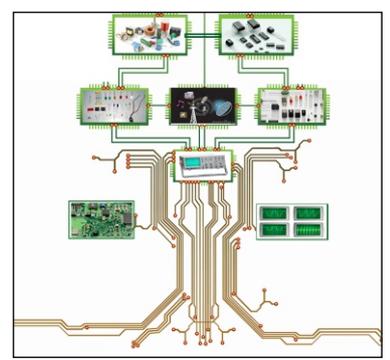


# ELECTRONICA

Newsletter

Department of Electronics & Communication Engineering



Volume 6

Issue 2

Jan - June 2021

## Vision and Mission of the Institute

### Vision

- To be one of the premier Institutes of Engineering and Management education in the country

### Mission

- To provide Engineering and Management education that meets the needs of human resources in the country
- To develop leadership qualities, team spirit and concern for environment in students

### Objectives

- To achieve educational goals as stated in the vision through the mission statements which depicts the distinctive characteristics of the Institution
- To make teaching-learning process an enjoyable pursuit for the students and teachers

## Vision and Mission of the Department

### Vision

- To be a renowned department for education in Electronics and Communication Engineering in Karnataka State, moulding students into professional engineers

### Mission

- To provide teaching - learning process in Electronics and Communication Engineering that will make students competitive and innovative to adapt to needs of industry and higher learning
- To imbibe professional ethics, team spirit and leadership qualities to succeed in changing technological world
- To inculcate empathy for societal needs and concern for environment in engineering design and practice

### Program Education Objectives

After 2 to 3 years of graduation, the students will have the ability to:

- Analyze, design and implement solutions in Electronics and Communication Engineering and adapt to changes in technology by self/continuous learning
- Engage in higher learning and contribute to technological innovations
- Work with professional ethics as an individual or as a team player to realize the goals of the project or the organization
- Work with respect for societal values and concern for environment in implementing engineering solutions



This edition of Electronica is dedicated to **Reinhard Genzel**, a German astrophysicist and **Andrea M Ghez**, an American astrophysicist, who were jointly awarded the 2020 Nobel Prize in Physics for their discovery of a supermassive compact object at the centre of the Milky Way Galaxy.

### *What's inside...*

- *Articles*
- *Crossword*
- *Department Events*
- *Student Achievements*
- *Staff Achievements*

*And more...*



## *B. N. M. Institute of Technology*

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All Eligible UG branches - CSE, ECE, EEE, ISE & Mech. Engg. Accredited by NBA for academic years 2018-19 to 2021-22 & valid upto 30.06.2022

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Vidyayamruthamashnuthu



## From the Editors' Desk

Dear Readers,

“Change is the end result of all true learning.” – Leo Buscaglia

It is an immense pleasure to introduce 'ELECTRONICA' Volume 6, Issue 2, of the year 2021 (Jan – June). We hope you and your family are safe and are following the social distancing norms. The Covid-19 Pandemic has brought us all in an unprecedented situation. May the coming days fill your life with happiness, good health and prosperity!

When a thought that has been enduring in the mind becomes real, it is truly an interesting and exciting experience. ELECTRONICA provides the right opportunity to the students of the Department of Electronics and Communications Engineering to exhibit their enthusiastic work. We are sure that the positive attitude, hard work, sustained efforts and innovative ideas exhibited by the students will surely stir the minds of the readers. This souvenir is indeed a pious attempt to make our young minds give shape to their creativity and learn the art of knowing everything. It also highlights the achievements of the students, staff and the events organized by the Department of ECE at BNMIT.

We shall assure all our readers that our consistent efforts will be aimed towards increasing the visibility, impact and the overall quality of our newsletter. We would like to thank all for the relentless efforts that joined us to bring excellence to this treasure trove.

**Editorial Team**

## About the Department

The Department of Electronics and Communication Engineering started in the Year 2001. Presently, the Department is headed by Dr. P.A. Vijaya. The Department has 2-programs; B.E and M.Tech (VLSI Design and Embedded Systems), affiliated to VTU. The Department has a VTU recognized Research Centre and presently, there are twelve registered candidates who are pursuing doctoral degrees. The Department has a team of highly qualified and dedicated staff with teaching, research and industrial experience. Well-equipped laboratories with State-of-the-art infrastructure and class rooms with LED projectors provide enhanced learning environment to cater to the needs of prodigious engineers of tomorrow.

Academic performances of the students are excellent with thirteen University Ranks since the inception. This year, we have Smitha A securing 7<sup>th</sup> rank, M.Tech (VLSI). The students do innovative projects, internship training in industries and academic projects in reputed organisations. They regularly participate in inter-college and intra-college technical, cultural and sports events and have regularly brought laurels to the Department. The students participate in hackathons, workshops, webinars, quizzes, and present as well as publish papers in reputed conferences and journals.

During lockdown situation and owing to Covid-19, the faculty conducted online classes, using virtual classroom platform like Microsoft teams. Videos recorded for theory courses and laboratory experiments were made online through BNMIT VROOK learning management system. Internal assessments, webinars and workshops were also conducted, using online platforms. Faculty Development Programmes, Workshops, Seminars and Invited Talks for students and staff were organized in online mode for continuous learning and periodic updation of knowledge and skills.

**Dr. P.A. Vijaya**  
Professor & Head, Dept. of ECE

## Li- Fi Technology

Li-Fi (Light Fidelity) is a modern technology which uses light or infrared radiation to communicate between two devices (Fig.1). Li-Fi technology was coined and enhanced by the German physicist Harald Haas, a Professor and Director of the Li-Fi Research and Development Centre at the University of Edinburgh. In 2017, a study was carried out by the University of Eindhoven in which a download rate of 42.8 Gbit/s with infrared light with a radius of 2.5 metres was achieved, whereas the best Wi-Fi would barely reach 300 Mbps. The main advantage of Li-Fi is that it multiplies the speed and bandwidth of 3G and 4G.



Fig.1: Li-Fi Block Diagram

The operation of Li-Fi is similar to that of Wi-Fi, but it differs in usage of radio frequency. Wi-Fi induces a voltage in an antenna to transmit data whereas Li-Fi uses the modulation of light intensity to transmit data. Li-Fi is a derivative of Optical Wireless Communications (OWC) technology, which uses light from Light-Emitting Diodes (LEDs) as a medium to deliver mobile and high-speed communication. Li-Fi is wireless and similar to 802.11 protocols, but it uses ultraviolet, infrared and visible light communication (instead of radio frequency waves), which has much bigger bandwidth.

### Advantages of Li-Fi:

- High speed: The current speed of Wi-Fi is between 11 and 300 Mbit/s, while that of Li-Fi offers a speed between 10Gbps to 224Gbps.
- Cheaper and more sustainable: It is almost 10 times cheaper than Wi-Fi. It requires fewer components and uses less energy.
- More accessible: Any light fittings can easily be converted into an internet connection point by using a simple Li-Fi emitter.
- More secure: Light does not pass-through walls like radio waves do, and this prevents intruders from intercepting Li-Fi communications through a wireless network.
- More bandwidth: The light spectrum is 10,000 times wider than the radio spectrum, which increases the volume of data it can carry and transmit per second.
- More reliable: Li-Fi transmits its signal without interruptions, making communication more stable compared to Wi-Fi.
- No interference: Electronic light does not interfere with radio communications, do not interact with other systems or compromise transmissions from aircraft, ships, etc.
- Wireless and invisible: Li-Fi takes advantage of lights and dispenses with the router, so it works without cables. In addition, it can operate with infrared light, which is invisible to the human eye, or with visible LED light at very low intensity so as to avoid disturbance.
- No saturation: Internet connection via light could prevent the collapse of the radio spectrum.

