. It is also important to find research gaps in literature and see how strengths/ skill-sets can be used to make contributions in the 'research space' available in quickest possible time. We should remember that there is very competitive environment for doing research in any current/ emerging area and speed of getting results always matters.

4. Can you please tell us about your 3 patents? What would you like to advise the budding researchers about the significance of working on patentable technology? What do think about research for publication and research for technology development.

If one's idea is novel, useful and non-obvious (all three criteria should be satisfied), a patent application should be filed. However, it gives great satisfaction, if your intellectual property finally goes to market and has useful societal impact. There are various enabling mechanisms these days for making this happen from Government and private agencies. Needless to say, much greater efforts are required for aligning efforts for successful deployment and acceptability of the developed technology as compared to research efforts required for publications.

5. You have been a part of different national and international bodies and committees. Can you share your experience?

It is very important to contribute through various kinds of voluntary activities, viz. editorships for journals, organization of workshops/ conferences, invited talks, and serving on various committees. These activities help you in networking with researchers/ professionals working in your areas and open up possibilities of collaborations in addition to giving you visibility. One needs to plan and choose these activities judiciously given other commitments and constraints.

6. What are the possible start-ups and entrepreneurial opportunities you see in the field of electrical engineering?

I would say that possibilities are unlimited. For example, the way India has progressed rapidly in renewable/ green energy area over the last one decade, there are many opportunities for budding entrepreneurs in production, storage, installation, service, consultancy, and maintenance/ diagnostic aspects of energy. Another area is that of Electric Vehicles, for which enough electrical engineering areas are available for innovation, some of which are power electronics, electromagnetics, charging infrastructure, and energy storage/ trading.

7. IEEE is an organization widely known in academic, engineering, and science fields. How did you come to know about IEEE and when did you become a member? How was your experience with IEEE?

I became IEEE Member way back in 1999 when I was working in industry. I came to know about IEEE through its publications and standards. Needless to say, I gained tremendously from the services provided by IEEE. Many of my papers are published in IEEE Journals and Conferences. It gives us great pleasure and satisfaction when our paper gets accepted for publication in an IEEE Journal after a meticulous peer-review procedure. We learn a lot from expert reviewers in our field through their comments and suggestions.

I was Editor of IEEE Transactions on Power Delivery (2012-2019) and it was really an enriching professional experience of working with global experts for evaluating submitted articles. I was elevated to IEEE Fellow Grade in 2019. These days, I am also volunteering for IEEE Bombay Section and IEEE India Council. Doing a voluntary work for IEEE gives me professional satisfaction and vast opportunities for networking.

8. How was your experience as an Execom member in IEEE Bombay section?

I was the Chair of Educational Activities Committee for 2019-2020 period and I organized Faculty Development Programs and Webinars on relevant topics. Currently I am the Chair of PES/IAS Joint Chapter and this Chapter has already organized about 10 webinars on current topics by global experts. Any such volunteering work is a team activity and if the work is properly distributed and planned, it can be executed with optimum individual efforts.

9. What is your advice to Student Members and YPs so that they too can be active volunteers of IEEE?

Student Members and YPs should look for volunteering opportunities which are generally available in plenty, take initiatives as a member of volunteering teams, and derive satisfaction of having contributed to your profession and society!

EVENT DIGEST

SMELT 2.0

Student Membership Enhancement and Leadership Development (SMELT) saw 560+ registrations. SMELT 2.0 acted as a platform for students, young professionals and faculty members to educate themselves on various opportunities provided by IEEE to them in the form of funding, grants, recognition and services along with a competitive environment to showcase their best practices.

Day 1 i.e. 28th August, 2021 saw insightful sessions on IEEE membership benefits by Dr. Rajesh Ingle, Vice Chair of IEEE India Council MDC in addition to distinguished speakers and Richard E. Merwin Scholars who shared their experience on drafting a good nomination for the same.

Day 2 was packed with interactive sessions on funding, grants, IEEE OU Analytics and SB Best practices Poster contest. Ms. Warunika Hippola, Region 10 Student Representative graced this event with her informative session on Volunteering Opportunities in IEEE.

The third day of SMELT 2.0 consisted of sessions on IEEE societies, their benefits as well as in-depth sessions on Research paper publication using IEEE Xplore by Dr. Satyanarayan Bheesette, chair of IEEE Bombay Section. The Joint SB Leadership contest on day 4 saw remarkable proposals from all participating Student Branches.

