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COLLEGE OF
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DEPARTMENT OF
ELECTRONICS AND
COMMUNICATION
ENGINEERING

IN THIS ISSUE

ARTICLE

- HOW OPTICAL NETWORKS ARE SHAPING THE DIGITAL AGE.

ACHIEVEMENTS

- FACULTY PUBLICATION
- STUDENT PARTICIPATION
- STUDENT ACHIEVEMENTS
- STUDENT PROPOSAL SUBMISSION
- PATENTS PUBLISHED
- EVENTS ORGANISED
- REVIEWER/EDITORIAL BOARD MEMBER
- FACULTY ACHIEVEMENTS
- ALUMNI ACTIVITIES
- PARENTS TEACHERS MEETING
- PALS
- INTERNSHIPS
- INDUSTRIAL VISITS

VISION OF THE DEPARTMENT

To excel in offering value based quality education in the field of Electronics and Communication Engineering, keeping in pace with the latest developments in technology through exemplary research, to raise the intellectual competence to match global standards and to make significant contributions to the society.

MISSION OF THE DEPARTMENT

- To provide the best pedagogical atmosphere of highest quality through modern infrastructure, latest knowledge and cutting edge skills.
- To fulfill the research interests of faculty and students by promoting and sustaining in house research facilities so as to obtain the reputed publications and patents.
- To educate our students, the ethical and moral values, integrity, leadership and other quality aspects to cater to the growing need for values in the society.

Program Educational Objectives (PEOs)

PEO1: Create value to organizations as an EMPLOYEE at various levels, by improving the systems and processes using appropriate methods and tools learnt from the programme.

PEO2: Run an organization successfully with good social responsibility as an ENTREPRENEUR, making use of the knowledge and skills acquired from the programme.

PEO3: Contribute to the future by fostering research in the chosen area as an ERUDITE SCHOLAR, based on the motivation derived from the programme.

Program Specific Outcomes (PSOs)

PSO-1: An ability to apply the concepts of Electronics, Communications, Signal processing, VLSI, Control systems etc., in the design and implementation of application oriented engineering systems.

PSO-2: An ability to solve complex Electronics and communication Engineering problems, using latest hardware and software tools, along with analytical and managerial skills to arrive appropriate solutions, either independently or in team.

FACULTY ARTICLE

How Optical Networks are shaping the Digital Age

Prepared by: Mr.S.Senthil Rajan, Assistant Professor/ECE

In the digital era, optical networks serve as the foundation. It can send data quickly, efficiently, and over long distances. The delivery of numerous services, including internet access, video streaming, and cloud computing, depends on optical networks. Light is used in optical networks to transport data. Light is also a form of electromagnetic energy that can propagate across long distances without deteriorating. Therefore, it is perfect for sending data across long distances.

We use Lasers and LEDs as light sources in optical networks and the photodetectors to detect and convert light into electrical pulses. Optical fibers link the photodetectors and light sources. Glass or plastic optical fibers have excellent transmission qualities.

Optical networks are undergoing continuous evolution. Continuously, the new technologies evolved to increase efficiency, capacity, and reliability of optical networks. The development of the digital age and the provision of new, cutting-edge services are both made feasible by these new technologies.

The following are some examples of how optical networks are influencing the digital era:

Terrestrial Wireless Optical Communications:
Free space optical (FSO) communication refers to wireless data transmission using a modulated optical beam that is steered through free space without the need of fiber optics or other optical guiding systems. The basic concept has been around since the beginning of time, when information was transmitted through smoke signals. The transmitter, channel, and receiver make up a terrestrial OWC system. An OWC terrestrial system is shown schematically in Figure 1.

Information waveforms are generated by the source at the transmitter and modulated onto an optical carrier. The modulated light is transmitted to the target location through the free space. At the receiver, the acquired light signal is converted to an electrical current. The original information is recovered by processing the observed electrical current.

However, due to the transmission loss the signal experienced over the channel, the information received could not be an exact reproduction of the information that was originally transmitted. The effectiveness of wireless communications technologies is severely hampered by this problem.