### Applications:

- Home and building automation: Li-Fi can be used for building secure smart homes as signals cannot be easily hacked.
- Underwater application: Li-Fi systems can be used in under water applications such as submarines since light can easily penetrate through water.
- Aviation: Li-Fi technology is used in passenger aircrafts for data transmission between the equipments.
- Hospitals: Li-Fi systems could be a better system to transmit information about the data of patients because light waves have little effect on medical instruments.
- Vehicles: Vehicles could communicate with one another via front and back lights to increase road safety.
- Industrial automation: Li-Fi is capable of replacing slip rings, sliding contacts and short cables, such as Industrial Ethernet.
- Advertising: Street lamps can be used to display advertisements for nearby businesses or attractions on cellular devices.
- Education: Students with devices such as smartphones or laptops can communicate with the teacher, or with each other via Li-Fi, to create a more efficient learning environment.

[source://https://www.iberdrola.com/innovation/lifi-technology](https://www.iberdrola.com/innovation/lifi-technology)

**Vismith Upadhya P J & Vishwas S N, VIII Sem B**

## Can Quantum Computing be a Gateway for: The End of Moore's Law?

### Why is Moore's Law Breaking Down?

From the past decade, computer scientists and engineers have been anticipating the abrupt end of progress. Moore's Law, a guideline that says a silicon transistor can be reduced in size by about half in every two years. It has been functionally dead for at least a couple of years now. When the transistor size is reduced, the electric current generates powers the processor's calculations and logic, it leaks out of the component. This is because, atoms meant to contain the flow of electrons are disrupted over a time. We can see the technological potential peaking up on the horizon; to reaching the desired size and be restrained by physical laws.

### The Quantum World: How is it Different from Classical World of Computing?

Scientists and engineers inevitably took the next step and looked to quantum mechanics for something smaller than the atom. The quantum world, however, is not at all like the classical world. Exotic subatomic particles behave in ways that are hard to accept. They can blow right through fundamental laws of physics without missing a step, as quantum entanglement does when paired particles communicate instantaneously with each other even if they are on opposite sides of the universe.

### How do quantum computers work?

Quantum computers use qubits in the place of classical bit. Rather than just being on or off, qubits can also be in what's called 'superposition' – where they're both on and off at the same time, or somewhere on a spectrum between the two. Take a coin. If you flip it, it can either be heads or tails. But if you spin it – it's got a chance of landing on heads, and a chance of landing on tails. Until you measure it, by stopping the coin, it can be either. Superposition is like a spinning coin, and it's one of the things that makes quantum computers so powerful. If you ask a normal computer to figure its way out of a maze, it will try every single branch in turn, ruling them all out individually until it finds the right one. A quantum computer can go down every path of the maze at once. It can hold uncertainty in its head.

### The Weird Nature of Qubits in Quantum world

The other thing that qubits can do is called entanglement. Normally, if you flip two coins, the result of one-coin toss has no bearing on the result of the other one. They're independent. In entanglement, two particles are linked together, even if they're physically separate. If one head occurs, the other one will also be heads. It sounds like magic, and physicists still don't fully understand how or why it works. But in the realm of quantum computing, it means that you can move information around, even if it contains uncertainty. You can take that spinning coin and use it to perform complex calculations. And if you can string together multiple qubits, you can tackle problems that would take our best computers millions of years to solve.

### Hardware of Quantum Computers: NISQ

These links can provide you with a detailed information about the Hardware Composition of Quantum Computing in the NISQ era.

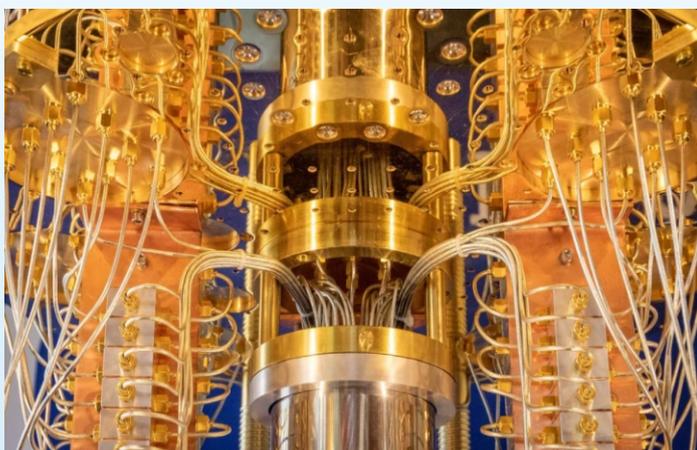


Fig.2: Typical Quantum Computer

### Quantum Computing Era:

The global market is estimated to reach a value of \$948.82 million by 2025. Quantum computing will give a substantial military and economic advantage to the countries that tops in this global technological competition.

#### Research areas and Career in Quantum Computing:

- Quantum science & Information Theory
- Quantum Computing & Simulations
- Quantum Communication & Post-Quantum Cryptography
- Quantum Metrology & Sensing
- Quantum Machine Learning

## Wireless Gaming Interactions through OpenCV Platform

Open Source Computer Vision (OpenCV) Library is an open source computer vision and machine learning software library. OpenCV is a cross-platform library using which we can develop real-time computer vision applications. It mainly focuses on image processing, video capture and analysis including features like face detection and object detection (Fig.3). By using it, one can process images and videos to identify objects, faces, or even the handwriting of a human. When it is integrated with various libraries like NumPy, Python is capable of processing the OpenCV array structure for analysis. To identify image patterns and its various features we use vector space and perform mathematical operations on these features.

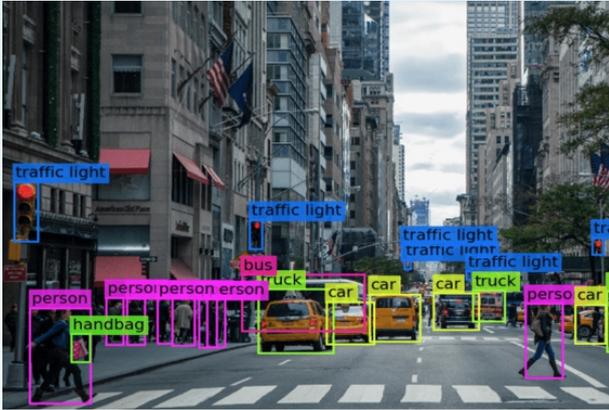


Fig. 3: Image Recognition

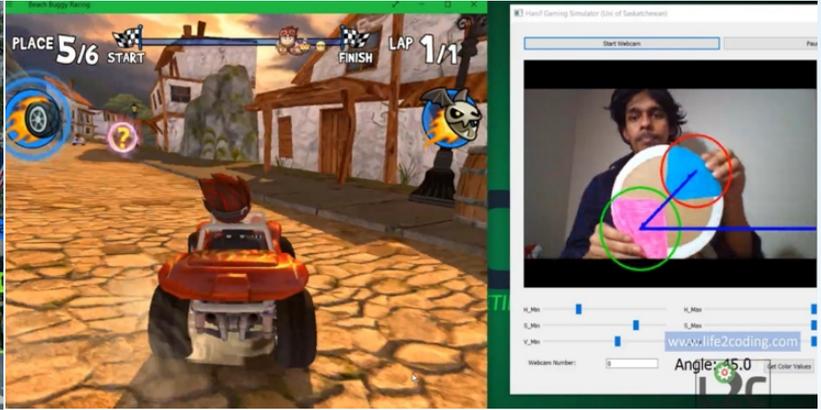


Fig. 4: Gaming Controls and Colour values (HSV)

### Gaming Controls through OpenCV

Voice and gestures are the widely used ways of communication. We have voice-controlled gadgets like Alexa and Siri-enabled devices to control our homes using voice commands. Even the dashboards on top-of-the-segment luxury cars are gesture controlled. The games are also gesture-controlled. Before running the game, we need to install packages Python, OpenCV and PyAutoGUI for transforming the gestures into the game actions, mainly firing the key pressed events in the game. In the frame, the video capture detects the pointer position in the virtual space of the captured window. Depending on which quadrant the pointer is, it fires the four arrow keys - LEFT, RIGHT, UP, DOWN.