IEEE BOMBAY SECTION SAC

IEEE Bombay Section, Technical and Professional Activities Committee and IEEE Student Branch, NIT RAIPUR

OCTAFEST'21

IEEE Bombay Section TPAC in collaboration with IEEE SB, NIT Raipur is organizing Octafest'21 to promote Open Source Contribution as a part of Hacktoberfest. It is a month-long fest scheduled from 6th October, 2021 to 28th October, 2021. It consists of various workshops to impart quality technical content. It also aims to provide a forum where students can come together and tinker with highly skilled professionals and academicians to contribute to Open Source.

The Kickoff Event was organized on 5th October, 2021 to promote Octafest'21. Dr. R N Patel, Branch Counselor, IEEE SB, NIT Raipur briefly described the IEEE SB NIT Raipur and IEEE BS TPAC and upcoming events to be organized by IEEE BS TPAC. Mrs. Aanchal Mishra, Student Community Intern at Postman shared about what Hacktoberfest is all about and her excitement to join the journey as a speaker. Prof. Yeshudas Muttu, Vice Chair, IEEE BS TPAC briefed about the IEEE Day celebration and announced the triumph of Octafest'21. He then announced a workshop on Git and Github introduction for beginners to get them started with Open Source. Mr. Hannan Satopay proposed the vote of thanks and asked the attendees to stay connected on their Discord server for further updates.

Some upcoming notable events include Knock'em Out: Solving DSA and CP by Sanjeeb Nath, Ex-Adobe intern, Hangout with Wolfram and Github by Aman Kumar Dewangan, Ex-Wolfram Summer School student, Roadmap to Microsoft Intern by Vibali Joshi, Upcoming Microsoft intern and Game Development with Processing by Priyanshi Sharma, Ex-Google intern. Few fun events like Chess Masters and Valorant Night have also been scheduled as a part of Octafest'21.

GABFEST 21

GABFEST 21, an annual flagship event was organized by IEEE Nagpur Subsection in association with IEEE S. B. Jain Student Branch on October 3rd, 2021 in virtual mode. Many astonishing speakers were invited for splendid talks on various tracks.

For Industrial track, Mr. Ranjit Singh, MD & CEO at Syslogyx Technologies, Chairman for CII Vidarbha Zone, an Entrepreneur, a Sports Fanatic, a Technology Enthusiast and a Mentor was invited. An insight was provided by him on industrial requirement, skill enhancement, need of industry and opportunities in the IT sector.

For Technical track, Mr. Nisarg Gandhewar, assistant professor at S. B. Jain Institute of Technology, Management and Research Nagpur, a technical enthusiast and an expert for AI, Deep Learning, Computer Vision, IOT was invited. An insight with a technical workshop was conducted on "AI for Everyone" enabling you to develop your own AI based bots.

For Women in Engineering track, Dr. Aarti Karande, assistant professor at Sardar Patel Institute of Technology, a woman in engineering with technical strength and excellence, was invited. An insight was provided on WiE, WiE Awards, benefits of joining WiE and their membership benefits.

For Entrepreneurship track, Ms. Jyotika Kapoor, an experienced professional in varied industries, founder of infinite space gaming & empowerment, a body-mind coach, a therapist and a facilitator was invited. She provided a deep insight on bursting out myths on entrepreneurship development and how to become a successful entrepreneur.

All the volunteers were proud with the feedback of the event and also that they have made a difference in these few days.

IEEE NAGPUR SUBSECTION and IEEE S.B. JAIN STUDENT BRANCH

IEEE MANIT STUDENT BRANCH
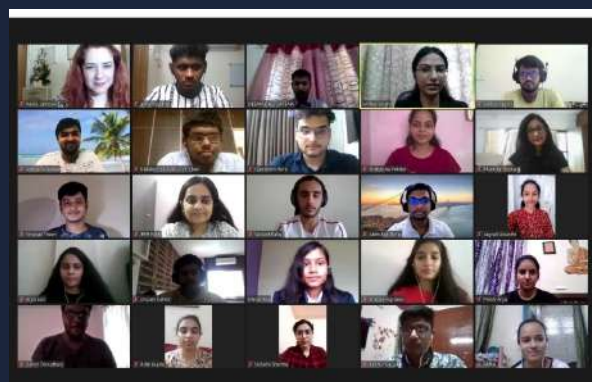
SAMWAD'21

To applaud the unconquerable essence of women technocrats and to celebrate the legacy of women in engineering, IEEE MANIT STUDENT BRANCH conducted their annual event SAMWAD on the 10th of October 2021 in online mode. SAMWAD'21 comprised of an eclectic range of exhilarating national-level competitions and guest lectures. SAMWAD'21 had a slew of exciting events including a drawing competition, a debate and an extempore. The competition prize money was worth 5K. SAMWAD'21 witnessed an overwhelming participation of 500 plus students.

