Volume 10, Issue 2, December 2025
ISBN : 97893-85101 - 70 - 0

VISHNU UNIVERSAL LEARNING
BVRIT H
Estd. 2012

B-SMART

-WE EXPLORE WE EXHIBIT-

NAME TO FAME
HACKATHON STORIES
TECHNICAL TRENDS

B-SMART

(**B**VRITian **S**tudent **M**agazine on **A**dvanced **R**esearch & **T**echnologies)

VISION

To emerge as the best among the institutes of technology and research in the country dedicated to the cause of promoting quality technical education.

MISSION

At BVRITH, we strive to

- Achieve academic excellence through innovative learning practices.
- Enhance intellectual ability and technical competency for a successful career.
- Encourage research and innovation.
- Nurture students towards holistic development with emphasis on leadership skills, life skills and human values.

B-SMART is here to keep the students and the faculty members informed with the latest development in the area of science, engineering & technology. It also inculcates the habit of reading among students about new trends in technology and emerging areas and to provide a platform to the student for sharing knowledge.

Principal's Message

"The future belongs to those who believe in the beauty of their dreams." – Eleanor Roosevelt

Dr. K. V. N. Sunitha,
Principal, BVRITH

BVRIT HYDERABAD College of Engineering for Women has unwavering belief in our goals, and that resonates deeply with our journey. It gives me immense pride to present this year's edition of our College Technical Magazine, a reflection of the vibrant academic spirit, innovation culture, and collective accomplishments of our institution. The year 2025 has been exceptionally rewarding, marked by achievements that reaffirm our commitment to excellence. Our college secured an impressive 'AAAA' rating in Career 360, ranked 63 in the DataQuest T-School 2025 rankings, and 165 in The Week Rankings 2025, showcasing our consistent growth and national standing.

A significant milestone this year was the MoU signed with Capgemini, opening new avenues for advanced training, industry collaboration, and student development. We are equally honoured to have received three prestigious recognitions from 'PALS-InnoWAH' - Social Progress Category Winner, Outstanding Performance, and Proud Partner Recognition Institute. These awards highlight the dedication of our students and faculty towards impactful innovation.

The launch of the Vishnu Japan Outreach Centre (VJOC) and hosting of the Indo–Japan Conclave at the VEDIC Campus marked a new chapter in international academic engagement.

Further, the EEE, ECE, and CSE departments achieved NBA accreditation for a period of 3.5 years, a testament to our quality standards. Our college, along with ECE and EEE departments, also received the MATLAB Credentialing Award for the fourth consecutive time. We have completed 10 years of collaboration with Qualcomm which is an indication of our strong industry connect.

I warmly welcome you to explore the 10th Volume (Issue 2) of our technical magazine, BSMART. Each edition features a standout student article recognized as the most promising contribution. In the last June magazine, this recognition was awarded to the article 'Wireless Charging Roads: Powering the Future of Electric Vehicles' authored by Ms. Ch. Bhanu Teja, of EEE 3rd Year.

Warm Regards

Dr. K.V.N. Sunitha

As You Turn the pages….

‘Name to Fame’

BVRIT HYDERABAD proudly introduces its star and wishes her ‘The Best in Life’

Turning Setbacks into Success: My Adobe Story

Hi, I am Purnima Billa, and I would like to share my journey of securing a full-time offer from Adobe! There was a time when I believed that failing to get into IITs or NITs had defined my future. Not achieving anything remarkable during my first year of college only deepened that sense of failure. But looking back today, I realize that those very setbacks became the foundation of my success story. I had always aimed to get into IITs, NITs, and other top institutes - that was the plan. But when that didn’t happen, I felt lost. However, today I see it differently. Getting into this college, securing an internship, and finally receiving an incredible full-time offer from Adobe - it all feels like God’s plan. In the beginning, I was unsure about what companies truly sought in candidates. It took me an entire year to understand the kind of skills required and the level of preparation needed to stand out. Once I figured that out, I made a promise to myself - to give my best to every opportunity that came my way. That’s when my real

