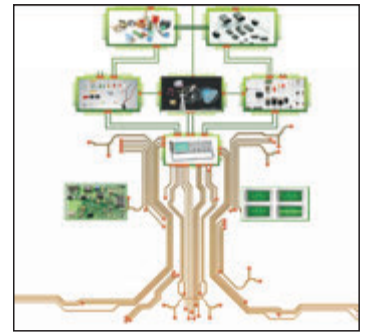


ELECTRONICA

Newsletter

Department of Electronics & Communication
Engineering



Volume 7

Issue 1

July - Dec 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 Syukuro Manabe and Klaus Hasselmann who were jointly awarded the 2021 Nobel Prize in Physics for the physical modelling of Earth's climate, quantifying variability and reliably predicting global warming and to Giorgio Parisi for the discovery of the interplay of disorder and fluctuations in physical systems from atomic to planetary scales.

What's inside...

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

And more...



B. N. M. Institute of Technology

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FROM THE EDITORS' DESK

Dear Readers,

“Read different to think differently; world is already into rat race.” - Aman Jassal.

On behalf of Department of ECE, the Editorial Team would like to wish all the authors, and the readers a wonderful and prosperous year ahead. We welcome you back to the 2021 Winter Edition of 'ELECTRONICA' Volume 7, Issue 1, July-December 2021, the department newsletter, after a knowledgeable and significant summer edition.

Our team is delighted to present to you the current edition as a creative and collaborative output of the young minds pursuing their Electronics and Communication Engineering. This magazine is evidence of our keen interest and passion towards our chosen field. We have put in our utmost efforts to update your knowledge with advances in the technological field. ELECTRONICA gives an opportunity to the students to explore and express their interest on the latest developments in the field of electronics. It strives to provide a platform for the students to publish their ideas very early in their career, which further helps them to continue their research with confidence. It also highlights the achievements of students and staff and the events organized by the Department of Electronics and Communication Engineering at BNMIT.

We would like to thank all the writers for their constructive and active contribution to the newsletter and we are grateful to all the readers for taking time off to peruse this newsletter. We hope you enjoy this edition and provide us with your valuable feedback.



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 eleven 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 classrooms 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 fifteen University Ranks since 2005. The students do innovative projects, internship training in industries and academic projects in reputed organisations. They regularly participate in intercollege and intra-college technical, cultural and sports events and have regularly bought laurels to the Department. The students participate in hackathons, workshops, webinars, quizzes, present papers in reputed conferences and publish papers in reputed 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. Webinars and workshops were conducted using online platforms and in offline mode. Faculty Development Programmes, Workshops, Skill Development Programmes, Seminars and Invited Talks for students and staff were organized in online and offline mode, for continuous learning and periodic updation of knowledge and skills.

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

Role of Miniaturization of Electronic Substrates for Medical Devices

Medical industry today has to meet the growing demand for miniaturization, high-speed performance, flexibility for handheld, portable, in vivo, and implantable devices. To achieve these, it is required to have certain new packaging structures characterized by greater function, higher input counts, and high reliability as it is pushed to smaller and smaller devices. Hence, microelectronics is moving towards alternative and innovative approaches as a solution to this. The application of medical electronics possesses unique requirements particularly for the case of handheld, portable and implantable devices that demand increased functionality, portability as well as streamlining to decrease the size, weight, and power (SWaP).



In this article, key enablers for achieving a reduction in size, weight, and power (SWaP) in electronic packaging for a variety of medical applications are discussed. A few manufacturing methods and materials for producing advances in electronic substrates are mentioned here:

High-Density Substrate Technology:

It is the most important technology to achieve SWaP in medical devices. When the degree of miniaturization is required to a greater degree on a rigid substrate then semiconductor packaging laminations are done. The laminates used don't contain glass cloth, which allow for the formation of higher resolution by UV laser drilling. As the devices get smaller, capture pad area size

minimizes and enables much greater density resulting in substrate size reduction as compared to conventional technology. This process enables increased functionality in decreased form factor for implantable cardiac devices such as implantable cardioverter-defibrillators (ICD's) and pacemakers.

Embedded Passive and Active Devices:

Passive devices account for a large part of today's electronic assemblies. Embedding passives is one way to save substrate real estate, conversion cost, reduce parasitic effects and improve performance. Embedded capacitors have special attention since they have the greatest potential benefit for high density, high speed, and low voltage IC packaging. They can be embedded into the interconnect substrates to provide decoupling, bypass, termination, and frequency determining functions. These devices play a major role in aneurysm clips, stents, catheters, external fixation devices, etc.

System-In-Package:

SiP designs implement embedded passive and active components which further enables SWaP reductions. Thinner, and high-density substrate technology with lower inductance is driving down the need for decoupling capacitors in the design. For example, High density interconnect technology combined with embedded passives and small die results in the reduction of body sizes which is 27 times reduced from its original physical size. The concept of SiP can be implemented at various levels depending on application requirements.

Multilayer Flexible Substrates:

Flex circuits are used in various applications where requirements for flexibility and space savings limit the serviceability of rigid substrates. Most of the miniaturized applications require high-density multilayer flex circuits. Desired multilayer properties are realized not through new materials but by new structural configurations by controlling dielectrics and thickness. Flexibility will decrease with an increase in total thickness. Thin materials offer flexibility without inducing significant strains in themselves. This approach has recently been introduced to create rollable and flexible devices. Examples of a few medical devices in which electronics are supporting for miniaturization of the latest medical innovations are as follows:

Wearables:

The modern and most widely used innovation in which electronics play a key role is in wearable devices which includes smartwatches, glasses, rings, and even items of clothing with inbuilt patient monitoring capabilities. The development of novel biosensors to measure heart rate, body temperature and sleeping habits are very useful for wearables. Electronics and at the same time microelectronics are key in allowing these devices to be scaled down while still carrying out their intended function. In addition, to letting people measure their vitals on the go, wearable devices are also driving to the uptake of telemedicine which has been enhanced by lockdowns and social distancing protocols during the COVID-19 pandemic.

Robotics:

In a wider health care sector, robotics play an important role and hence the associated electronics also play a vital role in its functionality. In hospitals, robot-assisted surgeries allow complex operations to be carried out with more precision, flexibility, and control which shortens the recovery time and mitigates many of the risks associated with open surgeries. AI-powered robots are making their way to hospitals to aid doctors and nurses and into a home setting to help elderly or disabled patients with daily activities as well. COVID-19 pandemic has even brought the idea of autonomous, germ zapping robots into the public eye.

Brain Stimulation Devices:

Deep brain stimulation (DBS) involves implanting electrodes in certain areas of the brain. These electrodes produce electrical impulses that regulate abnormal impulses. DBS is used to deliver low-level pulses of electricity to the brain and stimulate neural activity. These have become increasingly advanced as the developers strive to improve the safety and performance of these technologies. They claim to improve performance, sleep quality, or general mood using neurostimulation.

Next Generation Hearing Aids:

Hearing aids have been in use for many decades. Miniaturization of these devices is essential and microelectronics is set to play a key role here, as the rise of more discrete, invisible earpieces mean the components must be scaled down even further than before. The other capabilities being introduced are reduced power consumption, connecting to a smartphone via bluetooth, streaming audio directly from TVs, etc. Whether it's through an onboard deep neural network or the addition of an extra microphone, recent hearing aid products like the Oticon More and Resound ONE continue to push the boundaries by enhancing the hearing experience.

The health care industry is a booming industry in this era. Integrating the features onto a single device with reduced size and reduced power consumption is a challenging task. Developing handy portable medical devices for self-diagnosis plays an important role to have a healthier lifestyle in society. To meet the demand for cost-effective and portable medical devices, miniaturization is a must and electronics plays a major role in this process.