SAMWAD'21 focused to shatter the age-old orthodoxy that "women are not suited for high collar jobs or jobs that require brains and such jobs should be left to the men." It had two quintessential guests who precisely broke all the glass ceilings: Ms. Rania who works at the Greek Astronomy institute and who is a Global Educator, a STEM Instructor, an ICT Teacher, a Researcher, a Global Ambassador and a recipient of 92 accolades, both national and international including the International Women's Pride Award 2021 graced the stage with her exemplary presence and enchanted the audience with her enlightening words and Ms. Jagarti Awasthi who brought laurels by achieving an unprecedented rank in the country's most coveted examination.

The perspicacious discussion on "Innovative Approaches to Neurosciences and STEM" was helmed by our guest of honor, Ms. Rania Lampou, and an enlightening conversation with Ms. Jagrati Awasthi augmented the participants for their future endeavors. The event successfully culminated with the announcement of the winners of the competitions.

A TALK ON 'GRID MODERNIZATION: TECHNOLOGICAL ADVANCEMENTS BEYOND SMART GRID'

IEEE BOMBAY SECTION IAS/PES JOINT CHAPTER

The IEEE PES/IAS Joint Chapter of the Bombay Section organized a talk on "Grid Modernization: Technological Advancements Beyond Smart Grid" by John D. McDonald, P.E. IEEE PES Past President, IEEE Life Fellow, CIGRE Honorary Member (2021), CIGRE Distinguished Member (2016) GE Renewable Energy – Grid Solutions USA, on August 2, 2021, at 7.00 PM IST through virtual mode.

This talk familiarized the participants with a vision for Grid Modernization, focusing on technological advancements beyond Smart grids. The technological advancements include discussions of key industry/societal trends, Smart Grid concepts, holistic solutions, integration of microgrids and distributed generation, and Advanced Distribution Management System (ADMS) software applications. The talk also covered the feeder automation business models, managing different types of data, big data, analytics, enterprise data management, Smart Grid standards and interoperability, and Smart Grid deployments and lessons learned.

Number of Participants: 59

IEEE BOMBAY SECTION INDUSTRIAL RELATIONS COMMITEE (IRC)

LECTURE ON 'RECENT ADVANCEMENT ON HIGH VOLTAGE EQUIPMENTS AND TECHNOLOGIES'

IRC team has been continuously interacting with various industries within geographical domain of IEEE Bombay Section, who are potentially interested in participating in various IEEE activities.IRC is organizing lecture series on recent technology development activities undertaken by reputed industries from India and abroad on IEEE Bombay Section forum. In this series, a lecture was delivered by Dr. Z. H. Sholapurwala, Chairman & Managing Director, Zeonics, Bangalore, India on "Recent advancement on high voltage equipment and technologies" as mentioned in Fig.1 in August 2021 followed by another lecture by Shri Subhro Roy, Engineering Manager, Regional Application Centre, Asia-Pacific, Schneider Electric on "Latest trends in MV switchgears: Greener, Safer, Smarter, Higher Life Cycle Value" in September 2021. A large number of participants from India and abroad attended these events.

IRC also aims to assist any industry requiring technical consultancy for technological development activities undertaken by them and may request suitable experts from IEEE, if necessary, to resolve their technical challenges. IEEE Bombay Section arrange lectures, conferences, seminars, workshops, etc., for professional enrichment of participants and its IRC team encourage industries to participate in these events. IRC meeting is conducted on first Sunday of every month, at 17:00 hrs – 18:00 hrs in virtual mode via WebEx to plan, execute and monitor various IRC activities within IEEE Bombay Section. IRC invites industry professional to deliver talks in IRC lecture series, demonstrate their products and welcome suggestions to enhance industry academia interface.

2021 REGION 10 – POCO VIRTUAL WORKSHOP

TPAC organized a one-day Virtual IEEE Region 10 Panel of Conference Organizers (POCO) Workshop on 21st August, 2021. POCO-2021 was a high-level Workshop aimed to address all the needs of Conference Organizers throughout the Bombay Section. The event was targeted to all Conference Organizers and Associated Team Members that are actively involved in the conference management, locally and internationally.