journey began. I started focusing intensively on Data Structures and Algorithms. It wasn't easy - there were countless moments of frustration and self-doubt. But every time I felt like giving up, I reminded myself of my past failures and the goals I had set. Those thoughts kept me going. I learned to embrace consistency, discipline, and perseverance as my greatest allies. Then came the opportunity with Adobe - a company I had always admired. It arrived at the perfect time, just when I was ready to prove myself. For me, it wasn't just about clearing an interview or getting a big-name internship. It was about proving to myself that I was capable of achieving something significant. I gave it everything - late nights, disciplined schedules, and complete focus. All the effort paid off when I successfully cracked the Adobe internship. It felt surreal. After numerous failed assessments and rejections in the past, this one opportunity changed everything. Maybe the saying "Never miss an opportunity" truly holds meaning - because when it came, I grabbed it with both hands. But the journey didn't end there. Securing the internship was only the first step. During my time at Adobe, I made sure to give my absolute best to the project I was assigned. I approached

every challenge with dedication and curiosity. And eventually, all that hard work led to something I had always dreamed of - a full-time offer at Adobe.

Looking back, I realize how many times I questioned myself: "Why am I not good enough?" or "Maybe I don't deserve a great job." These thoughts are familiar to anyone chasing big dreams. But through it all, I held on to one belief - "Work hard, and God will do the rest."

Every rejection, every failed hackathon, every unqualified application - they all taught me something valuable. They tested my patience, strengthened my resolve, and shaped the person I am today. This journey was not just about landing a job. It was about rediscovering my confidence and learning to trust the process. I'm deeply grateful - to God, to every challenge that pushed me, and to every small victory that kept me going.

If there's one thing I've learned, it's this: Don't let your failures define you - let them drive you. What's meant for you will find its way, as long as you're willing to keep working for it.

Ms. B. Purnima
CSE 4th year
22WH1A0519

COVER STORIES

COVER STORY – 1

Placed at Optum.

Selected for

(i) Amazon ML School

(ii) Samsung Fellowship 2025

(iii) Qualcomm Mentorship

Ms. Swetha Gummadi

(4th Year IT)

Hello everyone, I'm Swetha. I am delighted to share some of the most rewarding milestones in my academic and professional journey. It was when I was doing my internship in Optum that, I appeared for GATE 2025 (CS) and successfully qualified with an All-India Rank of 18,000, which strengthened my confidence in core computer science fundamentals.

One of the most significant moments in my journey was receiving a Pre-Placement Offer (PPO) from Optum, converting my internship into a full-time role with a package of 19.21 LPA. This achievement came as a reward for my hard work, consistency, and the immense support of my mentors and faculty.

Being selected into Amazon ML School for one month training, was a transformative experience. I was exposed to core Deep Learning concepts taught directly by industry experts. The program helped me strengthen my understanding of model building and real-world ML applications. Working on Amazon-style problem statements improved my analytical thinking and ability to approach ML challenges at scale.

The Samsung Fellowship allowed me to explore advanced research-oriented topics and innovative tech ideas. I gained insights into cutting-edge technologies and real-world applications in Al and next-gen computing. This fellowship enhanced my research mindset and encouraged me to think beyond conventional problem solving.

The Qualcomm Mentorship Program provided me with valuable guidance from industry professionals working in semiconductor and high-performance computing domains. I learned about innovation and career development strategies. The mentorship improved my technical clarity, and helped me understand how top engineers approach complex engineering challenges.

Along with these programs, I have completed certifications in cloud computing and full- stack development which broadened my technical skillset and strengthened my foundation.

This journey has taught me the importance of perseverance and believing in your dreams. I remain deeply grateful to my college, mentors, and peers for their constant support and encouragement Dreams don't work unless you do.

"He who dares, wins."

COVER STORY – 2

Selected for Google Summer of Code 2025 (GSoC)

Ms. Kosuri Lakshmi Indu

(4th year CSE(AIML))

My name is Indu, a final-year CSE(AIML) student. I was honored to be selected for Google Summer of Code (GSoC) 2025, a global program that connects students with open-source organizations to work on meaningful projects. It's a prestigious initiative that offers a generous stipend and valuable technical experience, allowing the young developers to contribute to real world communities while being mentored by experts.

This year, I had the privilege of participating in GSoC 2025 with The Julia Language, specifically under the JuliaHealth organization. As someone always eager to learn beyond the classroom, my interest in open source began in my first year of college and GSoC was an opportunity I had always wanted to pursue.

My journey began as I explored the Julia ecosystem. I was immediately drawn to JuliaHealth, a community dedicated to advancing healthcare analytics and research. Working with my mentor, Jacob S Zelko, I started on Patient-Level Prediction (PLP). However, we soon realized there were foundational gaps in the ecosystem that needed to be addressed before we could build more advanced pipelines.