The color values are entered in HSV (hue, saturation, value) format and are not the typical RGB values. This is the requirement for OpenCV as it uses HSV format for image processing. If someone decide to use some other color for controlling the game, they need to modify the values specified in their code statements. HUE represents the color; SATURATION represents the amount of respective color that is mixed with white and VALUE represents the amount of respective color that is mixed with black. We first resize and blur the captured image so as to get a smoother image. It will be easier to detect a blob of blue color on a blurred image than the original high-quality image. We blur the image using the Gaussian blur feature of CV2. After blurring we convert the image into HSV scale.

Using parts of the human body as input has the benefit of being always available as the user is not required to carry any secondary device. Importantly, appropriating parts of the human body for gesture-based interaction has been shown to improve user experience and overall engagement. The hand detection is done on a frame-by-frame basis and the system does not automatically track hand across frames. However, this type of inter-frame tracking is useful as it can enable multiple user interaction where we need to track a hand across frames. The game interface connects to the web socket server and listens for hand detection data. Each detected hand is used to generate a paddle, and the coordinate of the hand in the video frame is used to relatively position the paddle on the game screen.

Source:<https://www.pyimagesearch.com/2017/09/18/real-time-object-detection-with-deep-learning-and-opencv/>

Rajshekhhar Choudhury, VI SEM B

Progress is impossible without change, and those who cannot change their minds cannot change anything.”

-George Bernard Shaw

## Augmented and Virtual Reality from fight against COVID

VR is helping out scientist to fight against Covid-19 and help patients get therapy as per experts. Scientists at University of Bristol have demonstrated a new virtual reality technique which helps in developing drugs against the SARS-CoV-2 virus and help researchers to share models and collaborate in more effective ways. MNC's such as Amazon are also using these techniques to avoid the spread of the virus.

In addition to physical rehabilitation, doctors anticipate a need for psychological support to reduce depression, stress, post-traumatic stress disorder (PTSD) and anxiety in Covid-19 patients. An intensive care admission is a fearsome experience, especially when a patient is supported by mechanical ventilation as is common in Covid-19. Depression occurs in approximately 30% of recovering patients hence their family and friends are the ones who can help them out in this period hence use of the VR is being proved to be effective in this situation.

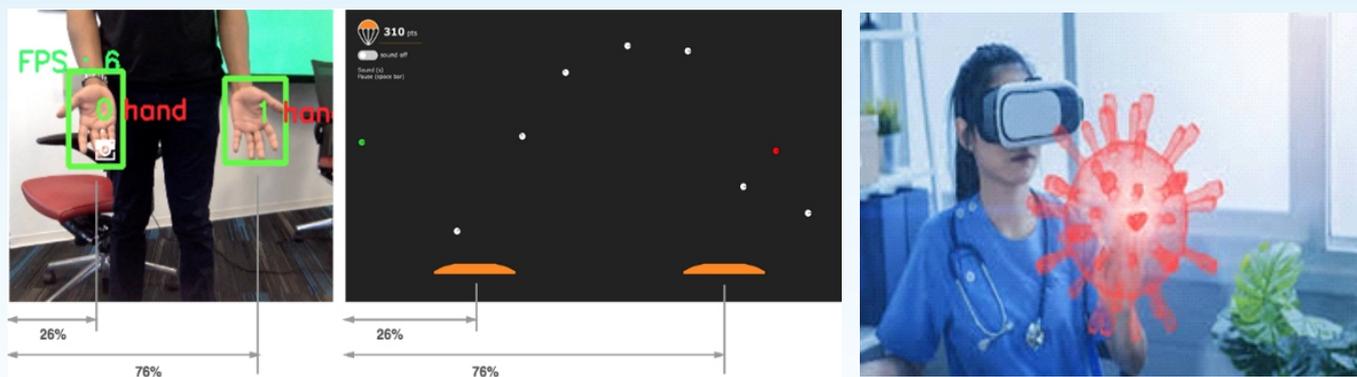


Fig. 5: SARS-CoV-2: Nanobody identification

Amazon has introduced an app that allows users to interact with augmented reality (AR) experience with a new QR code on the boxes delivered to you. Called “Amazon AR Player”, the app offers “a fun way to reuse your Amazon boxes” until you're ready to drop them in the recycling bin. Not only they have made changes in the user end even at their storage locations their employees are always watched to maintain the 6 feet gap between coworkers.

Amazon's VP and robotics head Brad Porter tells the augmented reality system that's already in place in a smattering of the company's fulfillment centers. “The standalone unit uses machine learning models to differentiate people from their surroundings. Combined with depth sensors, it creates an accurate distance measurement between associates. A monitor displays live video with visual overlays to show if associates are within six feet of one another. Individuals remaining six feet apart are highlighted with green circles, while those who are closer together are highlighted with red circles.”

Hence technology is playing its role in this pandemic to keep us safe from covid let's stay strong be bold and face this pandemic together following the protocell provided by the government.

Source:<https://www.signiant.com/resources/tech-articles/vr-ar-covid-19-experts/>

**Tejas S Koundinya, IV SEM B**

## Information and Communication Technology in Agriculture

Information and Communication Technology (ICT) in agriculture, also known as e-agriculture, focuses on the enhancement of agricultural and rural development through improved information and communication processes. More specifically, e-agriculture involves the conceptualization, design, development, evaluation and application of innovative ways to use information and communication technologies (ICTs) in the rural domain, with a primary focus on agriculture. ICT includes devices, networks, mobiles, services and applications; these range from innovative Internet-era technologies and sensors to other pre-existing aids such as fixed telephones, televisions, radios and satellites. Provisions of standards, norms, methodologies, and tools as well as development of individual and institutional capacities, and policy support are all key components of e-agriculture.

### Global Positioning System (GPS)

In agriculture, the use of the Global Positioning System provides benefits in geo-fencing, mapmaking and surveying. GPS receivers dropped in price over the years, making it more popular for civilian use. With the use of GPS, civilians can produce simple yet highly accurate digitized map without the help of a professional cartographer. In Kenya, for example, the solution to prevent an elephant bull from wandering into farms and destroying precious crops was to tag the elephant with a device that sends a text message when it crosses a geo-fence. Using the technology of SMS and GPS, the elephant can roam freely and the authorities are alerted whenever it is near the farm.