Source: www.science direct.com

Vaishnavi P Kumar
V ECE B

World's First Sodium-Ion Solar Generator

Sodium-ion batteries have become a cynosure as an alternative to the lithium ion and a counterpart in many industries due to their high abundance and low costs. Sodium-ion batteries have the potential to reduce the world's increasing reliance on lithium. Companies are working on sodium ion batteries that could be produced at a cheaper rate out of abundant sodium, providing a more ethical and sustainable alternative to traditional lithium-ion batteries. Cobalt and lithium used in traditional batteries are relatively rare, expensive, and are often sourced from war-torn countries where miners work in inhumane conditions. Bluetti, a Las Vegas-based manufacturer of solar energy facilities, Photovoltaic generators, solar panels, and other solar peripherals, has launched a sodium-ion solar generator, the NA300 and its compatible battery module the B480. Bluetti said "Chemical batteries, especially lithium-ion batteries, offer an optimum solution for the green energy transition. However, the long-term use of rare and expensive lithium has slowed down the energy shift across the world. That's to say, the changeover to sodium-ion batteries will sustain the future power supply, even accelerate the course of carbon neutrality."



The company will showcase its NA300 solar power generator, which uses a sodium-ion battery rather than a traditional lithium-ion one. Alongside the new generator, it will debut the B480 sodium-ion battery packs designed for use with the NA300. The NA300 will come with up to 3000Wh of solar input capability, while the B480 battery packs each have an output of 4,800Wh. As the NA300 can have two B480's attached, its capacity can be extended to an impressive 12,600Wh. The generator can also be charged from 0 to 80 percent in roughly half an hour thanks to 6000W dual charging, the system can charge to 80% state-of-charge in less than 30 minutes at room temperature. In a low-temperature environment of -20 °C, it has an 85% capacity retention rate and 80% system integration efficiency.

Bluetti said its first-generation sodium-ion battery excels in thermal stability, fast-charging capacity, low-temperature performance, and integration efficiency, despite slightly lower energy density than its lithium-ion counterparts. The solar generator and battery's chemical components also feature more abundant materials than traditional lithium-ion batteries, lowering prices and alleviating concerns about resource scarcity. The sodium-ion power station comes with four 20-amp traditional wall plugs, as well as a 30-amp L14-30 output port, driven by the system's built-in 3000W pure sine wave inverter.

Source: <https://www.saurenergy.com/solar-energy-news/bluetti-unveils-worlds-1st-sodium-ion-solar-generator>

R. Chinmayee
V ECE B

Why regulators cannot actually ban Bitcoin?

“You'd have to shut down the internet.” Hester Peirce, Commissioner to the U.S. Securities and Exchange Commission (SEC) on enforcing a Bitcoin ban.

Practical Challenges

An introductory understanding of blockchain technology underscores the practical challenges of a Bitcoin ban. Blockchain describes a decentralized and distributed tally that records the histories and deals associated with digital means. Bitcoin is a virtual asset that's penetrated and recorded on such a blockchain. The term cryptocurrency is a slight misnomer since Bitcoin is more like a decentralized network than a traditional currency that can be held or expropriated from a regulated custodian. Rather than holding physical coins or having access to an account with a regulated third party, a bitcoin holder uses private keys to unlock digital means recorded on the blockchain maintained by a decentralized and global network of computers. These private keys are frequently represented in a series of words, known as a recovery key.

Legal Challenges

Bitcoin was created as a public network where participants make inflexible entries on an electronic tally. While the most visible manifestation of these entries is the exchange of value, bitcoin is further than simply money. Saying bitcoin is digital money is like saying the internet is a fancy telephone. It's like saying that the internet is all about dispatch. The IRS categorizes bitcoin as property and therefore any ban would arguably represent an unconstitutional seizure. The U.S. government itself has seized and sold bitcoin, further legitimizing its status as property protected by the constitution. While the government could oppose this argument by offering holders a window in which to convert their bitcoin to U.S. dollars, the potential loss of hundreds of billions of net worth to individuals and openly-traded companies would hardly affect just compensation guaranteed by the Constitution.

Economic Challenges

Indeed, if the U.S. government could legally ban Bitcoin, doing so would be economically prohibitive. Much of the value in bitcoin has been created and is held by U.S. companies. For example, Tesla has bought \$1.5 billion in bitcoin, Coinbase is an intimately-traded and U.S.-grounded cryptocurrency exchange with a market value of over 85 billion \$, and mainstream banks like JPMorgan Chase and Goldman Sachs are launching cryptocurrency investment products. Likewise, payment companies like Visa and PayPal are helping thousands of small businesses accept bitcoin for goods and services. Although opponents may parrot claims that bitcoin is used by terrorists and drug dealers, blockchain analysis suggests that only a small and shrinking bit of Bitcoin deals are used for dark purposes.

Political Challenges

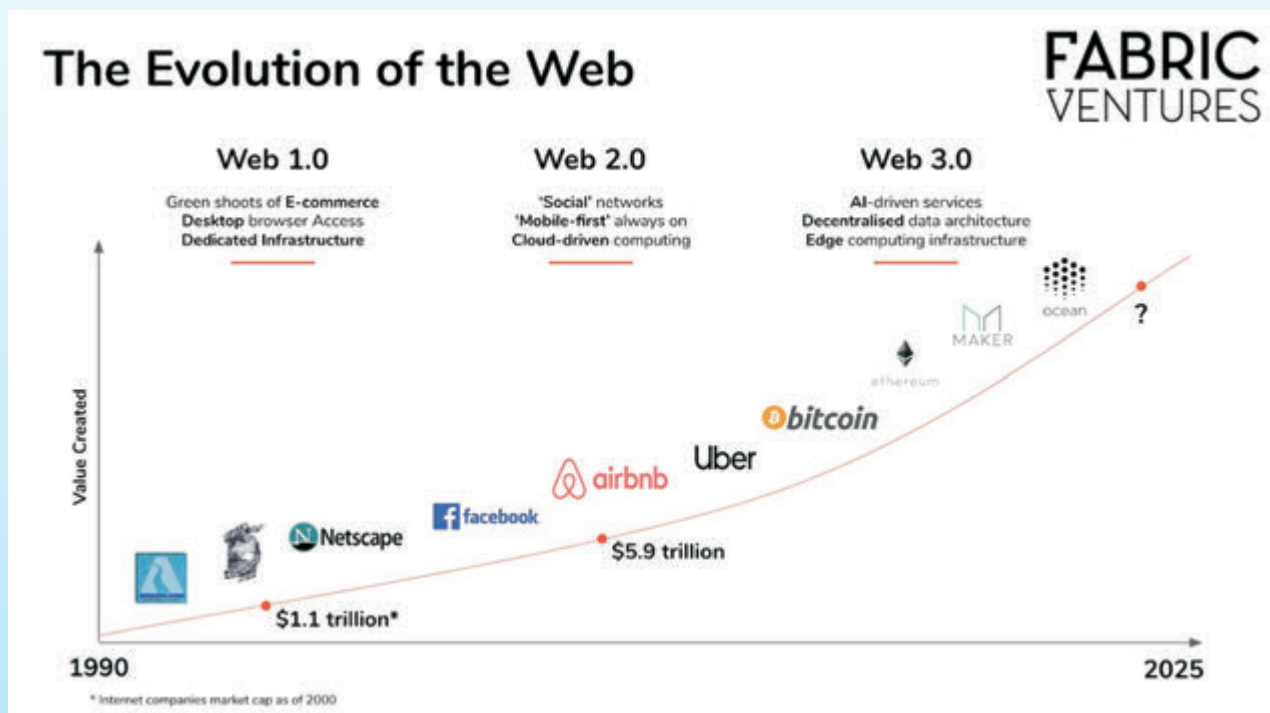
Just as Bitcoin has grown exponentially, so has its political influence. This influence, combined with practical, legal, and economic factors, will probably affect the U.S. government creating regulatory certainty rather than an outright ban of Bitcoin. Companies and individuals with significant exposure formerly have significant political influence. According to CoinDesk, Sam Bankman-Fried, the CEO of cryptocurrency derivatives platform FTX, made the second-largest donation to Joe Biden's presidential campaign. Freshly, Fidelity Investments, Square and Coinbase joined forces to launch a Bitcoin trade group to lobby policymakers. Until there is greater regulatory clarity regarding Bitcoin, the statements of some prominent government figures and business leaders will continue to fuel speculation about the imminent demise of this emerging asset. Although an outright ban would be unworkable for the aforementioned reasons, further regulation can be expected. If this regulation is narrowly tailored to avoid strangling the emerging Bitcoin economy, it could bring newfound legitimacy to the digital asset, minimize its use for illicit purposes, and bring additional price stability.