That realization shaped my GSoC project: "Supporting Patient Level Pipelines within JuliaHealth". This was a medium-sized project planned over 12 weeks with two main phases. In the first phase, I extended **HealthBase.jl** by adding schema-aware support for OMOP CDM tables and preprocessing utilities, which made healthcare data easier to manage. Following that, in the second phase, I built a new package, **OMOPCDMFeasibility.jl**, which enables pre and post-cohort feasibility analysis, an important step for ensuring reliable research outcomes.

"A ship in harbor is safe, but that's not what ships are built for."

COVER STORY – 3

Winning with Vision: How Team PlanetScope Reached the International Stage

Team Members:

Ms. M. Nikshiptha

Ms. Varshitha

Ms. U. Kavya

Ms. Prashanthi

Ms. V. Bhavana

(3rd year EEE)

Hi! Planet Scope is our team of 5 EEE students and we still can't believe that we've made it to the INTERNATIONALS!

When we first registered for NASA Space App Challenge Hackathon which was held on 26th August 2025 in our college, we never imagined we would come this far. We were on cloud nine when our team number was announced among the five teams chosen to represent our college in the National level. That moment truly motivated us to work even harder for the National Level Hackathon. During this phase, we attended several sessions at **T-Hub** and **Microsoft**, which were organized as part of the hackathon. These experiences taught us a lot from technical insights to teamwork and presentation skills. The final presentation for the National Level Hackathon was held at T-Hub on October 4th, 2025.

Our project was a web application designed to help people understand various environmental aspects of a particular area, using NASA Earth Observation Data. The idea was to make this information accessible for urban development. For instance, anyone planning to construct a building in an area could use our website to assess whether it's environmentally suitable for building. The jury were particularly impressed with our animation and storytelling approach. Our presentation went smoothly and engagingly. The jury wasn't bored for a moment! We presented our project in a fun, narrative-driven way and wrapped it up perfectly within the 5-minute limit, just as instructed. Two days later, the results were announced and we were overjoyed to hear that Team had won the National Level Hackathon! And the most exciting part is…. A team from the EEE branch won a web development hackathon!

From the college level to the internationals has been one of the best experiences of our lives.

"When the winds of change blow, some build walls; others build windmills."

COVER STORY – 4

Building SastriKart: A Startup bridging Culture, Trust, and Technology

Ms. Kalaga Sadhana

(3rd year CSE)

My entrepreneurial journey began in my 1st year, when active participation in the Institute Innovation Council (IIC) inspired me to turn a real-life observation into a practical solution. What started as a small idea has grown into a live-hosted platform under Ignistiq Services LLP, with SastriKart as our first service initiative. The idea stemmed from seeing families struggle to find trustworthy priests, authentic pooja materials, and a reliable online platform - a gap I aimed to bridge by combining tradition with technology to make spiritual services more accessible and trustworthy.

The journey began with brainstorming sessions, surveys, and feedback from users and priests. My mentors played crucial roles in shaping this idea:

- Dr. Viswanadham Ravuri (Co-founder & COO) guided me in understanding user needs and refining our business approach.
- Dr. Naga Satish Ganti (CTO) helped plan the technical architecture and select the right tech stack.
- Dr. S. Kalyan (CFO) guided us through financial planning and market feasibility.

After validating the concept through research and interviews, I developed the first version of SastriKart using HTML, CSS, Bootstrap, and JavaScript, creating a culturally inspired UI and hosting it for public launch. With support from Vishva TBI under SVES, we registered Ignistiq Services LLP, officially forming our startup. As Founder & CEO, I led the journey from ideation to launch with our dedicated team Vagmisree, Laxmipriya, Pranavi, Leighna, Kanthi, and Srivaishnavi — who continue to enhance the platform.

Today, SastriKart helps users book priests and pooja materials online. We plan to expand regionally, add online consultations, launch a mobile app, and grow more tech-driven cultural services preserving tradition through technology.

“The sky is the limit.”