Deepak Mathur (Director, IEEE Region-10) was the Chief Guest during the Inaugural Session. Mr. Mathur appreciated the initiatives of Bombay Section in conducting a series of important events and also winning various awards and accolades. B. Satyanarayana (Chair, IEEE Bombay Section) and Abhay Phansikar (Past Chair, IEEE Bombay Section) addressed the gathering about the key aspects in organizing a successful IEEE Conference. Anand Gharpure (Chair Elect, IEEE Bombay Section) detailed on pre-conference planning and process of submitting a conference application. Saurabh Mehta (Secretary, IEEE Bombay Section) and Kiran Talele (Treasurer, IEEE Bombay Section) deliberated upon Roles and functions of various committees, and financial planning. A Panel discussion was also conducted on the topic of Sponsorship Opportunities, and Collaborations with various IEEE Societies; the panellists were Pradyumn Chaturvedi (Chair, IEEE Bombay Section Joint Chapter of PELS-IES), Vinit Kotak (Past Vice-Chair, IEEE Bombay Section), Ashwini Kotrashetti (Chair, IEEE Bombay Section MTT-S Chapter) and B. Satyanarayana (Chair, IEEE Bombay Section). The panel answered the queries raised by the participants.

During the post lunch session, Michael Ong (Conference Quality Committee Chair, IEEE Region-10) and Sunil Bhat (Conference Chair, IEEE Bombay Section) talked about the important aspects of Conference Quality and Management. S. Thangaprakash (ExeCom Member, IEEE India Council) elaborated upon managing review process effectively in his session. R N Patel (TPAC Chair, IEEE Bombay Section) detailed the process of publishing the conference proceedings with IEEE Explore. During the valedictory session, participants shared their oral and written feedbacks; and also expressed the need for conducting such event at regular intervals. There were more than 70 participants from all across the IEEE Bombay Section Geography as well as participants from other sections. The Program was financially supported by IEEE Bombay Section and IEEE R-10 CQM. The program was coordinated by R N Patel (Chair TPAC, IEEE Bombay Section) and Lalita Gupta (Core Member TPAC, IEEE Bombay Section).
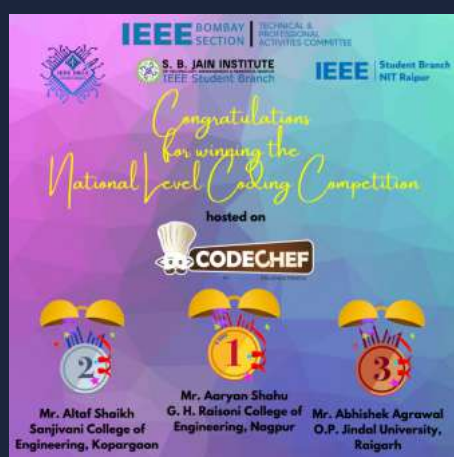
IEEE BOMBAY SECTION TECHNICAL AND PROFESSIONAL ACTIVITIES COMMITTEE
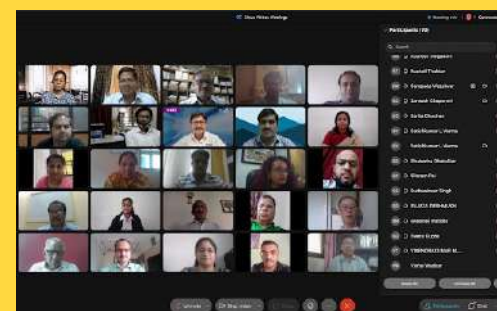
IEEE BOMBAY SECTION TPAC COMMITTEE

NATIONAL LEVEL CODING COMPETITION

IEEE Bombay Section Technical & Professional Activities Committee in association with IEEE DBCE – Goa, IEEE NIT – Raipur and IEEE S.B. Jain – Nagpur student Branches organized a National Level Coding Competition hosted on CodeChef platform on 4th September 2021. The industry oriented problem statements were taken from CodeChef team and framed by the organizing team. The competition received an overwhelming response of about 120+ participants from various institutes across the Nation.

IEEE BUZZ

YOUNG PROFESSIONALS MEET-UP 2021

IEEE Bombay Section YP, in association with IEEE Bombay Section SAC, SIGHT and MDC, with support of IEEE YP is going to conduct IEEE Bombay Section YP Meet-up 2021. The event is going to be an offline, physical meet, where Student members and YP members from across the section are going to attend, interact, network, and communicate with experienced leaders, students and professionals. The event will have keynote sessions, panel discussions, lunch, delegate kits, contests, etc.
The event doesn't have any registration fee and is dated for Hosting on 31st October 2021 from 10:00am to 5:00pm at BVB KMIAS, Vashi, Navi Mumbai.