Source: <https://bitcoinmagazine.com/culture/why-regulators-cannot-ban-bitcoin>

Rohith J E
III ECE B

What is Web 3.0?

So, what is Web 3.0! Since its announcement in 2006 by the co-founder of Ethereum Web 3.0 has made quite some news for itself recently. Even though Elon Musk and Jack Dorsey have already called it a scam, Web 3.0 promises a secure internet surfing for its users. To understand Web 3.0 we must know about its predecessors Web 1.0 and Web 2.0. The first generation of internet i.e., Web 1.0 operated from 1994 to 2004. Internet looked like a basic html page with no user interaction since sharing photos videos etc. wasn't possible at all over Web 1.0. Then came Web 2.0 with the introduction of Facebook. Users were able to interact as well as share content on various platforms. Web 2.0 grew exponentially and now users contribute to 86% of the internet content.



While the Web 2.0 wave is still bearing fruit, we are also seeing the first shoots of growth emerge from the next large paradigm shift in internet applications, logically entitled Web 3.0. As hard to believe as it might seem, Web 3.0 (originally coined the Semantic Web by Tim Berners-Lee, the Web's original inventor), is an even more fundamental disruption, one that in time will leave everything hitherto in its shade. It is a leap forward to open, trustless and permissionless networks.

'Open' in that they are built from open-source software built by an open and accessible community of developers and executed in full view of the world.

'Trustless' in that the network itself allows participants to interact publicly or privately without a trusted third party.

'Permissionless' in that anyone, both users and suppliers, can participate without authorisation from a governing body.

The ultimate outcome of these new open, trustless and permissionless networks is the possibility to coordinate & incentivise the long tail of work, service, data, and content providers that are the disenfranchised backdrop to many of the world's most acute challenges such as health, food, finance and sustainability. Where Web 2.0 was driven by the advent of mobile, social and cloud, Web 3.0 is built largely on three new layers of technological innovation: edge computing, decentralised data networks and artificial intelligence. While in Web 2.0 recently commoditised personal computer hardware was repurposed in data centers, the shift to Web 3.0 is spreading the data center out to the edge, and often right into our hands. Large legacy data centres are being supplemented by a multitude of powerful computing resources spread across phones, computers, appliances, sensors, and vehicles which are forecast to produce and consume 160 times more data in 2025 as compared to 2010.

Decentralised data networks are making it possible for these data generators (from an individual's personal health data, to a farmer's crop data, or a car's location & performance data) to sell or barter their data without losing ownership control, giving up privacy or reliance on third-party middlemen. As such, decentralised data networks can bring the entire long tail of data generators in to the emerging 'data economy'. However, Web 2.0 and Web 1.0 lack privacy of its users since the platforms used by them are operated by companies which can access their data at any point of time. These are no obstacles for Web 3.0 since it uses blockchain which decentralizes the control over user data. The user data is managed by smart contracts which no one other than the user will know. However, Web 3.0 comes with its own share of disadvantages, as the user identity is hidden, and any illegal activity can be promoted. Still, it is too early to assume that it's a scam or a success since Web 3.0 still has some time before its actual usage in everyday life.

Source: <https://medium.com/fabric-ventures/what-is-web-3-0-why-it-matters-934eb07f3d2b>

Goutam Singh
V E C E A

Heralding Agile Digital Transformation in the Financial Sector with SD-WAN

Be it for employees or for customers, the overpowering digital transformation in the financial sector has been eminent in recent years. While embracing digital transformation, financial services organizations are facing an increasing set of networking and security challenges such as, cloud migration; the increasing percent of the workforce working from home; maintaining a modern and resilient network infrastructure; and last but certainly not least – cybersecurity risks and regulatory compliance. SD-WAN has popularly emerged as a key enabler to mitigate these possible challenges and roadblocks.

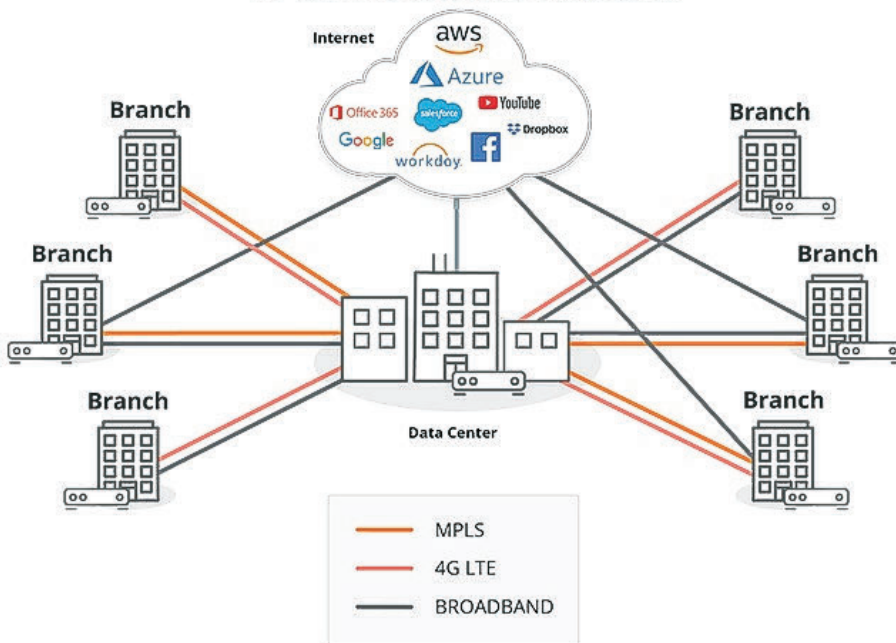
A software-defined wide area network (SD-WAN) is a virtual WAN architecture, in which any blend of network transport types be it MPLS (Multi-Protocol Label Switching), broadband internet, cellular, and satellite — can be virtualized and bonded then centrally managed in software, to securely connect users to applications and desktops in accordance with policy. Essentially, SD-WAN is software-defined networking (SDN) for the WAN.

SD-WAN simplifies the management and operation of a WAN by decoupling the networking hardware from its control mechanism.

1. Reimagining a simpler, cost-effective network infrastructure

At its core, SD-WAN provides financial institutions an avenue to securely leverage internet broadband and 5G/LTE connections at a lower cost while enjoying the same benefits as private, dedicated lines by merging MPLS, broadband internet, and 5G/LTE in a single logical link. Then, based on the policies and priorities outlined by the business, SD-WAN can automatically route the traffic. Meanwhile, advanced SD-WAN technologies, can optimize data transmission in internet and 5G links using techniques such as forward error correction that rebuilds transmitted lost packets, and packet order correction that helps reorder data at the destination.

SD-WAN Architecture Explained



2. Improve security and flexibility in the home or branch environment

In the past, financial institutions via MPLS had to wait months to establish a new ATM or branch location. Now with SD-WAN, financial firms can enjoy similar MPLS performance deployed through broadband internet services without the need for physical IT resources on the ground. Meanwhile, as work-from-home paradigms transition from temporary to more permanent fixtures at financial services organizations, employees can now expect the same level of digital services and security in the home as in the main office. A RAP (Remote Access Point) microbranch automates the formation of IPsec tunnels between access points of a remote site to the Gateway cluster of the parent WLAN network. This process equally protects home and remote-branch locations by providing SD-WAN capabilities.

3. Become more prepared with upgraded disaster recovery plans and expedited backups

For disaster recovery, often data is backed up at locations potentially thousands of miles away from the main data center typically located at the main campus or off-site nearby. That distance can add up to debilitating latency that can slow critical data transfers. Worse, some data may not even be backed up, placing a financial institution at risk in the chance it loses key customer data. Recently evolving SDWAN optimization software's leverage TCP protocol acceleration techniques to improve throughput while employing sophisticated data deduplication and data compression algorithms. Redundant data is fingerprinted, and a pointer is created to eliminate transmission of duplicate data across the WAN.