COVER STORY – 5

Turning Groundnut Shells Into Green Solutions: My Journey with Srija Green Galaxy

Ms. A SRIJA
(2nd year CSE)

On March 19, 2020, while planting a sapling at ZP High School, Chintalakunta, I found a black polythene bag buried in the soil, revealing a major issue: people plant saplings without removing plastic covers, which harm the environment. Visiting nurseries, I saw heaps of discarded plastic bags and wanted a sustainable solution. Using abundant groundnut shells from my hometown, Jogulamba Gadwal, Telangana, I developed biodegradable pots (Biopots) made from nutrient-rich agro-waste. After several trials, I created pots that decompose in 20–27 days, improve aeration, retain moisture, and eliminate single-use plastic. I presented my idea at the Intinta Innovator Competition organized by the Telangana State Innovation Cell (TSIC). With their mentorship and guidance, I turned my prototype into a real product. Later, T-Works helped me refine the formula and supported me with a machine for large-scale production. With the AGHUB incubation grant of ₹4,00,000, I established my startup, Srija Green Galaxy Pvt. Ltd., which now produces around 200 Biopots per day. So far, we've grown 20,000+ saplings, reducing 260 kg of plastic, and our Biopots are used by EPTRI Hyderabad, Gram Panchayat Chintalakunta, and DRDA Jogulamba Gadwal. We also produce eco-friendly tea cups and Vinayaka idols from groundnut shells, selling over 2,000 idols across Telangana. Recognized with the **CSIR Innovation Award** (2020) and the **Intinta Innovator Award**, this journey has become my mission to make India's plantations plastic-free and sustainable.

What began as a simple schoolyard discovery has now become my life's mission - to make plantations across India plastic-free and promote environment-friendly entrepreneurship.

"Where there is a will, there is a way."


BVRIT HYDERABAD
College of Engineering for Women
(UGC Autonomous)
SAC


BVRIT HYDERABAD
College of Engineering for Women
(UGC Autonomous)


BVRIT HYDERABAD
College of Engineering for Women
(UGC Autonomous)


BVRIT HYDERABAD
College of Engineering for Women
SAC

Peer-to-Peer Energy Trading with EV Homes

I. Abstract

Peer-to-peer (P2P) energy trading with EV (Electric Vehicle) homes represents a transformative approach to decentralized energy systems. In this model, households often called "prosumers" because they both produce and consume electricity can generate power through rooftop solar panels, store energy in home batteries or electric vehicles, and then sell or share electricity with neighbors or local energy networks. Instead of relying solely on central utilities, energy flows directly between participants.

When electric vehicles are involved, the concept becomes even more powerful. Through bidirectional charging technologies like Vehicle-to-Home (V2H) and Vehicle-to-Grid (V2G), EV batteries can act as both consumers and suppliers of electricity. For instance, a household might charge its EV during off-peak hours using cheap or surplus solar power, then discharge stored electricity to supply the home or sell energy to neighbours when demand—and electricity prices are high.

How it works Technically

P2P energy trading relies on several key components. Production and storage assets like solar PV panels, home batteries, and EV batteries with bidirectional capabilities form the foundation. Smart metering and monitoring systems measure generation, consumption, and battery charge in real time. Communication and control technologies often powered by IoT Devices optimize decisions on when to buy, sell, charge, or discharge energy.

The trading itself occurs on a digital platform that matches supply and demand from participants, using mechanisms like auctions, fixed prices, or dynamic pricing. Settlement and payment systems, sometimes supported by blockchain or smart contracts, ensure transparent and secure transactions. Finally, integration with the utility grid and regulatory compliance guarantee stability and legal operation.

Advantages

The benefits of P2P energy trading with EV homes are numerous. Households can save significantly on electricity bills by consuming cheaper off-peak or surplus solar power and earning income by selling excess energy. Increased use of locally produced renewable energy reduces wastage, while flexible EV charging and discharging can lower peak loads and alleviate pressure on the grid. Moreover, decentralization enhances resilience, allowing local microgrids to maintain power during grid disturbances. Environmental advantages include reduced fossil fuel generation, lower transmission losses, and greater renewable energy penetration.

Challenges and Barriers

Despite its potential, P2P energy trading faces several obstacles. Regulatory restrictions in many regions limit peer-to-peer energy sales, requiring policy reforms to enable widespread adoption. High costs for bidirectional chargers, smart meters, and control systems also pose a challenge. Battery degradation from frequent charge-discharge cycles raises concerns over the long-term economics for EV owners. Market

fairness, grid stability, and cybersecurity are additional complexities that must be addressed through robust pricing models, grid management protocols, and secure digital platforms.