"MAKE IN INDIA INITIATIVE - CHALLENGES, OPPORTUNITIES AND ROAD AHEAD"

Make in India is a landmark initiative of Government of India to facilitate investment, foster innovation, build best in class infrastructure and make India a hub for manufacturing. The development of a robust manufacturing sector continues to be a key priority of the Government of India, which has the potential not only to take economic growth to a higher trajectory but also to provide employment to a large pool of our young labour force. The defence ministry has earmarked a significant portion of its modernization funds under the capital acquisition budget for purchases from the domestic manufacturers. It is a part of Government's larger push to make India- currently the world's second biggest arms importer, self-reliant in the field of defence.

ENERGY SECURITY FOR INDIA'S DEVELOPMENT IN A CARBON CONSTRAINED WORLD

There is strong correlation between Human Development Index (HDI) and Per Capita Energy Consumption all over the world. With rising climate issues, a developing country like India faces the challenge of striking a balance between enhancing the quality of human life as well as keeping a control over the climate crisis. Researchers across the globe are putting sustained efforts to control CO2 emissions and associated climate changes, for avoiding serious threat to the environment. Nuclear power can make a vital contribution to meeting zero emission target while delivering increasingly large quantities of base load electricity needed for global economic development. Along with growth of non-emitting electric power, decarbonisation of energy infrastructure as well as production processes is also essential.

IEEE BOMBAY SECTION YP

OUR MARVELS

Dr. Jayant G. Joshi
Engineers' Day Award-2021

Dr. Jayant G. Joshi (Senior Member, IEEE) has been awarded with the Engineers' Day 2021 Certificate of Appreciation by Lions International Club, Nashik Road on 18 September 2021. It has been conferred to acknowledge his endless contributions towards society.

IEEE CIS SBC - GHRCE

IEEE CIS Student Branch Chapter - G H Raisoni College of Engineering, Nagpur has been selected to receive the IEEE CIS Outstanding Chapter Award 2022 with the citation "For the innovative and wide range of diverse and inclusive activities which connect research, education and industry in the field of computational intelligence".

The award includes an honorarium of USD 2,000 along with a certificate. The IEEE Computational Intelligence Society annually recognizes significant contributions and meritorious service in the field of computational intelligence. The Outstanding Chapter Award is awarded to recognise the chapter that provides the greatest overall contribution and service to its members. The judging criteria includes the dissemination activities about the chapter and society events, innovative ideas to promote Computational Intelligence Society and serve the local scientific, professional, governmental, and educational, and the ability of the chapter to recruit and retain members.

The strong nomination packet was assembled by Mr. Atharva Deolalikar(Chair, IEEE CIS Student Branch Chapter) to recognize the chapter's accomplishments.

The chapter was inaugurated in January 2020 with the vision of providing new insights and solutions to accelerate innovation, productivity, and growth for humanity. Within 6-months after installation of the chapter, it received funding of USD 2200 by IEEE CIS Society. The chapter conducted unique and productive events such as 'Alexa Skill Development Workshop & Hackathon', 'International AI Summit 2.0', 'Life of Open Source', 'Learn While Corona', 'Industry Connect 1.0', 'SheHacks', 'SheCodes', and 'Tech Convocation' under the guidance of former Mr. Vedant Bahel(Chapter Chair, IEEE CIS Student Branch Chapter) and Prof. A. Thomas(Chapter Advisor, IEEE CIS Student Branch Chapter) during the past year.

A R T I C L E S

Wearable Microstrip Patch Antennas: A Promising Element of Wearable Technology

In the present era, wearable technology is playing a vital role in day-to-day activities of human being such as patient monitoring, personal digital assistants (PDAs), military and defense, biomedical devices, smart phones, wearable computers, biotelemetry systems, public safety devices etc. The function of this antenna is to establish a faithful communication link between wearer and end equipment or vice-versa for the purpose of data communication. These antennas are integral part of wearer clothing on different parts of body for on-body and off-body communication applications and systems (body centric communication). On-body means to establish the communication between wearable devices on the body whereas off body means to with external networks. The objective of this article is to illustrate the details of wearable antennas in the recent wearable technology.