4. Protecting customer data and access

As customers increasingly embrace mobile options to access financial institutions, the traditional security perimeter is quickly dissolving and financial institutions must rethink how to secure cloud application traffic. The answer is SASE (Secure Access Service Edge), an architecture that implements security services in the cloud. SASE combines WAN edge network functions at the branch, such as SD-WAN, routing, basic security functions, and WAN optimization capabilities with security services including firewall-as-a-service (FWaaS), zero-trust network access (ZTNA), cloud access security broker (CASB), secure web gateway (SWG), and more, delivered from a cloud-delivered security service.

5. Achieving compliance

An SD-WAN solution can also help financial institutions comply with various kinds of regulations and rules. One core example is the Payment Card Industry Data Security Standard (PCI DSS) that sets the payment card industry regulations and guidelines. Some of the PCI DSS requirements specify encrypting transmission of cardholder data over public networks, while another requirement specifies installing and maintaining a firewall configuration to protect cardholder data. Modern SD-WAN can help financial institutions meet those specific requirements.

Sources: <https://blog.xigentsolutions.com/sd-wan-transforming-finance-industry>

Swathi Dayanand
First Rank Holder VTU 2021 BNMIT
Alumna (2017-2021 Batch)
Technical Support Engineer, Aryaka Networks.

STAFF ACHIEVEMENTS

- **Chaitra N**, who pursued Ph.D. under the guidance of **Dr. P. A. Vijaya**, defended her thesis on 16th August 2021.
- **Ashwini S Savanth, Priya R Sankpal, N Sheshaprasad, Sujaya B. L., Vrunda Kusanur, and Rashmi Bhaskar** submitted their Ph.D. thesis during September to December 2021.
- **Lt. Rohini T**, Associate NCC Officer had her rank pipping ceremony on 23rd September 2021 by CO Col. W.J.K Singh, Mr. Thrimurthy L., Mr. Santhosh H. S. in 2 KAR BN NCC Office.
- **Dr. S.Y. Kulkarni** delivered a technical talk on “Bio-chips and its applications” in the Faculty Development Programme on Research Trends in Biomedical Applications organised in BNMIT on 24th October 2021.
- **Dr. P. A. Vijaya** delivered a talk on “Project Proposals and Granting Agencies” in the ATAL Faculty Development Programme organized in BNMIT on 27th August 2021.

STAFF PUBLICATIONS

- **Keerti Kulkarni and Dr. P. A. Vijaya** have published a paper titled “NDBI Based Prediction of Land Use Land Cover Change” in Journal of the Indian Society of Remote Sensing, Volume 49, Issue 2, July 2021.
- **Keerti Kulkarni and Dr. P. A. Vijaya** have published a paper titled “Separability Analysis of The Band Combinations for Land Cover Classification of Satellite Images” in International Journal of Engineering Trends and Technology, Volume 69, Issue 8, August 2021.
- **Keerti Kulkarni and Dr. P. A. Vijaya** have published a paper titled “Using Combination Technique for Land Cover Classification of Optical Multispectral Images” in International Journal of Applied Geospatial Research, Volume 12, Issue 4, October 2021.
- **Dr. Jyoti R Munavalli, Dr. P A Vijaya and Priya R Sankpal** have published a paper titled “A Qualitative Analysis on Management Studies for Engineering Students” in Journal of Engineering Education Transformations, Volume 35, Issue 2, October 2021.
- **Dr. Jyoti R Munavalli and G.G. Van Merode** presented a paper titled “Image Processing for Patient Pathway Optimization” in International Conference on Computational Methods and Data Engineering (ICCMDE 2021) organized by Vellore Institute of Technology, Vellore, Tamil Nadu, India during 25th-26th November, 2021.
- **Dr. Bhuvana Suganthi, SSVSSRS Sarma Adithe, Su.Suganthi, B. Uma Maheswari and M.Selvi** presented a paper titled “Networking Reliability Approach for Energy Analysis in Wireless Sensor Nodes with Edge Computing Techniques” in Fifth International Conference on IoT in Social, Mobile, Analytics and Cloud (I-SMAC) held in November 2021.
- **N Sheshaprasad and S B Bhanu Prashanth** have published a paper titled “The Design of an Inset Fed Wide Band Antenna Operating from 23 to 30 GHz for Wearable Smart Watch Applications” in International Journal of Science of Research (IJSR), Volume 10, Issue 11, November 2021.
- **N Sheshaprasad and S B Bhanu Prashanth** have published a paper titled “Studies on Human Body Effects on a Printed UWB Microstrip Antenna, and SAR Analysis in WBAN Applications” in International Journal of Engineering Science Invention (IJESI), Volume 10(11), November 2021.
- **Keerti Kulkarni and Dr. P.A. Vijaya** presented a paper titled “Correlating Land Surface Temperature with LULC, Vegetation Index and Topography” in IEEE International Conference CCUBE-2021, at RNS Institute of Technology, Bangalore, on 23rd and 24th December 2021.
- **Bharathi. M and Dr. Yasha Jyothi M Shirur** have published a paper titled “Power-Efficient Modulo Multiply and Accumulate Unit using Distributed Arithmetic” in Design Engineering Journal, Issue 9, 2021.
- **Rashmi S Bhaskar and Dr. Veena S Chakravarthi** have published a paper titled “Predictive Framework for the Urban Environment Monitoring using Artificial Intelligence and Wireless Sensor Network” in International Journal of Creative Research Thoughts (IJCRT), Volume 9, Issue 12, December 2021.



Did You Know ?



The snowboard was invented by an engineer? With some engineering twists and turns along the way, the snowboard has become a marvel of geometry, chemistry, and bio-mechanics. Since the snowboard allows deft turns, ski manufacturers have quickly adopted some of the snowboard innovations, enabling skiers to turn with less effort.

STUDENTS' ACHIEVEMENTS

Technical Achievements

- **Tejas S Koundinya** secured first place in Ideation competition from IEEE Signal Processing Society organized by IIT Allahabad from 23rd to 28th October 2021 for project on “Advances in Biometric Signal Processing Techniques”