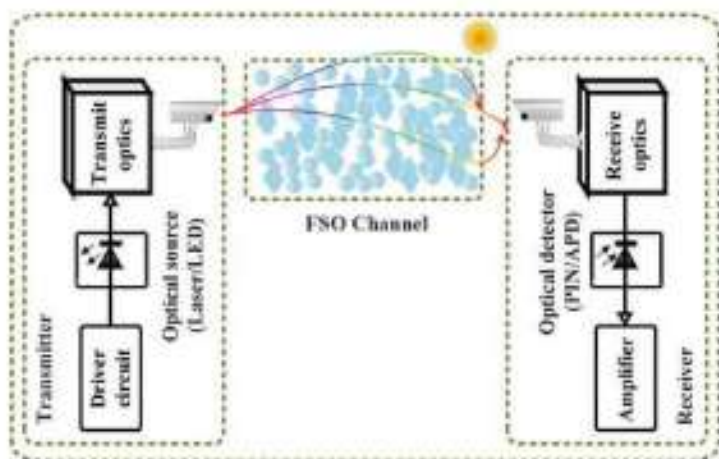


Figure: 1 A system block diagram for a terrestrial OWC [1]

Underwater optical wireless communications (UOWCs)

Underwater wireless communications is the process of transmitting data using wireless carriers like acoustic wave, RF wave, and optical wave. The data rate and transmission bandwidth of UOWC are higher than those of RF or acoustic alternatives. In the essence, UOWC transmits unguided data using optical waves as a wireless carrier.

The UOWC systems used for military operations, offshore exploration, environmental monitoring, and disaster preparedness. The following diagram explains the Underwater Wireless Sensor Network (UWSN) with Aerospace and Terrestrial Communications.



Figure: 2 UWSN with aerospace and terrestrial communication [1]

The major entities in the UWSN are distributed nodes such as relay buoys, seabed sensors, autonomous underwater vehicles (AUVs), and remotely operated underwater vehicles (ROVs).

Indoor infrared or Visible Light Communication (VLC):

Visible Light Communications (VLC) offers a solution to the anticipated radio-frequency wireless spectrum shortage since it offers both illumination and communications. Due to its ability to integrate both the illumination & communication, THz of unlicensed bandwidth (BW), a high level of spatial reuse, and good security, indoor visible light communications (VLC) is gaining popularity.

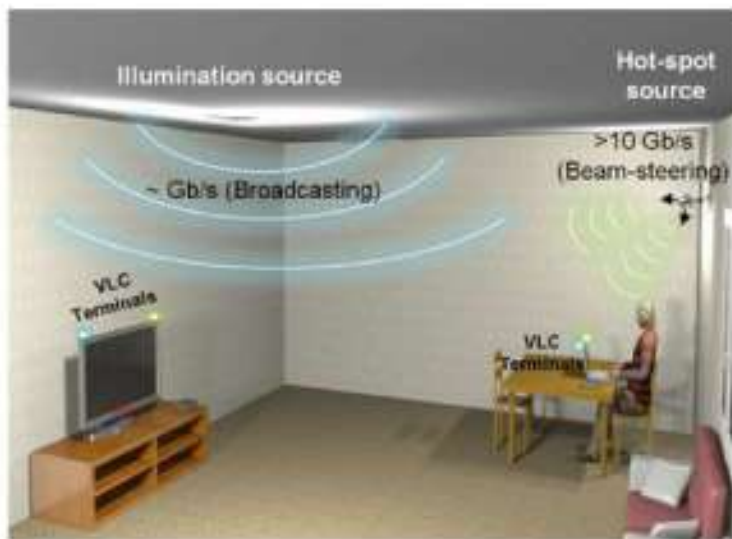


Figure: 3 A scenario for visible light communications within a building using a 10 Gb/s hotspot link and broadcasting at a few Gb/s. [2]

Inter Building Communications:

The Free Space Optics (FSO) technology, which uses eye-safe infrared lasers, gives fiber-like speed, is deployable quickly, and doesn't need authorization. Strict line-of-sight alignment and significant fading in wet, foggy, and snowy situations are the main drawbacks of this technology. However, such systems are expensive and limited by the low power of the laser component. Some system have developed into hybrid systems that combine FSO with radio frequency (RF). Therefore, the optimal solution for fiber-like stable and available networking among buildings and campuses is the combination of FSO with a wireless back-up, as shown in Figure. 4

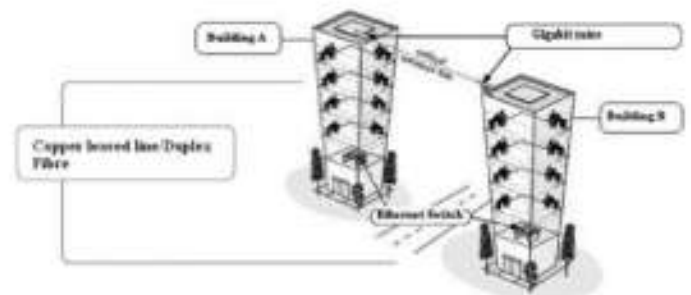


Figure: 4 FSO/Wireless Link Between Buildings [3]

Photonic Integrated Circuit

The objective of those who study photonics is to create a photon-based equivalent of an integrated electronic chip that could efficiently carry out all necessary computations in space and time. Scientists called these devices, which could incorporate many optical components on a single substrate, photonic integrated circuits (PICs). In theory, this device should be capable of carrying out tasks such as focusing, splitting, isolating, polarising, coupling, modulating, and (eventually) sensing light.

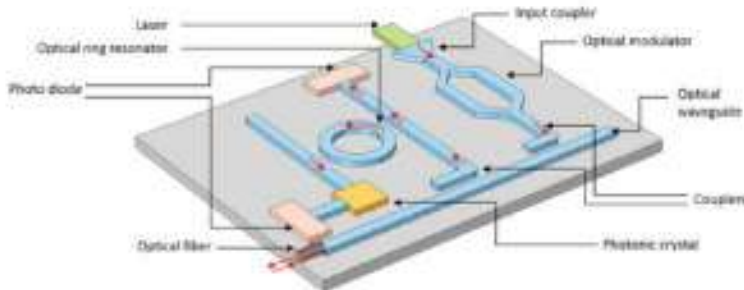


Figure: 5 Schematic of the photonic integrated circuit, showing several optical components [4]

3DWG for chip-to-chip optical interconnection

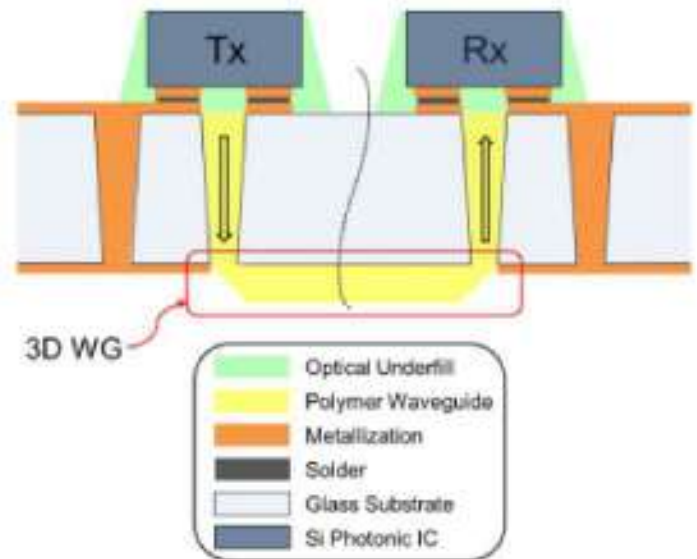


Figure: 6 3DWG for chip-to-chip optical interconnection [5]

Due to their tremendous bandwidth potential, optical interconnections have been a competitive alternative to their electronic equivalents since the invention of the optical fiber. The legitimate candidate for long-distance transmissions is glass fiber since it has low optical connectivity loss compared to its electrical counterpart. Shorter and shorter transmission distance needs optical connections due to ever-increasing bandwidth demands.