Dr. Jayant G. Joshi Senior Member IEEE Department of Electronics and Telecommunication Engineering Government Polytechnic Nashik (MS) India. jgjoshiantenna@gmail.com
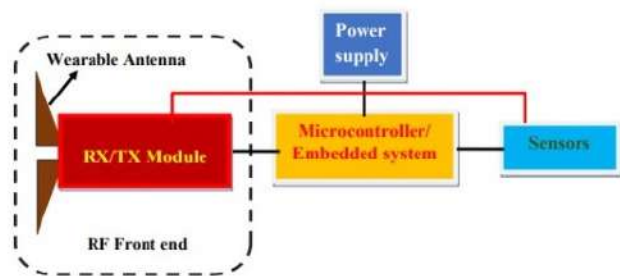
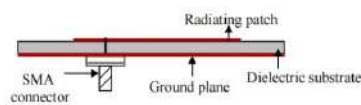Fig.1 Block diagram showing interface of wearable antennas

Fig.2 Cross-sectional view of microstrip patch antenna.

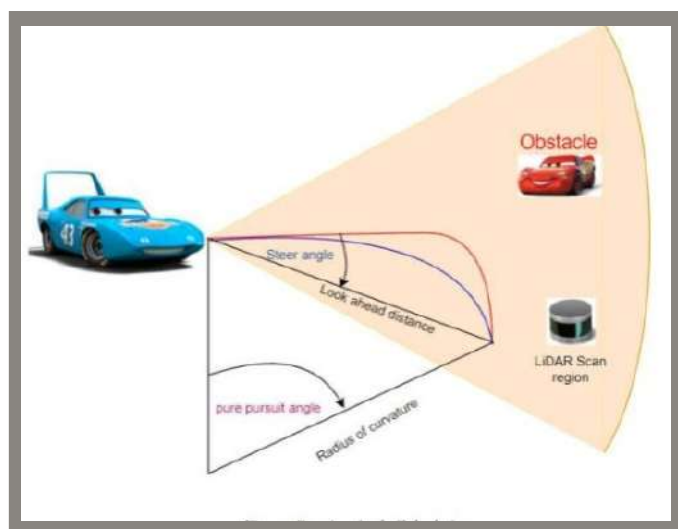Fig. 3 Photographs of wearable antennas with applications

Fig.1 depicts the block diagram showing the interface of wearable antenna with the RF circuitry and end equipment or system (external world). This antenna is used to establish interface between RF circuitry and the end equipment/device in wireless approach. Microstrip patch antennas (MPA) consist of dielectric substrates having conducting radiation patch and ground plane. The MPAs are fed using feeding techniques like coaxial, proximity, Wearable Antenna Power supply Microcontroller/ RX/TX Module Embedded system Sensors Fig.1 Block diagram showing interface of wearable antennas RF Front end CPW etc. In conventional MPAs, substates used may be FR4/RT Duriod/glass epoxy laminates etc. whereas for in wearable antennas, the dielectric substrates used are cloth or textile-based flexible material. These substrates are Cotton, Polyester, Nylon, Polypropylene, Denim, Jean, Foam, Nomex etc. Wearable antennas are hidden inside the clothing of wearer that is the person who is going to wear the clothing with antennas. Advanced techniques like metamaterial loading, slotting, fractal approach etc. are used to design and develop these antennas. Nowadays, embroidered antennas are used. These antennas are widely used for applications in different frequency bands such as ISM, Wi-Fi, Wi-Max, BAN, MBAN, public safety etc. Fig.2 shows the cross-sectional view of wearable microstrip patch antenna. The radiating patch and ground plane is made up of conducting material like copper tape or conducting paint or spray.

It is desirable that the wearable antenna should be flexible i.e. conformal so that the antenna structure should bend according to body parts or with respect to body movements. Metamaterial is also used to load wearable antennas to reduce the size of antennas as well to reduce the deposition of electromagnetic field that is specific absorption rate (SAR) due to the fringing field entering in the human body tissues. The performance of wearable antennas may be affected due to its bending according to shape of human/user body and deposition of electromagnetic signals in the soft tissues of human body. RF and microwave instrumentation systems are used to test basic parameters such as reflection coefficient, study of radiation pattern, gain. For wearable antennas important tests are study of bending effects and SAR measurement. Author of this article has designed, fabricated, tested and implemented different configurations of wearable antennas using typical Nylon, Polypropylene textile/cloth-based and foam substrates. Fig.3 exhibits the photographs of various wearable antennas fabricated and tested by the author of the article. These photographs show the installation of wearable antennas with applications.

Herbie Goes Ubiquitous!!

Our lives are certainly as envisioned in an H.G. Wells novel. Cut back to 1968, little did Walt Disney know that the fictional; sentient anthropomorphic that it created would one day hit the road in the not so utopian future. Sentience is linked to Autonomous driving vehicles that seem to be the future of the automobile industry based on the current developments being made in the field by various industry giants such as Tesla, Audi, Alphabet and Uber. Well, we wouldn't want a car without windows, would we? This technology gives us an upper hand in dealing with daily increasing traffic related problems. The architecture of this sentient technology is the amalgamation of perception, mapping and control.