Papers Presented and Published in Conferences/ Journals

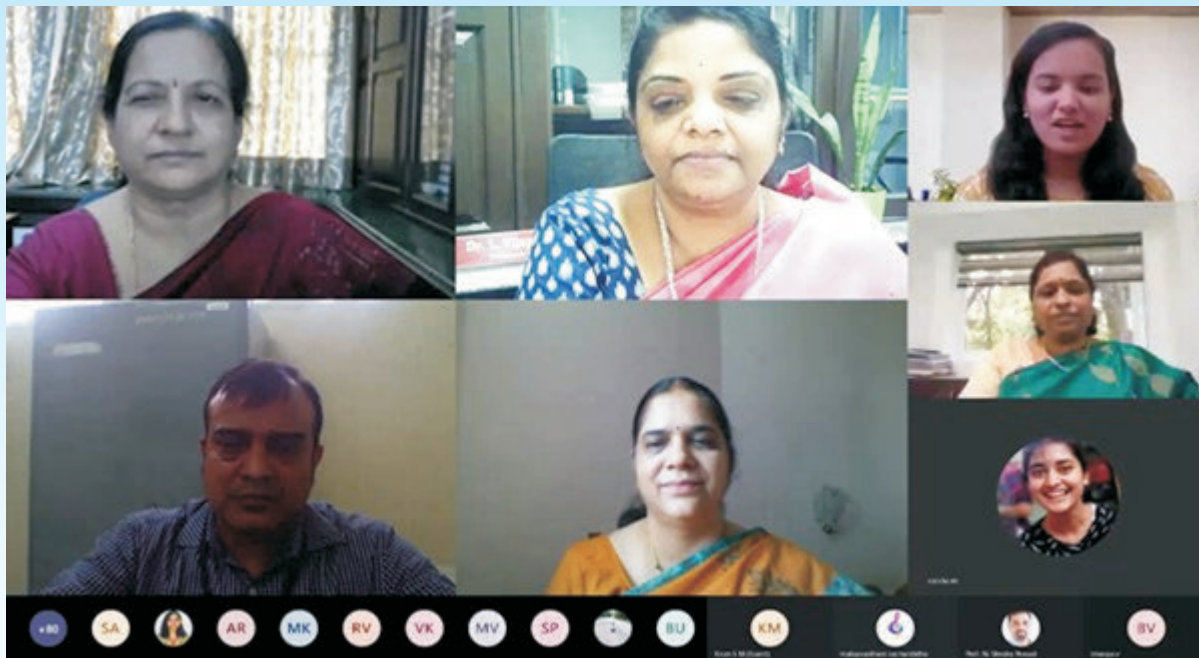
- **Gopalakrishna P and Dr. P. A. Vijaya** published a paper titled “Implementation of LPDDR4 Memory Interface Using AXI3 Protocol with Optimization Technique” in Journal of University of Shanghai for Science & Technology, Volume 23, Issue 6, 2021.
- **Sowmya S and Dr. Yasha Jyothi M Shirur** have published a paper titled “Smart IOT Enabled Power Theft Detection and Transformer Health Monitoring System” in Bulletin Monumental Journal, Volume 22, 2021.
- **Rachana P Rao, Swathi Dayanand, Varshitha K R and Keerti Kulkarni** presented a paper titled “Sarcasm Detection for Sentiment Analysis: A RNN based approach using Machine Learning” in 2nd International Conference on Computer Vision, High Performance Computing, Smart Devices and Networks (CHSN-2021) held during 20th - 21st August 2021.
- **Rameshwari Anand, Nandan A Rao and Sumukh D S** published a paper titled “Automatic Camera Panning with Face Mask Detection” in International Journal of Engineering Applied Sciences and Technology, Volume 6, Issue 6, pp. 124-127, October 2021.
- **Sailesh R, Sree Madhumitha, Sirish Ambarish and Jyoti Munavalli** presented and published a paper titled “AutoNav: A Lane and Object Detection Model for Self-Driving Cars” in International Conference on Computational Methods and Data Engineering (ICCMDE 2021) organized by Vellore Institute of Technology, Vellore, Tamil Nadu, India during 25th-26th November 2021.
- **Chaitra N, Yukti Khosla and Prerana Ramachandra** presented a paper titled “Detection of Autistic Individuals using Facial Images and Deep Learning” in 5th International Conference on Computational Systems and Information Technology for Sustainable Solutions CSITSS – 2021, held during 16th – 18th December 2021.
- **Rachana G Kummar, Suhas J Shetty, Vishwas S N, Vismith Upadhya P J and Jyoti R Munavalli** presented and published a paper titled “Edu-bot: An AI based Smart Assistant Chatbot for Knowledge Management System” in 2021 IEEE International Conference on Computation System and Information Technology for Sustainable Solutions (CSITSS), 2021, pp. 1-6. (IEEE Xplore).
- **Sujaya B L, Varun R Chaturvedi, Vijay Thirumalai, Sindhu V, and Vindhya P G** published a paper titled “Stress Detection Using Facial Recognition and ECG Analysis” in IOSR Journal of VLSI and Signal Processing (IOSR-JVSP), Volume 11, Issue 6, November - December 2021.
- **Aman Kumar, Astitwa Raj, Pratyush Raj and Kiran S M** have published a paper titled “Automatic Human Fall Detector using MPU6050 and ATMEGA328P” in International Journal for Scientific Research & Development, Volume 9, Issue 5, 2021.
- **Niharika V, Sourabh S Dolli and Sachin B Athani** presented a paper titled “Smart Band Communication for Visually and Auditory Impaired People” in International Conference on Mobile Networks and Wireless Communications (ICMNBC-2021) held at SSIT, Tumkur on 3rd and 4th December 2021.

Non-Technical Achievements

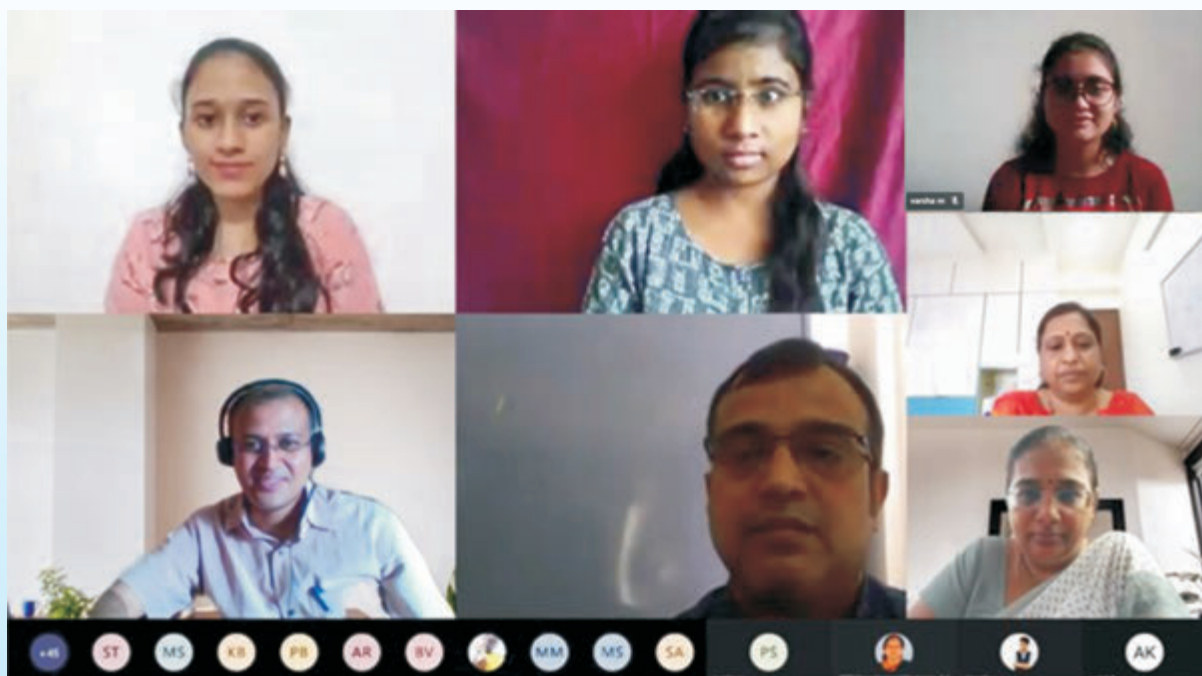
- In the Annual Training Camp held at Tavarekere from 7th to 13th October 2021 as part of NCC activities, **Indhu G** received Gold medal in Tent Pitching and Drill, **Kavipriya M** received Silver medal in Drill competition, **Kushboo Choudhary G** received Gold medal in Tent Pitching, Drill competition, and Group Music, **Subhashree N** received Silver medal in Drill competition, **Suhaas S Sastry** received Gold medal in Tent Pitching and Group Music, and **Joshitha Lakshmi Narayana** won Silver medal in Tent Pitching.
- **Namratha S and Kushboo Choudhary G** from 5th Semester who were part of Women Yoga Team secured 2nd Runners up in VTU Intercollegiate Inter Zone Yoga (M&W) Competition 2021-2022 held in VVCE, Mysore on 18th & 19th December 2021.

DEPARTMENTAL EVENTS

Institution of Engineers India Students' Chapter-ECE, BNMIT funded by BNMIT New GEN IEDC, CIPR & VTPC, Govt. of Karnataka conducted a two-day webinar on “Intellectual Property Rights Industry Designs and Trade Marks, as Significant Tools for Entrepreneurs & Embracing Branding and Design to Leverage in the New Normal” on 13th and 14th August 2021.