## Computer-Controlled Devices (Automated Systems)

Automatic milking systems are computer-controlled stand-alone systems that milk the cattle in the dairy without human labour. The complete automation of the milking process is controlled by an agricultural robot, a complex herd management software, and specialized computers. This way of milking eliminates, the farmer from the actual milking process, allowing for more time for supervision of the farm and the herd. Farmers can also improve herd management by using the data gathered by the computer. By analyzing the effect of various animal feeds on milk yield, farmers may adjust accordingly to obtain optimal milk yields. Since the data is available down to individual level, each cow may be tracked and examined, and the farmer may be alerted when there are unusual changes that could mean sickness or injuries.



Fig. 6: Smart Agriculture

## RFID for Animal identification

RFID tags for animals represent one of the oldest uses of RFID. Originally meant for large ranches and rough terrain, since the outbreak of mad-cow disease, RFID has become crucial in animal identification management. An implantable RFID tag or transponder can also be used for animal identification. The transponders are better known as PIT (Passive Integrated Transponder) tags, passive RFID, or "chips" on animals. The Veterinary Department of Malaysia's Ministry of Agriculture introduced a livestock-tracking program in 2009 to track the estimated

80,000 cattle all across the country. Each cattle is tagged with the use of RFID technology for easier identification, providing access to relevant data such as: bearer's location, name of breeder, origin of livestock, sex, and dates of movement. This program is the first of its kind in Asia, and is expected to increase the competitiveness of Malaysian livestock industry in international markets by satisfying the regulatory requirements of importing countries like United States, Europe and Middle East. Tracking by RFID will also help producers meet the dietary standards by the halal market. The program will also provide improvements in controlling disease outbreaks in livestock.

## Machine Learning

Machine learning is commonly used in conjunction with drones, robots, and internet of things devices. It allows for the input of data from each of these sources. The computer then processes this information and sends the appropriate actions back to these devices. This allows for robots to deliver the perfect amount of fertilizer or for IoT devices to provide the perfect quantity of water directly to the soil. Machine learning may also provide predictions to farmers at the point of need, such as the contents of plant-available nitrogen in soil, to guide fertilization planning. As more agriculture becomes ever more digital, machine learning will underpin efficient and precise farming with less manual labour.

Source:<https://www.cropin.com/ict-in-modern-agriculture/>

Sushmitha S T T, IV SEM B

## GARUDA LINUX : An Indian Operating System

### What is Linux?

Linux is an open-source operating system or kernel just like Windows or Mac OS, that belongs to nobody, free to download and use. Finnish student named Linus Torvalds originally developed it in 1991. It is important to know that they widely use this OS in servers, smart devices, firewalls and many more. Linux distribution is available under various flavours, such as Ubuntu, Debian, Manjaro, Arch Linux, Linux mint, Fedora, Solus, Kali Linux, Red Hat, Elementary OS and many more.

Some advantages of Linux over Windows or Mac OS are as follows:

- The major advantage of Linux is it is an open-source operating system. This means the source code of the OS is easily available for everyone and may change and distribute the code to anyone without permission.
- There is a large community forum to answer users' queries.
- It runs smoothly on a low-end PC.
- Performance of Linux is higher than other operating systems.
- Security of the OS is outstanding and is highly stable.

### Then what is Garuda Linux?

Garuda, new to Linux world, is the second Indian Operating System created by Garuda Developers: Shrinivas Kumbhar, Naman Garg, Yorper, Nico. The first Indian OS was Bharat Operating System Solutions (BOSS) based on Debian distribution. As of 2019, there are very few institutions and people in India who use BOSS. BOSS is included in the school syllabus, but only few schools teach these open-source software to the students. The name Garuda is taken from the Indian mythology, the vehicle mount of Lord Vishnu. Garuda Linux is an Arch based rolling distro that ensures getting latest security and system updates. It includes beautiful and polished themes, making it attractive. The latter is available in many desktop environments: KDE Plasma, CINNAMON, LXQt, GNOME, XFCE, Wayfire.

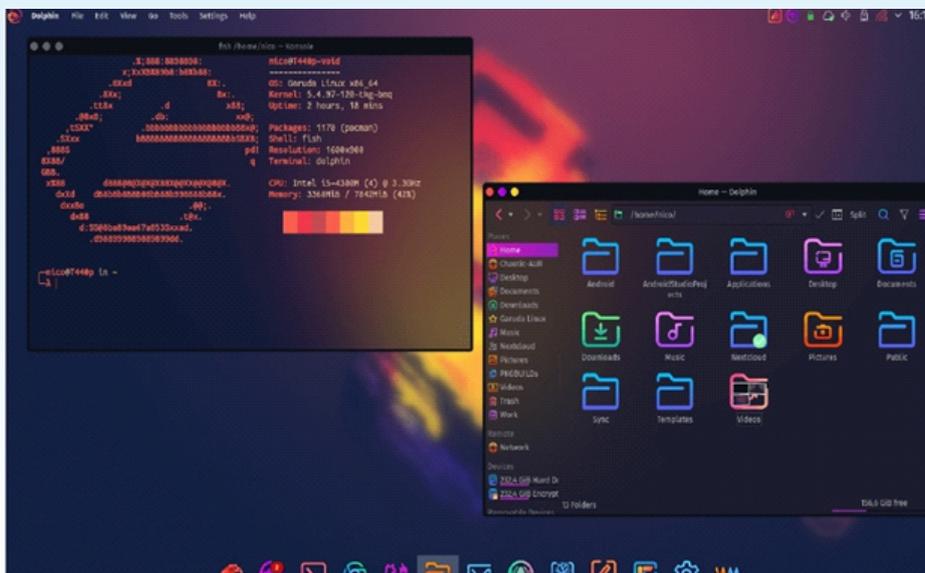
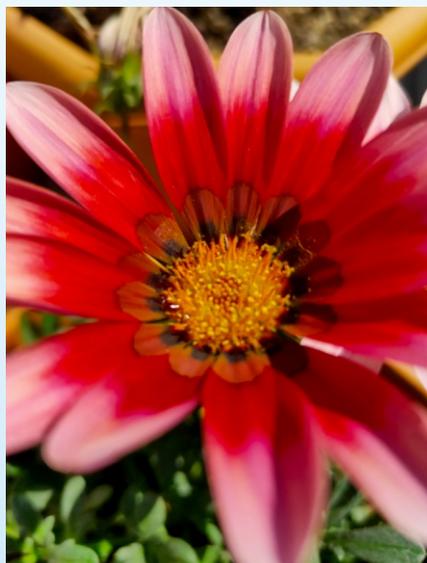


Fig.7: Garuda Linux Desktop Look

The type of file system used to store, access and manage files in the Garuda Linux is **BTRFS** file system. Windows users rely on the New Technology File System (NTFS), while Mac OS X currently runs on the **HFS+** file system. **BTRFS** (B tree file system) is a modern file system used in many Linux operating systems that provides great stability and security to its users. We would be excited to see **SHREE** written on top of the home page of Garuda Linux official website. BTRFS file system is based on the copy-on-write (**CoW**) principle to efficiently implement duplicate or copy operation on modifiable resources. Garuda Linux is fast, responsive and optimized for gamers and ethical hackers. BTRFS is integrated with Time-shift that utilizes automatic snapshot feature, which backup system configuration before each update. Even after a problematic update, the files and programs are secure in backup system. Garuda Linux comes with many GUI based package managers that helps users in easy installation. In a nutshell, Garuda Linux is an ideal choice for those who switch over from Windows or Mac OS to Linux based

Source: <https://www.techrepublic.com/article/garuda-linux-kde-version-usurpsdeepin-linux-as-the-most-beautiful-linux-desktop/>;

**Bhargav D V, VI SEM A**



## From Alumni's Desk

### College to Corporate

This time we have our alumna, K M Archana from Batch 2015-19 working as Firmware Developer at Tismo Technology Solutions (P) Ltd, Bangalore. She had shared an article on her learning experience.