The mapping algorithms such as FastSLAM, FastSLAM 2.0, EKF Slam, etc. are used based on the requirements. The FastSLAM approach runs in $Nlog(N)$ time complexity with accuracy proportional to the number of particles. The landmarks are then fed to a rule-based path planner that generates a trajectory to follow based upon the relative positions of the obstacles

Saurabh Pednekar, Dr. Sunil Karamchandani (Senior Member, IEEE) Dwarkadas Jivanlal Sanghvi College of Engineering No. U-15, J.V.P.D. Scheme, Bhaktivedanta Swami Rd, Opp.Cooper Hospital, Vile Parle, Mumbai, Maharashtra 400056

The above figure depicts the calculations of look-ahead-distance for computation of pure pursuit angle and the radius of curvature needed for steering angle calculation based on the perception mechanism. The red line indicates the path planned by the mechanism whereas the blue line indicates the path taken by the vehicle during the maneuver. Control system basically provides the action to the stimulus that is created because of SLAM. The control architecture of an autonomous vehicle can be predominantly segregated into two control systems viz. the lateral and the longitudinal control system. Longitudinal mainly comprises the speed and acceleration control of the vehicle and is based on its current state, distance to the obstacle in front and the rate which obstacle is approaching or is moving away from it. The data required to calculate these parameters is collected from onboard speed and acceleration sensors mounted on the vehicle to get current car parameters and ranging devices like LiDAR and ultrasonic sensors for calculation parameters related to obstacles. The data from these sensors is used for velocity planning of the vehicle. The safety mechanism ensures that the maximum velocity can be capped to a certain value depending upon the accuracy and processing time of the control system.

The control mechanism comprises the throttle and brake control which is in most of the cases handled by an OEM motor and the steering angle controller. The steering can be controlled with the help of an PID controller due to its ease of computing and good performance. The error i.e. the difference between the desired steering value from the processing unit and the actual steering angle collected from the steering angle sensor is given to the controller which minimizes the error based upon the coefficients and generates a pulse width modulated (PWM) signal. Further this signal can be used to control the steering actuator motor. Usually the PID controller is used along with a deadband compensator to reduce the delay in time and minimize the error between the desired and the actual values of steering. This is important due to the fact that the steering actuator is a mechanical device and does not account for the small changes in the input which are crucial during lateral maneuvers. The compensator takes into account the minimal torque required to steer the vehicle. Utopian world where the highways are filled with a ghost handling the steering wheel, is what we are looking into. Along with the bantling, we too can steal forty winks on the freeway. Sentience being linked to AI in a way that Marty McFly and Doc Brown in the DeLorean will cease to be fiction. Unmanned Vehicles are something that Gottlieb Daimler would be proud of and Greta Thunberg would approve.

JOY OF VOLUNTEERING

AMAN KUMAR DEWANGAN

HEAD COORDINATOR,
IEEE STUDENT BRANCH, NIT RAIPUR ,
CORE MEMBER, TPAC IEEE BOMBAY SECTION

As the Head Coordinator of IEEE Student Branch NIT Raipur and Core member of IEEE Bombay Section Technical and Professional Committee, it has been an amazing experience for me, though the pandemic had a great affect on the normal working and connection between people being completely digital, we still have managed to keep all together to be together for the stand of humanity. There was a complete transition in the way events were being conducted over the period of time. But the constant efforts and hard work from the team helped us cope from the situation and we successfully organized some of the great events.

It was with the help of the enthusiastic volunteers and hard work of team members of Bombay Section TPAC and Student Branch NIT Raipur that we successfully organized Octafest'21, A Hacktoberfest promotional event to promote Open-Source Contribution and guide Beginners on how to get started to Open-Source Development in addition to various Workshops, Webinar and Fun-events.

I also have tremendous experience being part of IEEE Bombay Section TPAC for last 2 years continuously. It's really great to get to opportunity to interact with people from different background and region working together as a team and sharing their thoughts, ideas and experiences, and this has actually kept me motivated and dedicated to serve communities. Working with the IEEE Bombay Section TPAC I got the opportunity to be the Lead Organizer of the First Version of Octafest - Octafest'21 and deliver a Workshop as a Speaker as well. I look forward to more such opportunities and interactions to work with the team and would also motivate others to join such teams as it provides you great opportunities to learn, develop, interact, share and communicate to explore beyond part.