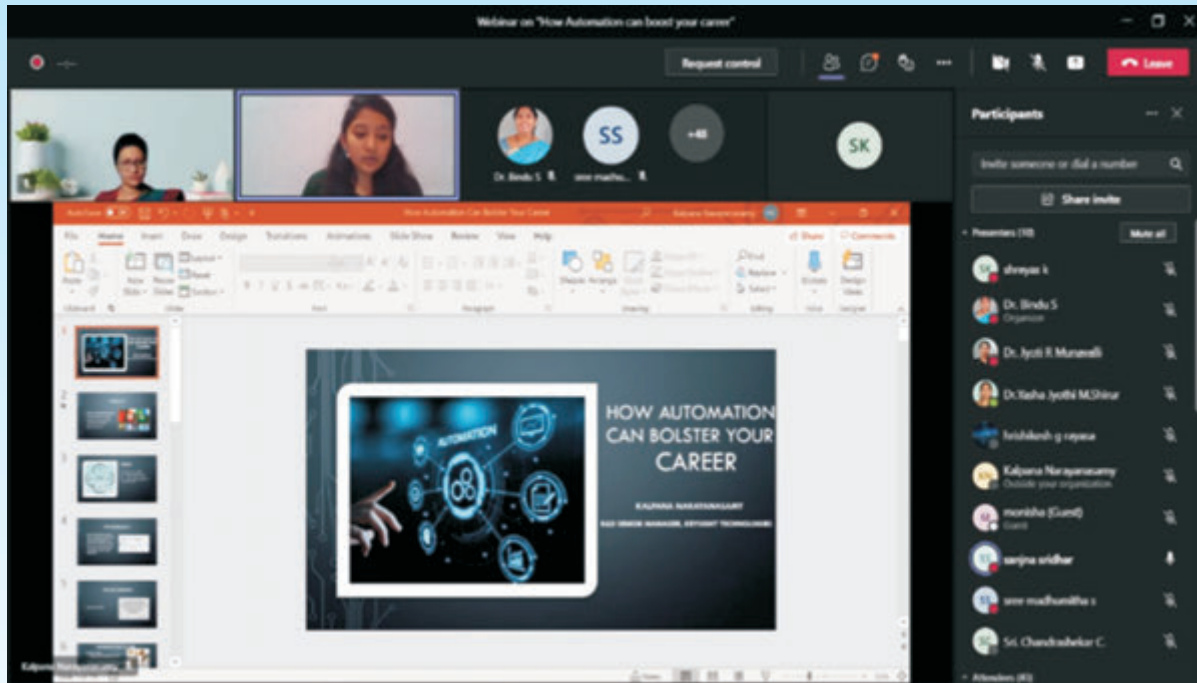


On 13th August 2021, the Resource Person Ms. Girija V, Founder of IPaatEntiti IP Solutions, Patent Attorney & Agent, Trademark Attorney, and Ms. Prabhavathi Rao, Facilitator, Intellectual Property Initiatives and Geographical Indications Cell, Visvesvaraya Trade Promotion Centre, Dept. of Industries & Commerce, and the Govt. of Karnataka, discussed on Intellectual Property Rights Industry Designs and Trade Marks, as Significant Tools for Entrepreneurs.

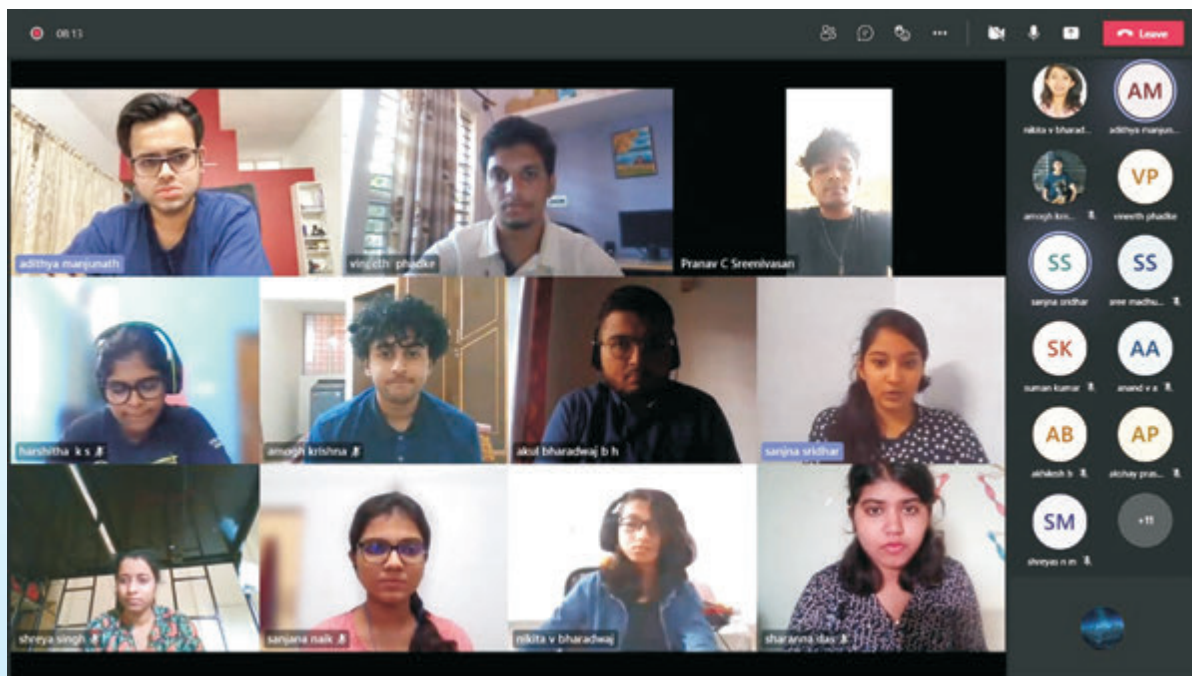


On 14th August 2021, Mr. D P K Muthukumaraswamy, Principal Consultant, IdeaLabs, Innomantra Consulting Private Limited, discussed on Intellectual Property Rights Embracing Branding and Design to Leverage in the New Normal. The participants were able to gain knowledge of Intellectual Property Rights Industry Designs and Trademarks, as Significant Tools for Entrepreneurs & Embracing Branding. The workshop was informative, interesting, and useful for developing various industrial projects, products and patent processing.

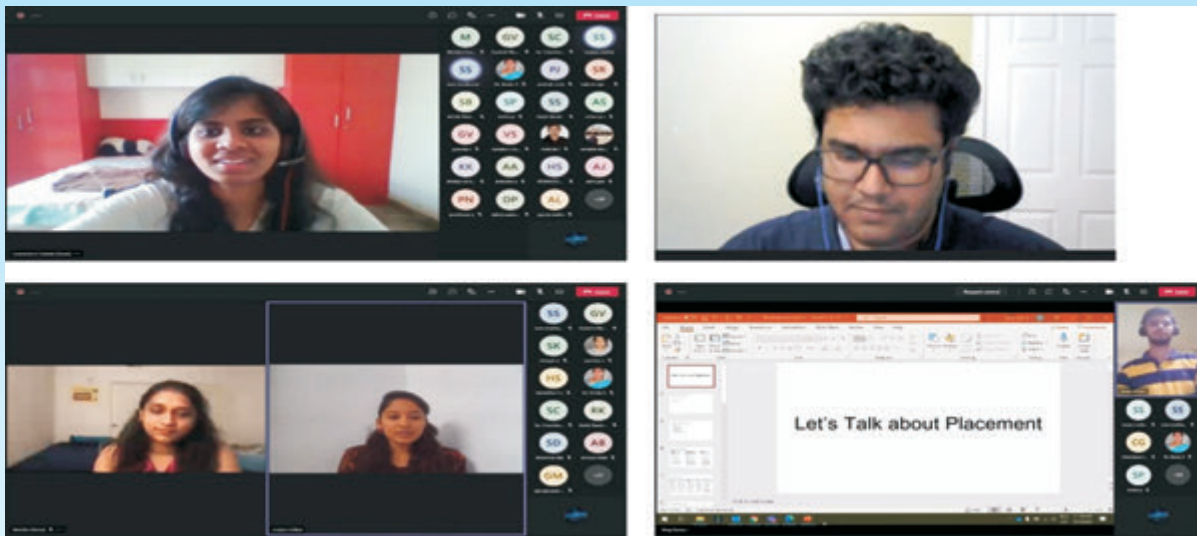
IEEE Week 2021 was organized by IEEE-BNMIT Student Branch in association with IEEE Nanotechnology Council from 29th September to 5th October 2021 with various activities for students.