I have been working as a Firmware developer in Tismo Technologies since July 2019. I got placed through campus placement. I am working on projects that involve Fiber-optic networking and Smart Lighting systems.

To help ease the transition from college to corporate we were initially given training in C and firmware development. Following the 3 weeks of training, each trainee was given a demo project to work on. This helped us understand the entire project cycle.

Day 1 at the floor, I was assigned to a project that involves Embedded Linux. It was a challenging task as I had to develop the code for the hardware that is still in development. I was able to complete the tasks with the help of the team. Through the projects at Tismo, I was able to gain practical knowledge of the various theoretical concepts.

In one of my projects, I2C communication is used for collecting all the data from the optical cables. I used MUX to glow a particular LED in our college Lab(Digital Electronics). I have learnt one use case of it. There are multiple slaves connected to the master with the same slave address. To communicate with the particular slave MUX is used.

I had learnt many protocols in the Networking course. UDP protocol is used for the communication of the device to the server. To give you an idea, Smart Light devices have to be registered to the server to keep track of the devices installed in the field. For the registration process GPS, RFID are used for identifying each device.

There are many topologies like Mesh, Star I had learnt during my engineering course. A Zigbee mesh network is used for communication among the smart lighting devices. Brightness level of the lights is determined by analysing the movement of vehicles which is communicated over Zigbee network to neighbouring devices.

Taking complete ownership of the project is a much needed quality. We must be willing to accept any challenges in our project. To ensure overall success of the project we must communicate well with the team members and the client.

With a good grasp of all the subjects in the engineering course and good communication skills you will be able to adapt easily to the industry environment.

**K M Archana,  
Firmware Developer,  
Alumna, ECE, BNMIT**

### Alumni Speaks...

BNMIT has been a learning platform for the 4 best years of my life. The faculty and staff are brilliant and very helpful. They have been supportive of us through all our projects and coursework. The labs are well equipped and the management has taken care to provide the best of the resources. The peer group was great and the competition was just right for one's overall development.

Tejaswini S Ram

Year of Graduation: 2016

Current Designation: Senior Design Engineer - High Speed IO Design, Western Digital, California, USA

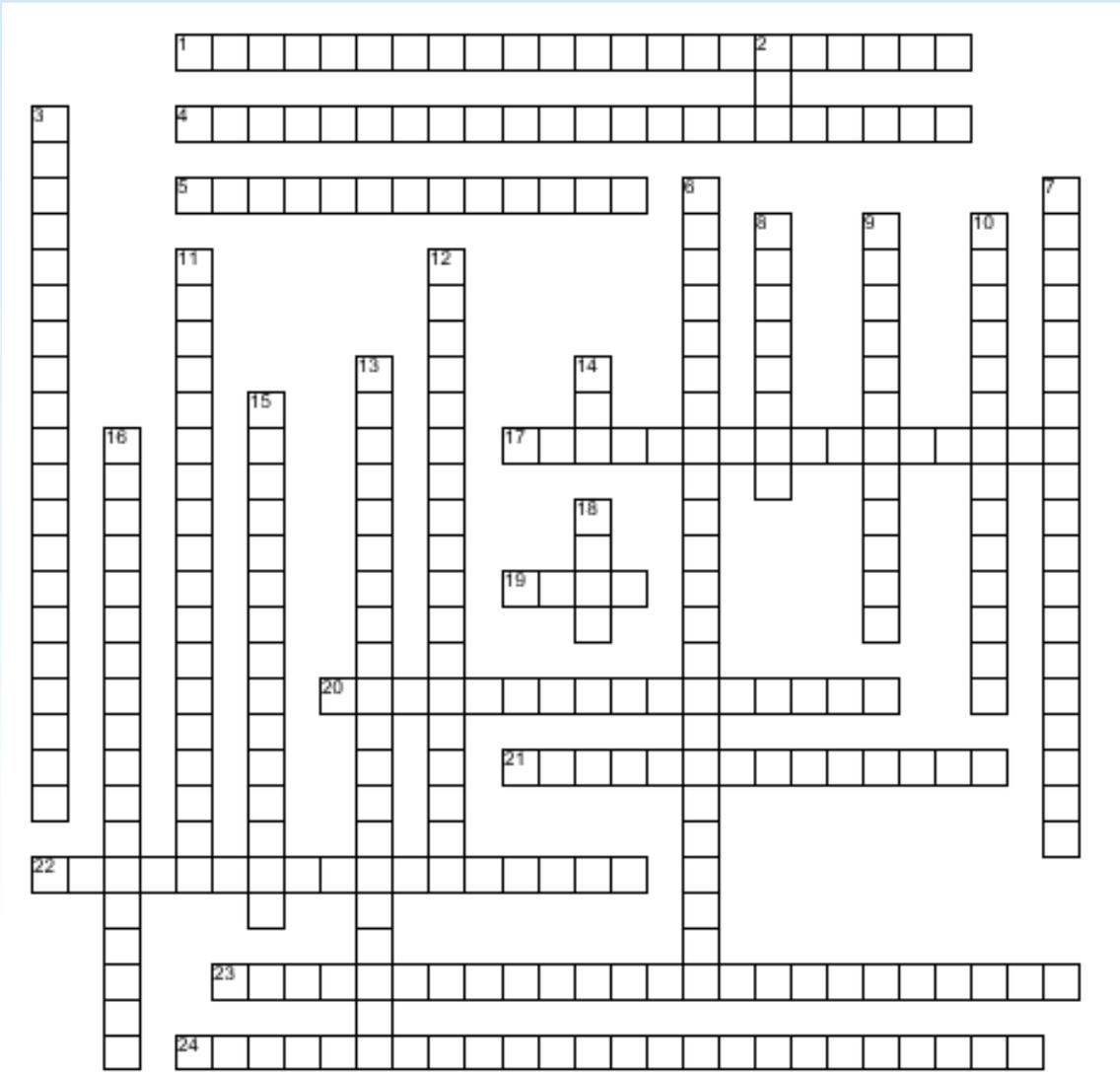
Always a pleasure to look back on the technical, extracurricular skill sets and the work ethic I developed at BNM. Wonderful professors who enabled us to take off on our career paths. Got a chance to make good friends who are still a part of my personal circle.