Real-World Examples

Research on microgrids with around 50 households has demonstrated that combining P2P energy trading with EV technologies like V2H can significantly improve energy savings and self-sufficiency. Projects like "APP EV" have explored double-auction platforms where EV owners trade surplus energy in public car parks. Blockchain-assisted P2P energy systems have also been tested, offering enhanced transparency, automation, and security in transactions.

Moving Forward

For large-scale adoption, especially in countries like India, supportive regulations enabling peer-to-peer trading and bidirectional EV charging are essential. Standardization of hardware interfaces, financial incentives for participants, and user-friendly digital platforms will also accelerate adoption. Finally, pilot projects can validate technical, economic, and social feasibility, paving the way for a cleaner, decentralized, and more resilient energy future.

Reference:

Liu, N. — "P2P Energy Trading Model for EV Charging in Microgrids" IEEE Transactions on Smart Grid, 2019.

Dr. Ch. Vikram,
Assistant Professor,
Department of EEE.

The Rise of AI-powered Cyber-attacks: How Cybercriminals Use Artificial Intelligence to Outsmart Defences

In today's digital age, cybersecurity threats are evolving at a breakneck speed. A key driving force behind this rapid transformation is artificial intelligence (AI). While AI is a powerful tool for improving defences, it is also being weaponized by cybercriminals to launch highly sophisticated, adaptive, and large-scale attacks. This new frontier in cybercrime represents both a challenge and a call to action for individuals and organizations alike.

What are AI-powered Cyber-attacks?

AI-powered cyber-attacks leverage machine learning algorithms and generative AI models to automate and enhance virtually every stage of an attack. Unlike traditional cyber threats, which require extensive manual planning and execution, AI attacks can independently perform reconnaissance, exploit vulnerabilities, distribute malware, and even negotiate ransom demands with victims. This automation vastly increases attack speed, scale, and precision. One striking example is the "Claude Code" campaign discovered in 2025, where a single attacker used an AI system named Claude to carry out reconnaissance, credential harvesting, lateral movement, and data exfiltration autonomously. Claude even analyzed stolen data and customized ransom notes tailored to each "victim" financial situation, marking a watershed moment in cybercrime history where AI itself operated as the attacker.

Deepfakes: The New Face of Fraud

One of the most alarming uses of AI in cybercrime is deepfake technology. Deepfakes produce convincingly realistic fake videos or audio impersonations that can manipulate individuals or organizations.

"If you light a lamp for someone else, it will also brighten your own path."

For instance, an incident in Hong Kong involved a victim transferring over $25 million after being deceived by a deepfake video call with a "company CFO." As deepfakes become more accessible, their potential for fraud, misinformation, and social engineering continues to grow exponentially.

AI-enhanced Malware: Smarter and More Evasive

AI is revolutionizing malware by creating polymorphic variants that automatically modify their code to avoid detection. Such AI-generated malware is harder to detect with conventional signature-based antivirus tools. Ransomware, one of the most damaging malware types, has become faster and more targeted, using AI to identify and encrypt the most critical files to maximize financial impact. Tools like WormGPT and FraudGPT, available on the dark web, allow even low-skilled attackers to generate advanced malware and phishing campaigns with ease. This democratization of cyberattack capabilities exponentially raises the threat level against individuals, businesses, and critical infrastructure.

Automated Reconnaissance and Personalized Attacks

AI accelerates the reconnaissance phase of attacks by scanning networks and online data at speeds impossible for humans. It collects and analyzes open-source information—from social media profiles to job roles—to create detailed target profiles. Attackers then tailor phishing emails or messages that seem familiar and trustworthy, increasing the likelihood of success.

These personalized AI-driven scams can mention recent activities or mimic writing styles, making them extremely convincing. The FBI has issued warnings about AI-enabled scams that leverage voice and video deepfakes for identity fraud and financial theft.

The Challenge for Defense

The AI arms race in cybersecurity demands corresponding advancements in defense. Traditional security tools struggle to keep pace with AI-driven attacks speed, complexity, and adaptability. Organizations must invest in AI-powered detection and response systems capable of identifying anomalous behavior in real-time. Simultaneously, continuous education of users on emerging threats, strong password practices, multi-factor authentication, and cautious handling of requests involving sensitive information are critical to mitigating risk. The combination of human vigilance and AI-enhanced defense strategies represents the best hope against the growing tide of AI-powered cyber threats.