TATHAGAT

STUDENT REPRESENTATIVE
IEEE BOMBAY SECTION

My IEEE Volunteering Journey started in the early days of my engineering. I used to watch the IEEE Student Branch in my college hosting so many insightful and technically advanced events, that got me attracted towards it. The first event I got to participate in, was a quadruped robotics workshop in IEEE SB of SIT Lonavala, where I participated and even won the first prize in the contest. Then and there I decided that I want to be a part of IEEE. I attended the recruitment interviews and became a junior team member in the technical team of my SB. In the following one year, my dedication towards the SB and IEEE was so powerful, that the SB EXECOM appointed me as the next Chairman of my SB. That gave me the confidence to work even harder. In my tenure as the Chair, I along with my team hosted many events like robotics workshops, soft skills trainings, celebrity talk shows, tree plantation drives, solar workshop under SIGHT, etc.

Such exposure in IEEE and its activities motivated me even more to apply for a role in the IEEE Bombay Section Student Activities Committee, where I got selected as a member of the Design and Networking team. The seniors and Bombay Section EXECOM members saw my dedication and will, and motivated me to take the responsibility of the Section Student Representative, as an IEEE Bombay Section EXECOM member.

As the SSR, I have formed a strong and smart working team, with whom I've hosted and led many events such as Chairs meet, Counselors meet, SMELT 2.0, Spectrumania, Membership development sessions, etc. and helped many students, faculties and Student Branches in getting the most out of IEEE.

IEEE has been a strong pillar in helping me reach my highest potentials in academic learning as well as professional life, and I'm grateful that I got the opportunity to contribute towards the Advancement of Technology for Humanity.

RITESH JAISWAL

IEEE RCOEM STUDENT BRANCH
BOMBAY SECTION

Once you start identifying the wisdom gained from volunteering, there is no stepping back. Before I joined IEEE, I was a type of person who never used to like interacting with people and was not fully confident. Once I was oriented about IEEE by my college faculty, I thought to join IEEE just for the sake of doing something. I was new to the college and joined IEEE. As a student, I started with my student branch. There is no better place to start volunteering. I got a chance to volunteer for an event conducted by the student branch of my college which helped me get connected with IEEE members of my student branch. Then this volunteering experience helped me to get selected as a creative head in my SB. After this, we conducted some more events which added to my skills. After some time I gave the interview for IEEE Nagpur Subsection SAC and got selected as a Strategy and Ideation coordinator.

In IEEE NSS SAC I got a chance to interact and work with people from different student branches which boomed my confidence which automatically resulted in me getting selected in IEEE TEMS INDIA team where people from different states of India and even people from out of India are working together. So IEEE gives you a lot of exposure and experience. Volunteering For IEEE would gift you the benefit of meeting amazing and like-minded people. Exposure to an entirely new world and a huge network of friends and colleagues. The learning you get from volunteering is unmatched. Volunteer in IEEE for the joy of volunteering and not just for perks from IEEE. As a student IEEE has broadened my horizons and changed my perspective about the world and the future it holds.

CONTACT US

Email us at ieeebsnewsletter@gmail.com

Visit our website: https://ieeebombay.org/newsletter/

UNTIL THE NEXT TIME...

"Man's mind, once stretched by a new idea, never regains its original dimensions."
— Oliver Wendell Holmes

The IEEE Bombay Section Newsletter Committee always endeavours to highlight the great minds of the pioneers among our peers, who have never been afraid to forge their own path. Their accomplishments serve as a motivation to others to never give up the journey towards knowledge and enlightenment. It is our mission to assist our readers to continue on their never-ending journeys of learning. With that, we'd like to convey our best wishes!

Dr. Lalit Kumar Sahu
Chair, Newsletter Commitee
IEEE Bombay Section

OUR TEAM

CORRESPONDENCE

Dr. Ankita Dwivedi (Team Lead)

Catherene Joshi

Shruti Singh

Anusha Ganapathy

Mansi Rai

Anushka Somavanshi

Akshat Chandak

EDITORIAL

Dr. Lalit Kumar Sahu (Team Lead)

Anushka Somavanshi

Mukul Aigalikar

Catherene Joshi

Shruti Singh

Anusha Ganapathy

Mansi Rai

Aaditya Muley

DESIGN

Dr. Anil Soni (Team Lead)

Mukul Aigalikar

K. Sai Snigdha

Aaditya Muley

WEBSITE

Dr. Rohit Raja

Akshat Chandak