Shorter and shorter transmission distance needs optical connections due to ever-increasing bandwidth demands.

A novel out-of-plane optical turning solution at the interposer level, specifically in ultra-thin glass for chip-to-chip optical connections, is being developed by the 3D Glass Photonics (3DGP) team at Georgia Tech's Packaging Research Center. Figure 6 presents a clear schematic of this novel technology, a 3D integration at the system level.

Advanced Optical transceiver module

The main component of optical communication devices is an Advanced Optical transceiver module. It sends and receives data using fiber optic technology after converting optical signals into electrical signals and electrical signals into optical signals. The transmitting part and the receiving part make up an optical transceiver module. While the transmitting part completes the electro-optical conversion, the receiving part completes the photo-electric conversion.

Transceiver typically has a special connection on one end for fitting into particular models of enterprise-grade Ethernet switches, routers, or network interface cards and a cable attached to the other end. The connection shield cage fitted on the line card PCB encloses the transceiver module and the cage connector and it is depicted in the following figure.

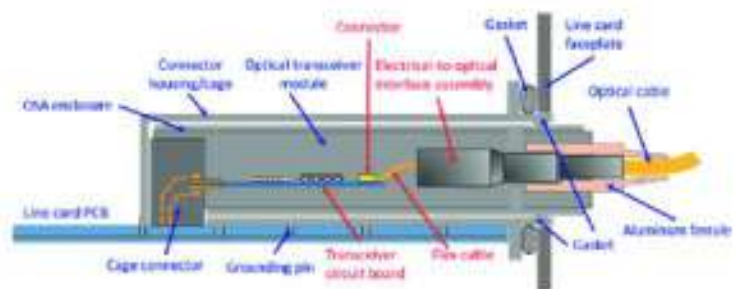


Figure: 7 Structure diagram of the optical transceiver module [6]

Radio over Fiber (RF over fiber)

When light is amplitude modulated by a radio signal and delivered across an optical fiber link to enable wireless access, this technique is known as radio over fiber (RF over fiber) or analog transmission over fiber.

The term "RoF" is often used to identify this sort of radio transmission when it is done for wireless access, even though radio transmission over fiber is used for several purposes, including cable television (CATV) networks and satellite base stations.

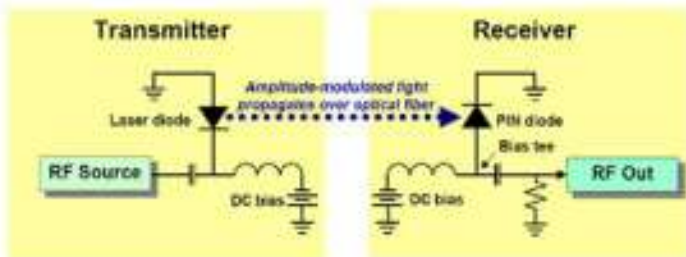


Figure: 8 Radio Over Fiber: How Does It Work? [7]

LiFi (Light Fidelity):

A bidirectional wireless technology called LiFi (light fidelity) transfers data using infrared or LED light. Unlike wifi, which uses radio frequency, LiFi technology initially introduced in 2011 and uses only a light source with a chip to transmit an internet signal through light waves.

This technology represents a remarkable improvement over current wireless networks. The speed and bandwidth of 3G and 4G increased via LiFi. The latter have a finite capacity and become overloaded as the number of users increases, resulting in crashes, performance reductions, and even connection interruptions.

LiFi, on the other hand, has a band frequency of 200,000 GHz, which is 100 times faster than the maximum 5 GHz of wifi and has a far higher data transfer rate.



Figure: 9 Rather than using microwaves for transmitting data, LiFi technology utilizes light sources [8]

Quantum key distribution (QKD):

Quantum key distribution (QKD) is a secure way to share encryption keys between two parties. It uses the principles of quantum mechanics to create a key that is known only to the two parties involved, and that cannot be eavesdropped on by anyone else.