A webinar on “How Automation can Bolster your career” was conducted on 29th September 2021, on Teams platform and was hosted by Shreyas S and Abhishek K. The webinar was attended by 70 students from various departments of BNMIT. The resource person Mrs. Kalpana Narayanasamy, R&D Senior Manager, Keysight Technologies, gave inputs about the various automation trends like hyper automation, intelligent automation, predictive and probabilistic automation; low code/no code automation along with an introduction to the concept of Industry 4.0. The event concluded with a small quiz and questionnaire session.



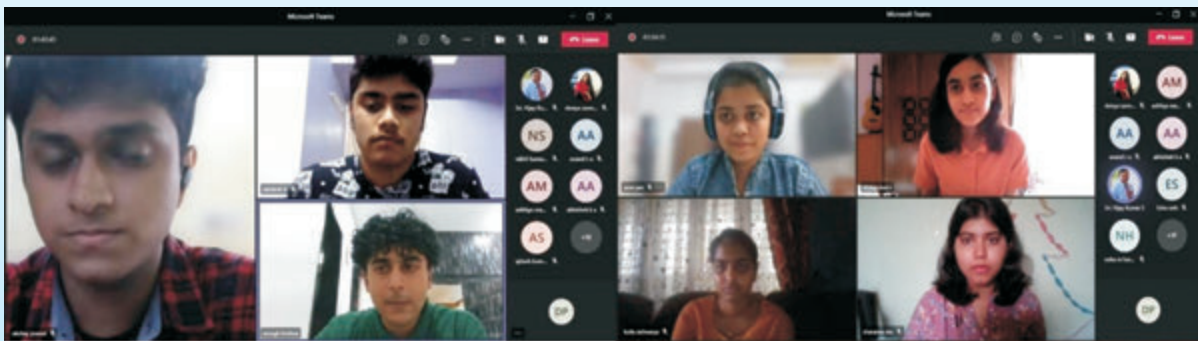
A quiz was conducted on 30th September 2021 as a part of IEEE Week. The banner of IEEE and the quality of quizzing attracts inquisitive minds every year to this prestigious event, and this year was no exception. There were about 32 students who actively participated in the event. The event was divided into 2 parts. The first round was the prelims, and the second round was the finals. Ten participants were selected based on the process of elimination. The quiz was an individual quiz and the topics were from the various fields like sports, politics, comics, movies etc.



Alumni Interaction was conducted as part of IEEE Week on 2nd October 2021. Monika Lakshminarayan, Engineer at Google, Ganesh Murthy, Cloud engineer at Akamai Technologies, Chandana Gowda, New Product planner at Bosch Automotive India Pvt. Ltd, Vinay Kumar, Software engineer at NXP Semiconductors and Varshini Vijay, Software Engineer at Walmart Global Tech India were the invited alumni to share their views and thoughts. They gave a brief talk on their area of expertise and on their area of interest. Each speaker spent about 20 minutes on sharing their experiences and narrated instances on their journey at BNMIT.



A debate was conducted on 4th October 2021 by IEEE-BNMIT Student Branch. There were about 12 students who actively participated in the event. The competition was split into two parts: the preliminary round and the finals. Four participants were selected based on the process of elimination. They debated in pairs in the preliminary round, while the final was a one-on-one. The topic for the prelims was “Every citizen should be mandated to perform national public service” while the finals' topic was “People should be fined according to their income”.

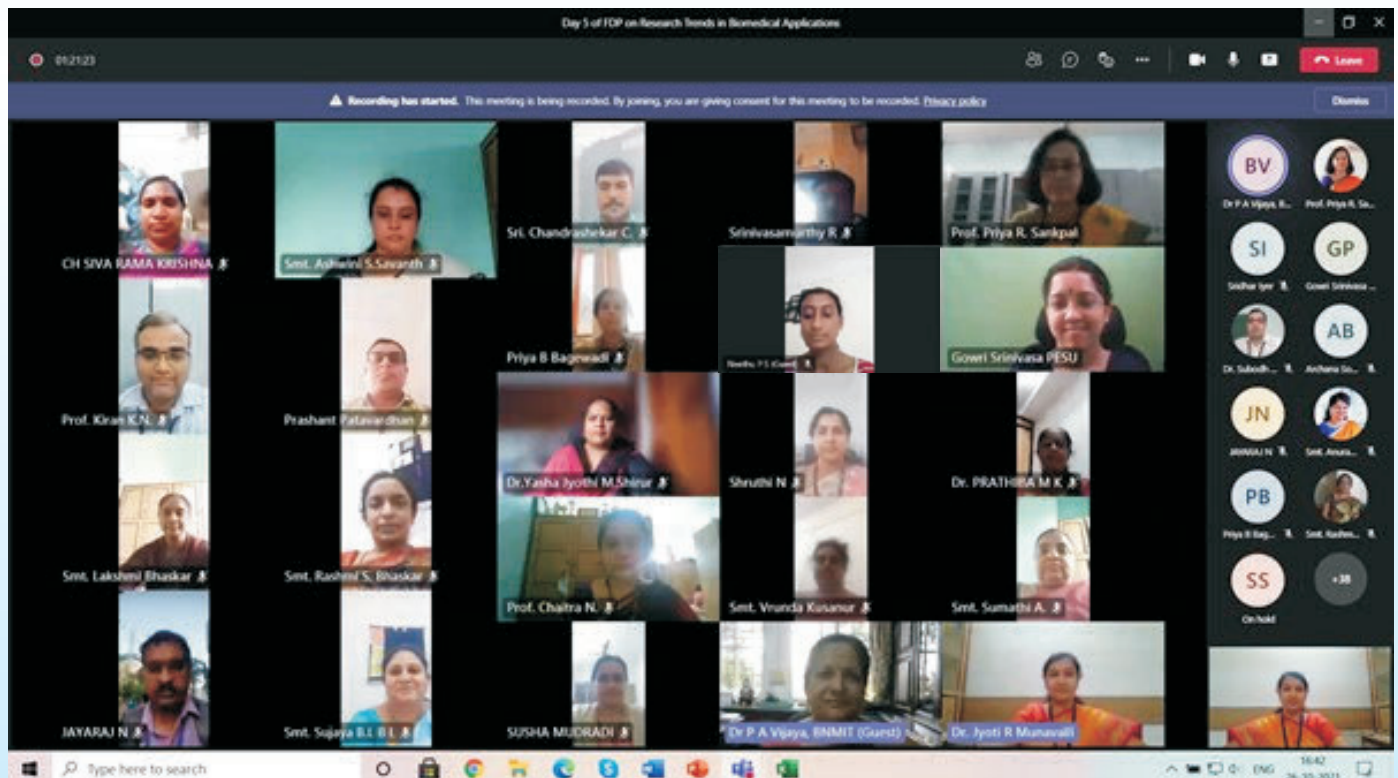


IEEE BNMIT Student Branch conducted HACKATHON 5.0 on 5th October 2021. Hackathon lets students come up with creative solutions to a particular problem. The problem of mental health issues, the detection, prevention, and treatment was given to them. All the participants eagerly took part in the event and worked hard to come up with good, sustainable, practical solution to the problem given. They had a good learning experience and displayed excellent sportsmanship regardless of the result they got.



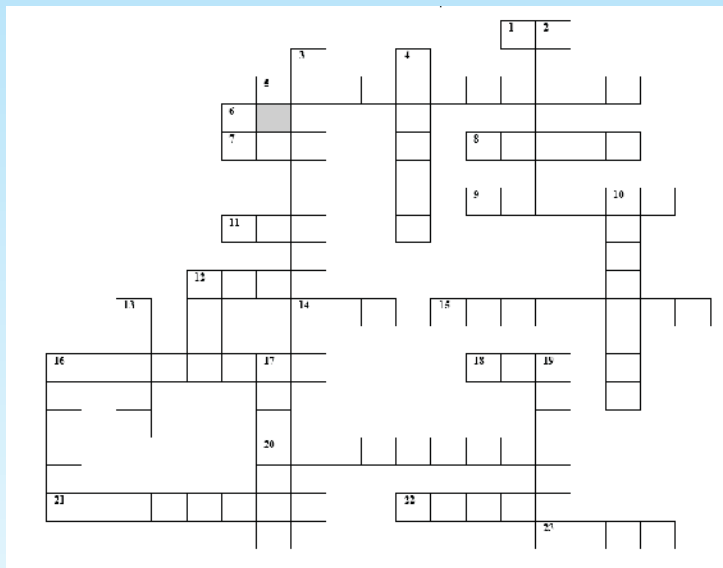
Institution of Engineers India Students' Chapter-ECE, BNMIT conducted a two-day webinar on “Front-End Design using HTML and CSS” for students of 5th Semester ECE on 4th and 5th October 2021. The Resource Person Ms. Vitasta, Senior Software Developer, Prinston Smart Engineers, Bengaluru gave students a hands-on experience of webpage designing with HTML and CSS software. The topic was presented systematically in a step-by-step manner to the students. The informative session essentially guided students in developing various webpage designs.