Kishore Jonnavittula

Year of Graduation: 2012

Current Designation: Physical Design CAD Engineer, Apple Inc, Austin, USA

# Crossword



**Across**

1. Which characteristics involve the facility the thing to respond in an intelligent way to a particular situation?
4. MCC stands for \_\_\_\_\_
5. \_\_\_\_\_ in IoT as one of the key characteristics, devices have different hardware platforms and networks.
17. What requires Edge Analytics?
19. IoT is a paradigm that involves ubiquitous presence in the environment.
20. IoT stands for \_\_\_\_\_
21. Mobile cloud computing at its simplest refers to an \_\_\_\_\_
22. \_\_\_\_\_ gives an exact, up to the second state of all devices on a network
23. IaaS stands for \_\_\_\_\_
24. A system that can enable machines to respond to human requests based on meaning

**Down**

2. Global network connecting any smart object
3. PDT stands for?
6. Mobile Cloud applications moves the \_\_\_\_\_ Power and \_\_\_\_\_ away from the mobile phone, and into the cloud.
7. SBC stands for \_\_\_\_\_
8. IoT devices are naturally vulnerable to \_\_\_\_\_ threats.
9. \_\_\_\_\_ empowers IoT by bringing together everyday objects.
10. One way to see observations addressing IoT is \_\_\_\_\_
11. PaaS stands for \_\_\_\_\_
12. SaaS stands for \_\_\_\_\_
13. What does IoT collect?
14. What requires data stream management?
15. IP expansion is \_\_\_\_\_

**Answers**

**Swathi Dayanand, VIII SEM B**

<p>24. INTERACTIVE VOICERESPONSE</p> <p>23. INFRASTRUCTURE AS A SERVICE</p> <p>22. PRESENCE DETECTION</p> <p>21. INFRASTRUCTURE</p> <p>20. INTERNET OF THINGS</p> <p>19. TRUE</p>	<p>18. TRUE</p> <p>17. INTERNET OF THINGS</p> <p>16. HUMAN GENERATED DATA</p> <p>15. INTERNET PROTOCOL</p> <p>14. IOT</p> <p>13. MACHINE GENERATED DATA</p>	<p>12. SOFTWARE AS A SERVICE</p> <p>11. PLATFORM AS A SERVICE</p> <p>10. 3.TIER ANALYTICS</p> <p>9. CONNECTIVITY</p> <p>8. SECURITY</p> <p>7. SMART BUSINESS CENTER</p>	<p>6. COMPUTING AND DATA STORAGE</p> <p>5. HETEROGENEITY</p> <p>4. MOBILE CLOUD COMPUTATION</p> <p>3. PORTABLE DATA TERMINAL</p> <p>2. IOT</p> <p>1. ARTIFICIAL INTELLIGENCE</p>
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## STAFF ACHIEVEMENTS

- Dr. Veena S Chakravarthi, Sowndarya S, Shubham Raj, Vismith Upadhya P J and Dr. Yasha Jyothi M Shirur applied for a patent on “System, Method and Tool for Circuit Design and Implementation” with Application number 202041057157. May 2021
- Dr. YashaJyothi M Shirur received “**Outstanding Scientist Award**”, in the International Scientist Awards on Engineering, Science and Medicine, held on 6<sup>th</sup> and 7<sup>th</sup> Mar 2021, Goa, India, organized by VDGGOOD Professional Association.
- Dr. P.A. Vijaya delivered a talk on 'Machine Learning and Deep Learning Techniques Applied for COVID-19 Data' in International Conference on Advancements and Recent Trends on Electronics & Communications at Meenakshi Sundararajan Engineering College, Kodambakkam, Chennai on 11<sup>th</sup> June 2021.
- Dr. Jyoti R Munavalli delivered a talk on 'Exploring Data Science' during IEEE Student Chapter - webinar organized by KLS - Vishwanathrao Deshpande Institute Technology, Haliyal on 21<sup>th</sup> June 2021.
- Dr. P.A. Vijaya delivered a talk on 'Antennas for Wearable and Biomedical Devices in Embedded Systems' in FDP- Antenna Design and Printing for Practical Applications on 29<sup>th</sup> June 2021.
- Dr. Basavaraj I Neelgar delivered a talk on 'Role of Antennas in Wireless Communication Technology' in FDP Antenna Design and Printing for Practical Applications on 29<sup>th</sup> June 2021.
- Smt. Rohini T. have been selected as the Associate NCC officer for BNM Institute of Technology NCC, 10/2 COY, 2 KAR BN NCC, Bangalore Group A, KAR & GOADTE.
- Dr. Bindu S and Dr. Jyoti R Munavalli share their expertise as Consultants in Supraja Gurukula and Innovation System Plus, Bangalore respectively.

## STAFF PUBLICATIONS

- Dr. Bhuvana Suganthi D published a paper titled ‘The Defense Against Jamming Attack in Cognitive Radio Networks: Energy Efficiency Management Perspective’ in Microprocessor and Microsystems, Elsevier, Jan 2021.
- Rajyalakshmi Chikkani, Bharathi. M and Dr. Yasha Jyothi M Shirur have published a paper titled ‘VLSI Implementation of Multiply and Accumulate Unit using Distributed Arithmetic’ in Bioscience Biotechnology Research Communications Special Issue, Vol. 13. No. 15. Jan 2021.
- Dr. Bhuvana Suganthi D has published a book chapter titled ‘Edge Computing’ in the book ‘Emerging Technologies in Engineering Research’, Technical Research Publications, Jan 2021.
- Dr. Jyoti R. Munavalli, Shyam Vasudeva Rao, Aravind Srinivasan and G. G. Van Merode have published a paper titled ‘Workflow-Based Adaptive Layout Design to Improve the Patient Flow in the Outpatient Clinics’ in Annals of the Romanian Society for Cell Biology, Vol. 25, No. 3, Apr 2021.
- Vrunda Kusanur and Dr. Veena S Chakravarthi have published a paper titled ‘A Study of Factors Influencing Plant Growth by WSN Approach and Plant Nutrient deficiency Classification in Tomato using SVM’ in the Journal of University of Shanghai for Science and Technology, Vol. 23, No. 6, June 2021.
- P Gopala Krishna and Dr. P. A. Vijaya have published a paper titled ‘Device Controller using IP2 PC Bus Protocol by FSM based Verilog code’ in International Journal of Scientific Engineering and Applied Science (IJSEAS) – Vol. 7, No. 4, April 2021
- Bharathi. M and Dr. Yasha Jyothi M Shirur have published a paper titled ‘VLSI Implementation of Multiply and Accumulate Unit using Offset Binary Coding Distributed Arithmetic’ in Turkish Journal of Computer and Mathematics Education, Vol. 12, No. 11, 2021.
- Bharathi. M and Dr. Yasha Jyothi M Shirur have published a paper titled ‘Floating-Point Multiply and Accumulate Unit Core using Distributed Arithmetic for DSP Applications’ in Turkish Journal of Computer and Mathematics Education, Vol. 12, No. 11, 2021.
- Sujaya B. L. and S.B. Bhanu Prashanth have published a paper titled ‘PHY-DTR: An Efficient PHY based Digital Transceiver for Body Coupled Communication using IEEE 802.3 on FPGA Platform’ in International Journal of Advanced Computer Science and Applications, Vol. 12, No. 2, 2021.
- Sujaya B. L. and Rashmi S. Bhaskar have published a paper titled ‘A Modelling of Context-Aware Elderly Healthcare Eco-System-(CA-EHS) using Signal Analysis and Machine Learning Approach’ in Wireless Personal Communications, Vol. 119, 2021.
- Rashmi S Bhaskar and Dr. Veena S Chakravarthi have published a paper titled ‘A Secure Communication Process of Wireless Sensor Network Architecture for Smart Urban Environment Monitoring Applications’ in the International Journal of Advanced Computer Science and Applications, Vol. 12, No. 5, June 2021.
- Priya R Sankpal and Dr. P.A. Vijaya have published a paper titled ‘Performance Evaluation of Nested Watermarked Scheme using Objective Image Quality Metrics’ in the Journal of University of Shanghai for Science and Technology, Vol. 23, No. 6, June 2021.