QKD works by sending photons, which are particles of light, over a fiber optic cable. Each photon is polarized in a random way, and the two parties agree on a set of rules for how to interpret the polarization of the photons. If an eavesdropper tries to intercept the photons, they will disturb the polarization of the photons, and the two parties will be able to detect this.

Once the two parties have exchanged a stream of photons, they can use the rules they agreed on to generate a secret key.

In simpler terms:

QKD is a way to send a secret code to someone else without anyone else being able to see it. It uses the power of light to do this. QKD is a very secure way to send secret messages, and it is becoming increasingly important as our world becomes more digital. A collaborative team of scientists from the Indian Institute of Technology (IIT) Delhi and the Defence Research and Development Organization (DRDO) successfully demonstrated QKD.

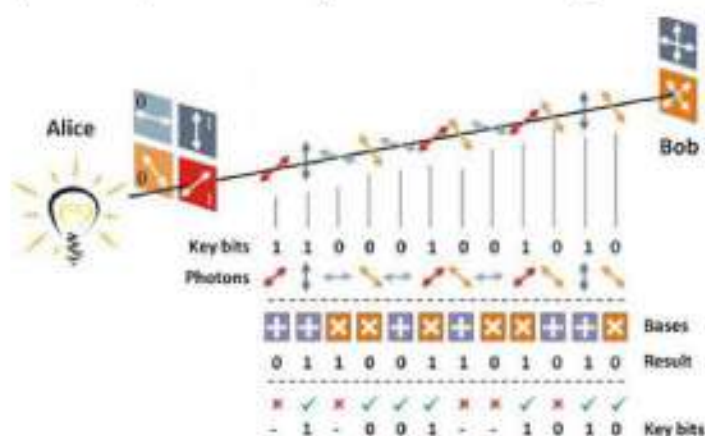


Figure: 10 Testing of Quantum Key Distribution [9]

Conclusion:

Optical fibers have remarkable transmission properties and can carry data rates of up to 100 Gbps. Optical networks are substantially more dependable and less prone to interference than copper-based networks and thus ideal for mission-critical applications like providing money-related information and pictures for medical care.

New technologies are being created to increase optical networks' efficiency, capacity, and dependability. These new technologies enable the development of the digital era and the provision of innovative new services.

In short, optical networks are the essential infrastructure for the digital era. They provide the high-speed, reliable, and efficient data transmission that is essential for a wide range of services. Optical networks are also constantly evolving to meet the growing demands of the digital world.

References:

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[6] Ling Zhang, Yuru Feng, Jun Fan and Er-Ping Li, Open Access Peer Reviewed Chapter on "High-Frequency Electromagnetic Interference Diagnostics," Source: DOI: <http://dx.doi.org/10.5772/intechopen.97613>

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[8] Light Fidelity, the web article published in <https://www.iberdrola.com/innovation/lifi-technology>

[9] IMR Reporter, "Quantum Key Distribution Test Successfully Demonstrated," Published in Indian Military Review (IMR), in imrmedia.in dated March 15, 2022.

ACHIEVEMENTS

FACULTY PARTICIPATION

- Dr.T.J.Jeyaprabha has attended a one day FDP on "Graph Theory" organized by Department of Mathematics, Sri Venkateswara College of Engineering (Autonomous), Sriperumbudur held on 1st Sep 2023.
- Mrs.S.M.Mehzabeen, Mrs.S.M.Abinaya has attended a one day National Webinar on "Academic Writing Skills and Publishing" through online mode organized by Balani Infotech Pvt.Ltd,Noida on 15th September 2023.
- Dr.T.J.Jeyaprabha has attended a one day workshop on "Creating a ChatGPT based application using next.js" organized by IETE-SF-SVCE in association with IETE Chennai Center held on 23rd Sep 2023.
- Mr.R.Ramesh Kumar and Mr.L.K.Balaji Vignesh attended three days International workshop on "Antenna Design for Intelligent Transport Systems" organized by Department of Electrical and Electronics Engineering, Anna University, Guindy held from 25th September 2023 to 27th September 2023.