ISTE students Chapter-BNMIT in association with BNMIT New Gen IEDC, Govt. of Karnataka organized a two-day workshop on “Machine Learning Using Python”, on 4th and 5th October 2021. Mr. Girish H N, Decision Science Manager, HSBC conducted the hands-on session on “Machine Learning Using Python” for 7th semester ECE students. It was an opportunity for the undergraduate students to enrich their knowledge and skills in developing various engineering solutions in the field of machine learning. The workshop covered the topics on introduction to machine learning, lists, tuples using python, handling missing/corrupted data, regression, and outliers including use case analysis, use case implementation: model building, and machine learning in production.



A Five-Day Online Faculty Development Programme (FDP) on “Research Trends in Biomedical Applications” was conducted by Department of Electronics and Communication Engineering, BNM Institute of Technology and Funded by NewGen-IEDC, DST, Govt. of India, from 22nd to 26th October 2021. About 104 participants from different places other than Bangalore like Chennai, Solapur, Mysore, Belgaum, and Bellary attended the FDP. Over these five days, the speakers Dr. Gopikrishna Deshpande, Professor, Auburn University, Dr. Shyam Vasudeva Rao, Director & Founder, Forus Health, Renalyx, EHE, Dr. S.Y. Kulkarni, Additional Director, BNMIT, Dr. Rajkumar Rajasekeran, Professor, Vellore Institute of Technology, and Dr. Gowri Srinivasa, Professor, PES University, Bangalore shared their experience and knowledge in the Biomedical field with the participants.

CROSSWORD



ACROSS:

1. The circuit used as filter at rectifier output.
5. A filter whose frequency response is almost flat with no ripples.
7. A three-lead electronic semiconductor device with only one junction that acts as an electrically controlled switch.
8. The Greek letter that is used to represent angular frequency.
9. The frequency at which diode starts to conduct.
11. What type of language is Verilog?
12. The presence of a force field in a specified physical medium, or the flow of energy through a surface.

14. A filter whose transfer function has both poles and zeros.
15. A method used to simplify Boolean expressions by mapping and grouping the variables.
16. It occurs when a system is measured at an insufficient sampling rate.
18. Amplitude modulation with only one sideband is called ____.
20. A theorem used to reduce complex circuits by resolving into single voltage source in series with single resistance connected across the load.
21. The process of converting a message into codes.
22. The terminal through which charge carriers leave the channel of FET is called ____.
23. The ratio of output to input voltage.

DOWN

2. The rate of flow of electrons.
3. A technique used to combine and send multiple data streams over a single medium.
4. A device that generates the original signal as output from the coded input signal.
6. Frequency of a wave is represented by this Greek letter.
10. The number of waves that pass through a point in unit time is called ____.
12. Voltage controlled switching devices.
13. Unwanted signals are called ____.
16. The scientist who gave the relationship between current and the magnetic field created by it.
17. A theorem used to reduce complex circuits by resolving into single current source in parallel with single resistance connected to the load.
19. The process of giving proper DC voltage required by a device to function is called ____.

ANSWERS

ACROSS		DOWN	
1. RC	5. BUTTERWORTH	1. HDL	15. KARNAUGH
2. CURRENT	3. MULTIPLEXING	2. DRAIN	16. ALIASING
3. MULTIPLEXING	4. DECODER	3. GAIN	17. THEVENINS
4. DECODER	5. NU	4. SSB	18. IIR
5. NU	6. NOISE	5. OMEGA	19. FLUX
6. NOISE	7. UJT	6. AMPERE	20. THEVENINS
7. UJT	8. OMEGA	7. BIASED	21. ENCODING
8. OMEGA	9. CUTOFF	8. BIASED	22. DRAIN
9. CUTOFF	10. FREQUENCY	9. BIASED	23. GAIN
10. FREQUENCY	11. VERILOG	10. BIASED	
11. VERILOG	12. FORCE FIELD	11. BIASED	
12. FORCE FIELD	13. SSB	12. BIASED	
13. SSB	14. POLES AND ZEROS	13. BIASED	
14. POLES AND ZEROS	15. KARNAUGH	14. BIASED	
15. KARNAUGH	16. ALIASING	15. BIASED	
16. ALIASING	17. THEVENINS	16. BIASED	
17. THEVENINS	18. IIR	17. BIASED	
18. IIR	19. FLUX	18. BIASED	
19. FLUX	20. THEVENINS	19. BIASED	
20. THEVENINS	21. ENCODING	20. BIASED	
21. ENCODING	22. DRAIN	21. BIASED	
22. DRAIN	23. GAIN	22. BIASED	
23. GAIN		23. BIASED	



Geek The Geek Out

Being an engineering student doesn't necessarily mean maintaining good attendance, scoring good grades and securing a job during campus placement. It is an opportunity where one can completely utilize their time to experiment on the few concepts which they are confident about and gain more knowledge by bothering every faculty possible with their questions. This being said, academic work shouldn't be the only goal. I met my closest friends at BNMIT, and our first conversation happened in IPL lab during our first year. We started working on mini projects and ended up using one of our IPL ideas as our final year project at the end of third year. The faculty were always ready to guide us in the right direction and gave undivided attention while listening to our ideas. I always considered participating in workshops and getting certifications to be highly advantageous. On the other side, I was an active NSS member and loved to volunteer for maximum number of activities. I was also an integral part of the college fest team for the last two years.

Additionally, I was an IEEE EXECOM member for the IEEE BNMIT Student chapter. It opened a portal for me to work on inter- personal skills like diplomacy, critical thinking and leadership. Most importantly, it improved my ability to manage my time, balancing my studies and the rest of the activities. During my final year, my CGPA only accounted for eligible job interviews. Working on mini projects every semester and my experience from indulging in non-academic activities were some of the main factors which successfully landed me in a job during Campus Placement. After working for two years, I planned for pursuing higher studies. The department was extremely helpful during this phase and guided me at every step. My college experience has shaped me into the confident person who I am today and I am now aiming for the stars.

Abhigna Rama Mohan
Graduate student,
Paderborn University, Germany
Alumna, ECE, BNMIT



Alumni Speaks.....

“The four years that I spent in BNMIT have been one of the best and the most fulfilling in terms of learning and carving a path for my career. ECE is one of the best in BNMIT with extremely experienced and passionate professors and staff. The numerous programs organized by the EC department have been very helpful in understanding the industry perspective of everything we studied. This in turn has helped me in my placements because I had a clear understanding of not just the theoretical but also the practical aspects of every domain. I am so grateful for the learning that I have gained and the time that I have spent in BNMIT as it has played a major role in building the person and the professional that I am today.”

Manaswini S
Year of Graduation 2018
Business Analyst, First American India (FAI)



Alumni Speaks.....

“I never knew back then that choosing BNMIT over NIT would turn out to be one of the best decisions that I had taken because looking back from now, every minute that I had spent in the Institution is worth cherishing. Apart from all the academic and co-curricular activities, the Institution prepared me to face new challenges after I graduated. The credit of being the best department in the Institution goes to the teaching and non-teaching staff and their guidance has helped me to this day. It is their knowledge, experience, and most importantly their humbleness that made me grow as a student to compete and succeed among the best students across India from major Universities like the IITs and NITs.”

Jeevan Aditya
Year of Graduation 2021
Pursuing Masters in University of Minnesota
(Electrical and Computer Engineering)

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