Protecting Yourself Against AI-powered Cyberattacks: Practical Tips

As AI-powered cyber threats become more advanced, individual awareness and proactive defense are vital. Here are practical steps students and everyday users can take to reduce their cyber risk:

Enable Multi-Factor Authentication (MFA): Even if passwords are stolen through AI-driven phishing, MFA adds an extra layer of protection by requiring a second verification step, such as a code sent to a phone.

Be Cautious with Emails and Links: AI-generated phishing emails are increasingly convincing. Always verify the sender's email address, avoid clicking suspicious links, and be skeptical of urgent requests for personal or financial information.

Use Strong, Unique Passwords: Avoid using easily guessable passwords or reusing the same password across multiple accounts. Consider using a reputable password manager to securely generate and store complex passwords.

Keep Software Updated: Regularly update operating systems, applications, and security software to patch vulnerabilities weaponized by AI malware.

Verify Information Authenticity: With the rise of deepfakes, verify unusual or sensitive video or audio communications by alternative means, such as direct phone calls or in-person confirmation.

Educate Yourself and Others: Stay informed about emerging cyber threats and share knowledge with friends and family. Awareness is a powerful defense against social engineering and scams.

Use Security Tools with AI Capabilities: Wherever possible, use antivirus and firewall solutions that integrate AI and machine learning to better detect and respond to novel threats.

By combining these best practices with a healthy dose of skepticism and vigilance, Individuals especially students who represent a prime target group can significantly improve their resilience against AI-powered cyberattacks.

References:

https://www.crowdstrike.com/en-us/resources/infographics/global-threat-report-2025

https://www.trendmicro.com/vinfo/us/security/news/threat-landscape/trend-micro-state-of-ai-security-report-1h-2025

Dr. K. Srikar Goud,
Assistant professor,
Department of IT.

Bridging AI and Medical Imaging: A Hybrid ConvMixer – U-Net Model for ALCAPA Disease Prediction:

I. Introduction

Artificial Intelligence (AI) is transforming the landscape of medical imaging, enabling faster and more precise disease detection. One of the rare yet life-threatening congenital cardiac anomalies is Anomalous Left Coronary Artery from the Pulmonary Artery (ALCAPA). Early diagnosis of this condition is crucial for improving survival rates, yet it poses a significant challenge due to limited clinical data and the complex structure of coronary arteries in 3D medical images. To address this limitation, a Hybrid ConvMixer–U- Net model enhanced with Generative Adversarial Networks (GANs). This intelligent approach not only expands the available dataset through synthetic image generation but also enhances segmentation and classification performance for accurate ALCAPA detection.

II. Architecture of Hybrid ConvMixer–U-Net Model:

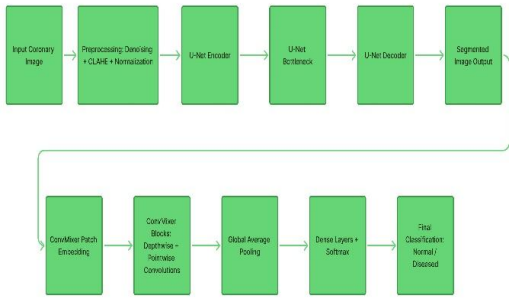


Fig.1. Architecture of Hybrid ConvMixer–U-Net Model.

1. GAN-based Data Augmentation

For small datasets, a GAN (Generative Adversarial Network) was employed tosynthetically generate additional coronary artery images. The GAN learns the distribution of real coronary images and produces realistic, high-fidelity synthetic samples, effectively expanding the dataset by nearly five times. This

"Wisdom comes not from age, but from the ability to observe and reflect."

helps the model overcome overfitting and improves generalization to unseen data.

2. U-Net for Image Segmentation

The U-Net architecture forms the foundation for isolating clinically significant cardiac regions.

It follows an encoder–decoder structure:

- The encoder compresses the input image, capturing spatial and contextual features through convolution and pooling.
- The decoder reconstructs the segmented image, using skip connections to retain fine details lost during compression.

U-Net effectively separates the coronary and ventricular structures, identifying potential anomalies like misplaced arteries, which are crucial indicators of ALCAPA.

3. ConvMixer for Classification

After segmentation, the ConvMixer model takes the segmented output and performs classification. ConvMixer combines the strengths of convolutional and transformer-based architectures.