- Dr.D.Menaka, Mrs.K.S.Subhashini, Mrs.S.Kalyani, Mrs.S.M.Mehzabeen, Mrs.S.Mary Cynthia, Mr.L.K.Balaji Vignesh attended a Technical Session on "Low Code AI with MATLAB" organized by Department of Electrical and Electronics Engineering, Sri Venkateswara College of Engineering (Autonomous), Sriperumbudur held on 27th September 2023.

STUDENT PARTICIPATION

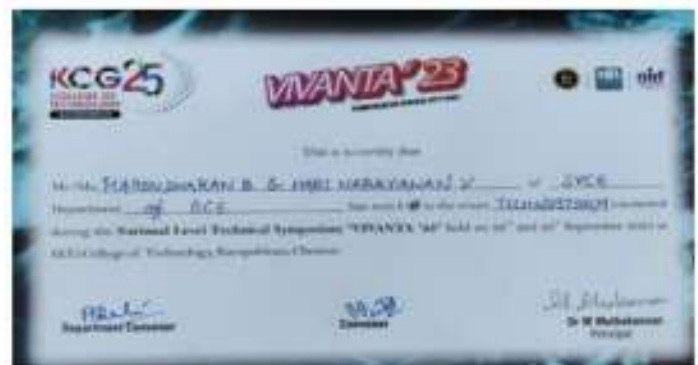
- 03 Teams from IV Year ECE presented their work at IEEE YESIST 12 on the occasion of "Kaushalya" Open House Project Expo-2023 were final listed and presented their work at Arab Academy for Science, Technology & Maritime Transport (AASTMT), Egypt (Online Mode) on 03rd September 2023.
- Nirmalkumart K, Pratosh Karthikeyan and Pranav Manikandan Sundaresan, Mrs.S.M.Mehzabeen, have presented a paper titled "Enhancing Hepatitis C Disease Detection Through Machine Learning and Optuna-Optimized Hyperparameter" in 2nd National Level Symposium on Recent Trends in Electrical, Information & Technology, Electronics & Communication and Computers, IETE on 21st September 2023.

- II Year, III Year and IV Year ECE Students have successfully participated in Smart India (36 Hour) Internal Hackathon organized by Sri Venkateswara College of Engineering (Autonomous), Sriperumbudur held from 23rd September 2023 to 24th September 2023.
- Ms.P.Shanmugapriya from III Year ECE participated in the event "VIDYUTRENTZ-National level Symposium" organized by Chennai Institute of Technology (Autonomous), Chennai held on 21st September 2023.

STUDENT ACHIEVEMENTS

- Mr.Hariharan.G and Mr.Harshavardhan R participated and won the prize with cash 500 USD in Innovation Challenge 2023 Event Organized by IEEE YESIST12 held at Arab Academy for Science, Technology & Maritime Transport, EGYPT, in Hybrid Mode on 03rd September 2023.
- Mr.Rajeshvar M Swamy, Sudarshan C, Supraja R, Vishnu Priya V T of IV Year ECE C (2020-24 Batch) mentored by Dr T J Jeyaprabha, were in the final list in Innovation Challenge 2023 Event Organized by IEEE YESIST12 held at Arab Academy for Science, Technology & Maritime Transport, EGYPT, in Hybrid Mode on 03rd September 2023.

- Ms.Sahana Balasubramanian, Mr.Raswanth U, Mr.Raja Pandi K, Ms.Aishwarya Srinivasan of IV Year ECE C (2020-24 Batch) mentored by Dr T J Jeyaprabha, were in the final list in Innovation Challenge 2023 Event Organized by IEEE YESIST12 held at Arab Academy for Science, Technology & Maritime Transport, EGYPT, in Hybrid Mode on 03rd September 2023.
- Mr.Harendharan B and Mr.Hari Narayanan V from IV Year ECE have presented a paper in "TECHNOSTORM" Paper Presentation and won the First Prize with cash 2000 Rupees organized by KCG College of Technology, (Autonomous), Chennai held on 22nd September 2023.