- Sumathi A and Priyadarshini K Desai published a paper titled 'Design and fabrication of 2.4GHz rectangular patch antenna for Wi-fi application' in the Journal of University of Shanghai for Science and Technology, Vol. 23, No. 6, June 2021.
- Dr. Jyoti R Munavalli and Rashmi Deshpande published a paper titled 'Pattern Recognition for Data Retrieval using Artificial Neural Network' in the Journal of University of Shanghai for Science and Technology, Vol. 23, No. 6, June 2021.
- Ashwini S Savanth, Dr. P. A. Vijaya, Dr. Ajay Kumar Nair and Dr. Bindu M. Kutty published a paper titled 'Machine Learning-based Classification of Meditators using Functional Connectivity over Resting-State Networks' in the Journal of University of Shanghai for Science and Technology, Vol. 23, No. 6, June 2021.
- N. Sheshaprasad, Chandrashekar C, Dr. P A Vijaya and Dr. Basavaraj I Neelgar published a paper titled 'Analysis of a printed UWB antenna and the effects of human body in WBAN applications' in the Journal of University of Shanghai for Science and Technology, Vol. 23, No. 6, June 2021.
- N. Sheshaprasad, Aditi Rao, Bhoomika R and Eva D. Saglani published a paper titled 'Design of UWB Antenna for Human Body Communication' in the Journal of University of Shanghai for Science and Technology, Vol. 23, No. 6, June 2021.
- Keerti Kulkarni and Dr. P. A. Vijaya published a paper titled 'NDBI Based Prediction of Land Use Land Cover Change' in the Journal of the Indian Society of Remote Sensing, 2021.
- Sreenath M and Dr. P. A. Vijaya published a paper titled 'Boosted System Performance based on Execution Time Using LiMca Scheduling Algorithm' in the Journal of University of Shanghai for Science and Technology, Vol. 23, No. 6, June 2021.
- P Gopala Krishna and Dr. P. A. Vijaya published a paper titled 'Implementation of LPDDR4 Memory Interface Using AXI3 Protocol with Optimization Technique' in the Journal of University of Shanghai for Science and Technology, Vol. 23, No. 6, June 2021.

## STUDENTS' ACHIEVEMENTS

- Swathi Dayanand of VIII Semester ECE and P Gopala Krishna of VI Semester M.Tech were awarded '**Best Outgoing Student 2020-21**'.

### Technical Achievements

- Pramod, Pradhvin and Kavan were awarded Rs. 5000 by Karnataka State Council for Science and Technology for the project 'Clean Wheel' guided by Dr. Rekha P.
- Darshan N Divakar, Giridhar S Benkipur and Fawaz Khan won the first prize for their project 'Wireless Robotic Arm' in IPL project exhibition summer 2021.
- Rachana R Vaidya, Swaroop Kaushik, Vishnu N and Sanjit Kangovi, won the best project award for the project titled "AI powered Notes Assistant" in the 5<sup>th</sup> National Level IEEE Project Competition organized by GSSSIETW, Mysuru on 26<sup>th</sup> June 2021.
- Nishmitha A R, Priyanka P and M Harshita have won Best Project Award for 'Web based Embedded Robot for Safety and Security Applications' and, Akshatha Pramod, Bhoomika M U, Deeksha R and Fauziah Batool I for 'IKSHANA Remote and real time monitoring system for people in need of special care' - VIII Sem BE. (A Section)
- Shreya R, Prakash, Sonika M and Rahul R B have won Best Project Award for 'Development of technique to estimate the correctness of yoga posture' and, Vinay Kumar J, Samarth M H, Shivaswaroop J P and Yukthi V for 'Raspberry pi based SOP Monitoring during COVID-19' - VIII Sem BE. (B Section)
- Bhanupriya V, Darshith Karthikeyan and Aditi Rao have won the Best Presentation Award for 'Mutual Coupling Analysis for 2x2 MIMO Antenna at 28GHz with DGS', 'Smart Automotive System' and 'Analysis of UWB Microstrip Antenna for on-Body Communication' respectively - VIII Sem BE. (A Section)
- Vismith Upadhy P J, Sowndarya S and Suraj Pawar have won the Best Presentation Award for 'EDU-bot', 'VLSI Designbot for I2C Master & Slave Design' and 'Sign Language Recognition Using Convolution Neural Network' respectively - VIII Sem BE. (B Section)

### Papers Presented & Published in Conferences/Journals:

- Sai Priya Nalluri, Reshma. L and Dr. Jyoti R. Munavalli have published a paper titled "Evaluation of Virtual Reality Opportunities during Pandemic" in 6<sup>th</sup> International Conference for Convergence in Technology (I2CT), Apr 2021.
- Rachana G Kummar, Suhas J Shetty, Vismith Upadhy P J and Dr. Jyoti R Munavalli have published a paper titled "Brain Computing Interface - Applications and Challenges" in IOSR Journal of Computer Engineering, Vol. 23, No. 2, Ser. III, Apr 2021.

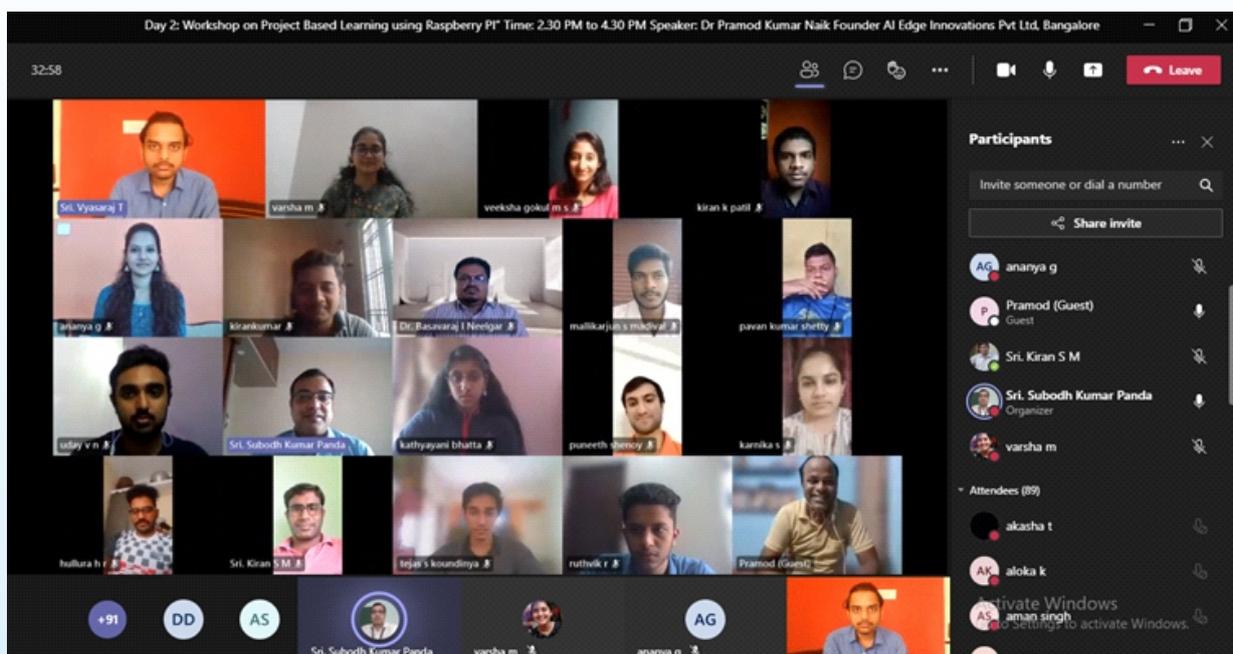
### Non-Technical Achievements

- Hemanth Prasad N, Hrishikesh G Rayasa, Suhaas S Sastry, Indhu G, Kavipriya M, Kushboo Choudhary G, Nidhi Rajan and Shubhashree N have received B certificate and Bharath PA received A grade in C certificate in NCC.