- 07 Batches of Students have been shortlisted to next level in Smart India (36 Hour) Internal Hackathon 2023 organized by Sri Venkateswara College of Engineering (Autonomous), Sriperumbudur held from 23rd September 2023 to 24th September 2023.

- S.Swetha of II year ECE has received Rs 55,000/- as part of SVCE Alumni Scholarship (1985-89 Batch)

- R.Magdalene Roy (III Year ECE B), S.Harini (I Year ECE A) along with few other students of SVCE bagged Runner-up in the Chess tournament held at Saveetha Engineering College as part of Anna University zonal tournament on 23-09-2023.

- Mr.Ramanathan (II year ECE) along with few other students of SVCE bagged Runner-up in the Tennis tournament held at Anna University on 30th September 2023.



STUDENT PROPOSAL SUBMISSION

- 09 Students with a group of two teams (III year ECE) mentored by Dr.T J Jeyaprabha and Dr.M.Kavitha submitted their idea for "Idea Submission to Tomato Grand Challenge 2023"
- 08 groups of students exhibited their project in the expo organized by the Department of Electronics and Communication Engineering, Sri Venkateswara College of Engineering (Autonomous), Sriperumbudur scheduled on September 4th, 7th and 9th 2023.



- 14 Teams successfully registered for Project Proposals (TNSCST) invited under STUDENT PROJECT SCHEME 2023-2024 on 30th September 2023.

PATENTS PUBLISHED

- Dr.D.Menaka along with the 2023 batch passed-out students Mr. Rakesh Velavaluri, Mr.N.S.Sribalajy, Ms.D.Uma Maheshwari filed an Indian patent titled "Innovating Interface-Exploring Hand Gesture Recognition For Smart Interaction" published in the Patent Office Journal No. 35/2023, IPR on 1st September 2023.

REVIEWER/EDITORIAL BOARD MEMBER

- N. Kumaratharan, Professor, reviewed papers for the conference titled, "IEEE Second International Conference on Advances in Computational Intelligence and Communication (ICACIC 2023)", organized by Puducherry Technological University, Pondicherry.

- Dr T J Jeyaprabha, Associate Professor and Mr.L.K.Balaji Vignesh, Assistant Professor reviewed "IEEE International Conference on Networks, Multimedia and Information Technology (NMITCON)" organized by Department of Electronics and Communication Engineering, NITTE Meenakshi Institute of Technology, Bangalore.

FACULTY ACHIEVEMENT

- N.Kumaratharan, Professor authored a book titled, "**Fundamentals of Wireless Technologies**", published by Scientific International Publishing House. ISBN: 978-93-5757-509-6
- Mrs.K.S.Subhashini, Mr.S.P.Sivagnana Subramanian and Mr.L.K.Balaji Vignesh acted as **Jury Member** in reviewing 26 Ideas in **Smart India (36 Hour) Internal Hackathon 2023 regarding Hardware Category** organized by Sri Venkateswara College of Engineering (Autonomous), Sriperumbudur held from 23rd September 2023 to 24th September 2023.

- Dr.M.Bindhu delivered a Guest Lecture on **"Industry 5.0"** organized by the Department of Electronics and Communication Engineering, Kings Engineering College, Chennai held on 22nd September 2023.
- Dr T J Jeyaprabha, Associate Professor and Mr.L.K.Balaji Vignesh, Assistant Professor received Certificate of Appreciation from IETE Chennai Center for contributing towards Research Activities, Industrial Projects, Organizing Events, Collaboration with Professional Bodies and Industrial Organizations for the Student Community Development during IETE Teacher's Day and Engineer's Day Celebration on 28th September 2023.
- **Mentored 02 teams** and received the winners at Ease the Error 3.0 organized by FODSE in association with IETE Chennai Center, for internships on Computer Vision and IOT at Motherson Technology Services Ltd. for a period of one month during July 2023.
- Dr.T.J.Jeyaprabha, Associate Professor and Mrs.K.S.Subhashini, Assistant Professor delivered a guest lecture on **"HACKATHON PREP: Tips and Tricks to crack SIH"** - Mentoring Session for SIH 2023 organized by IIC - SVCE held on 15th September 2023.

EVENTS ORGANIZED

- ECEA, IETE-SF and RAIC of ECE Department lead by Dr.T.J.Jeyaprabha, ASP, ECE (Coordinator) organized a one day intercollegiate Workshop on **"Creating a ChatGPT Based Application using Next.js"** by Mr Rajavasanthan, Mentor at GUVI, Founder of Grids and Guides under IETE-SF in association with IETE Chennai Center on 23rd September 2023. It was organized under offline mode for 50 Students from various colleges.



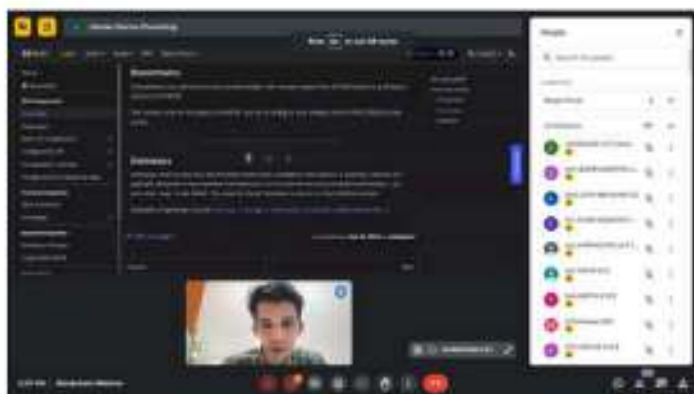
- FODSE of SVCE led by Dr.T.J.Jeyaprabha, ASP, ECE (Coordinator) and Dr.N.Devi, ASP, INT (Coordinator) inaugurated the club for the year 2023-24 on 20th Sep 2023. The invited dignitary was Shri.Jayaraja Kumaran, Engagement Partner - Indian Operation, Surge Technology Solutions, Chennai and Founder & Trustee of Neeyumnanae Foundation (INT Alumni 2005-2009).

ALUMNI ACTIVITIES

- Dr.Arun Janarthanan ,1999-2003 batch ECE alumnus currently working as technology director and Engineering practice, Head, EdTech Business,,HCL Tech,delivered a technical talk on "Triggering an era of Hardware and Software in India:Insights on VLSI and Embedded Systems" for second year and third year students on 19th September 2023 (Tuesday) from 1.30 pm-3 pm.



- ECEA & RAIC of SVCE organized a webinar on "**Blockchain Technology**" by Office Bearers of IETE & RAIC on 23rd September 2023. It was organized under online mode for 200 ECE Students.



- The first batch of SVCE alumni has instituted a scholarship from the academic year 2018-19 to sponsor the tuition fee for two to four girl students from third semester till final semester based on Economic and Merit criteria. Ms. Swetha.S of II ECE (2022-2026) received this scholarship for the academic year 2023-2024.

PARENTS TEACHERS MEETING:

- PTM Meeting for Senior Students (II, III & IV year) held on 23rd September 2023.
- Parents felt they had a very good interaction with all subject handling faculties regarding backlogs as well as placement related activities.
- At the end of the session the vision, mission and PEO's of the department has been discussed and disseminated to the parents.



PALS:

- 04 students as a team participated in the PALS ANALYZE Case study event on the topic "**PEDESTRIAN SAFETY SYSTEM IN CARS**" conducted on 13th Sep 2023.

INTERNSHIP:

- Dr.T. J. Jeyaprabha mentored 2 teams who were the winners at Ease the Error 3.0 organized by FODSE in association with IETE Chennai Center, for internships on Computer Vision and IOT at Motherson Technology Services Ltd. for a period of 1 month during July 2023.
- P.VASANTH have undergone Internship Training in **"Wiztech automation solutions"** from 08/09/2023 to 29/09/2023.



INDUSTRIAL VISIT:

- Around 180 Students from Second-year ECE have undergone Industrial visit to BSNL Rajiv Gandhi Memorial Telecom Training Centre, Meenambakkam, Chennai on 21.09.2023 and 22.09.2023.



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