## DEPARTMENTAL EVENTS



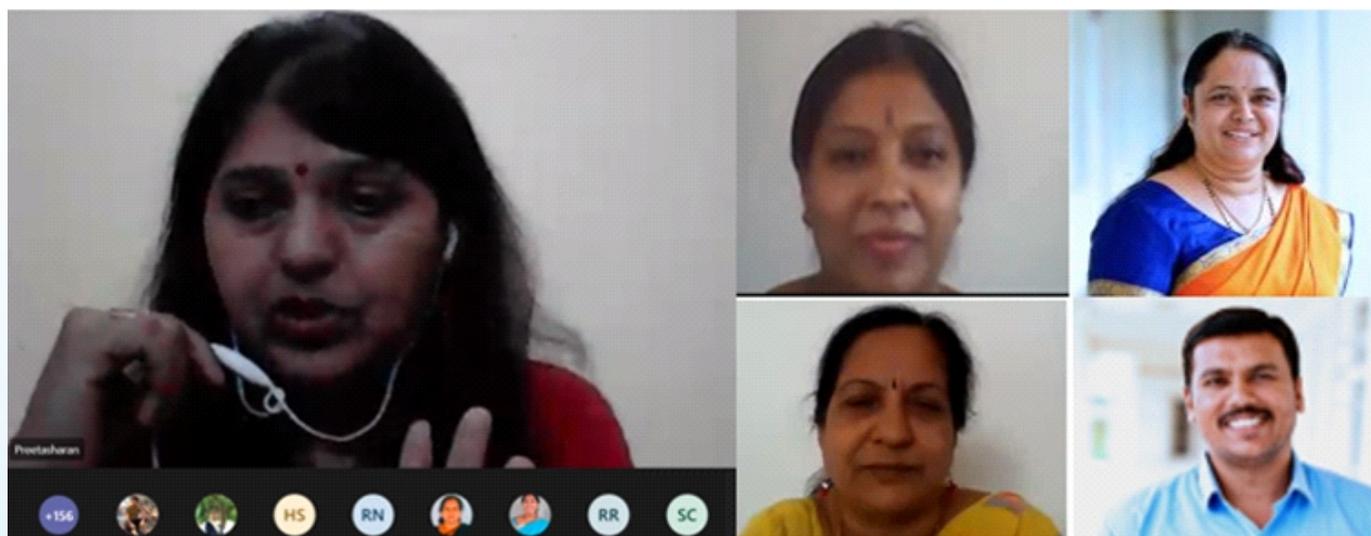
A two-days workshop was organized under ISTE students Chapter-BNMIT on “Python and Data Science”, on 5<sup>th</sup> and 6<sup>th</sup> June 2021. The Resource person, Mrs. Rashmi M, Consultant at AGIMUS Technologies Pvt. Ltd., Bengaluru highlighted the need for data analysis in the current scenario, job opportunities for data analysts and took the participants through the journey of most popular tool used for data analysis – The Python. Hands-on sessions were practised using Anaconda navigator and Jupyter Notebook. This workshop covered various commands, functions and data types, File handling in Python. Participants expressed their satisfaction through their feedback and chat replies in the online meeting. This workshop aimed at providing good hands-on to use Python for Data Science and develop interest in students to take up projects/complex problems related to data science.



A two-day workshop on 'Project Based Learning using Raspberry Pi' was organized by the Department of ECE under Institution of Engineers India Students' Chapter, BNMIT. Resource Person Dr. Pramod Kumar Naik discussed the introduction to Raspberry pi and its architecture, usage of MATLAB and Simulink for Raspberry Pi, how to Setup the Raspberry Pi and demonstrated through demos/projects on Raspberry Pi. The participants were able to gain knowledge of Raspberry Pi, MATLAB, Simulink and their usage in different real time applications. The two days' workshop 'Project Based Learning using, Raspberry Pi introduced to the students was informative, interesting and useful for developing various projects and products..



Dr. Cynthia Menezes Prabhu, Dean, Faculty of Commerce, Professor, MBA-Bangalore University, delivered a webinar on Gender bias and Gender equality on 3<sup>rd</sup> June 2021. Number of participants: 188. Her presentation included facts and screening of videos related to gender discrimination. She discussed on how women's roles is restricted to private spheres i.e. in house hold managing and taking care of the family and men's roles to more public ones. In many rural houses males are fed first and the left-overs are eaten by the females. She mentioned in her presentation that women, in general, find it difficult to reach their career goals due to lack of childcare support.



Dr. Preeta Sharan, Professor, Oxford College of Engineering, Bangalore delivered a talk on “Writing and Publishing a Technical Research Paper”. The speaker shared her research achievements with students and motivated them to have a research mind-set. She briefed about her project work, patents and collaborations with various funding agencies. The presentation included planning a paper, writing a good abstract, structuring of a paper, indexing, selection of a journal for publishing and overview of peer review process etc. The speaker highlighted the importance of professional ethics while writing a paper. The second day was mock paper presentation where students were given an opportunity to present published papers. Dr. Yasha Jyothi M Shirur, Dr. Jyoti R Munavalli, and Dr. Bindu S were the judges for the mock paper presentation. Altogether 17 papers were presented.



The event was organized by IEEE Student Branch, BNMIT. Dr. Aarti Jagannathan, Associate Professor, Department of Psychiatric Social Work (Psychiatric Rehabilitation Services), National Institute of Mental Health and Neurosciences (NIMHANS) delivered a talk on “Managing one's emotional wellbeing” on 8th June 2021. No. of participants: 286. The speaker gave an insight on topics on health for positive wellbeing, physical fitness, nourishment, sleep hygiene, emotional wellbeing, managing negative emotions, support network and personal time schedule.



Winners of Best Project Award and Best Presentation Award in VIII Semester (A Section) Project Exhibition (2020-21) with project guides



Winners of Best Project Award and Best Presentation Award in VIII Semester (B Section) Project Exhibition (2020-21) with project guides



A One-week Online Faculty Development Programme (FDP) on “Antenna Design and Printing for Practical Applications” was conducted by Department of Electronics and Communication Engineering, BNM Institute of Technology and Funded by NewGen-IEDC, DST, Govt. of India, from 25<sup>th</sup> June 2021 to 30<sup>th</sup> June 2021. About 200 participants from various engineering institutes in and out of Karnataka state and industries, have registered and attended the FDP.



Best Outgoing student from the Department of ECE - Swathi Dayanand during Graduation Day on 2<sup>nd</sup> August 2021



Best Outgoing student from the Department of M.Tech - P Gopala Krishna during Graduation Day on 2<sup>nd</sup> August 2021

## EDITORIAL TEAM

### FACULTY MEMBERS

**Dr. Jyoti R. Munavalli**  
Assoc. Prof., Dept. of ECE

**Dr. Shashi Prabha (Asst. Prof.)**  
English, Training & Placement

### STUDENT MEMBERS

**Deeksha R., VIII ECE A**  
**Greeshmaa S., VIII ECE B**  
**Nagaveni G. R., VI ECE B**  
**Hamsini U., IV ECE A**

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