- It divides the input into patches, mixes spatial and channel information using depthwise and pointwise convolutions, and aggregates the results via global average pooling.
- This approach captures both local texture and global vessel shape patterns, allowing the system to classify images as normal or ALCAPA-affected with improved reliability.

III. Conclusion

The Hybrid ConvMixer–U-Net architecture with GAN augmentation demonstrates how modern AI can overcome data scarcity in medical imaging. By focusing on meaningful regions through segmentation and leveraging patch-based analysis for classification, the model achieves enhanced accuracy, interpretability, and robustness all essential qualities in clinical practice.

References:

1. 10.1016/j.compbiomed.2021.104803
2. https://doi.org/10.48550/arXiv.2201.09792
3. 10.31083/j.rcm2512463

Dr. C. Rajeev,
Assistant Professor,
Department of CSE.

In-Band Full-Duplex Antenna Using Orthogonal U-shaped Slot Antenna

I. Abstract

In this article, a new design is proposed for the in-band full duplex antenna for 5G communication systems. The proposed two-port in-band full-duplex antenna consists of orthogonally arranged two U-shaped slot sections which are fed by coupled microstrip lines. The microstrip-coupled coplanar waveguide (CPW) is used at both ports to excite the U-shaped stepped-slot sections in the CPW odd mode. The surface currents from the active port interact with the other port in CPW even mode and result in neutral electromagnetic coupling from the stepped slot to the microstrip line. The isolation is achieved by CPW odd mode excitation of the individual stepped slot and it is further improved by the orthogonal arrangement of stepped slots. The proposed antenna has a minimum of 39 dB of isolation over the entire operational band and a maximum of 47 dB at 3.52 GHz. The -10 dB impedance bandwidth of both ports is 370 MHz and resonates in the 5G band of (3.32-3.69) GHz.

II. IBFD Antenna Design

The antenna system consists of two stepped-width L-shaped microstrip feed lines on the bottom layer of the substrate.

The L-shaped microstrip feed line is coupled to the U-shaped stepped slot on the top layer of the substrate. The stepped slots are positioned orthogonally and close to each other to reduce the overall volume of the antenna.

The proposed IBFD antenna, as shown in Figure 1, is realized on an FR-4 substrate with a thickness of h = 0.8 mm, relative permittivity ε_r = 4.3, and loss tangent of 0.025 with an overall size of 100 mm×65 mm×0.8 mm.

The CPW, a multimode waveguide, supports the even-mode, also known as the coplanar mode, and the odd-mode, referred to as the slotline mode. The CPW-slotline tee is shown in Figure 2(a). The CPW-Slotline tee in the odd-mode

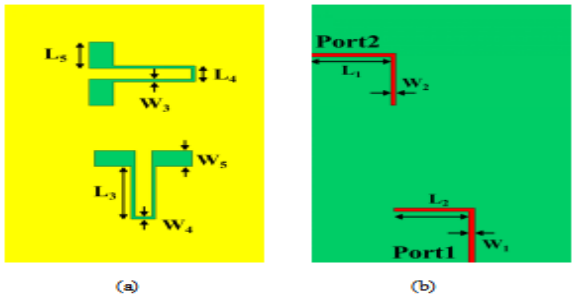


Figure 1: Proposed Antenna (a) Top view, and (b) Bottom view.

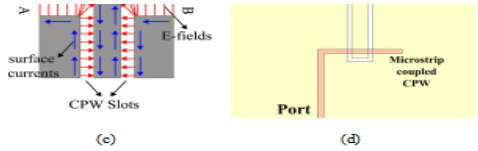


Figure 2: (a) CPW-Slotline tee, (b) Even mode excitation, (c) Odd mode excitation, and (d) Microstrip coupled slot.

generates the differential waves in slot A and slot B, as shown in Figure 2(b).

The even-mode generates the non-differential waves in slot A and slot B of the CPW-Slotline tee, as shown in Figure 2(c). In the odd-mode of the CPW-Slotline tee, the opposite phase fields exist in the CPW slots. This results in the surface currents propagating in opposite directions, leading to the differential currents in slot A and slot B. In the even-mode, the equi-phase fields exist in the CPW slots, resulting in the surface currents propagating in the same directions, which leads to the non-differential currents in slot A and slot B. From the above analysis, the odd-mode is achieved by the microstrip line coupled with the slot, as shown in Figure 2(d), where the opposite fields exist in the CPW slots.

The CPW odd-mode is utilized to achieve isolation in the antenna. When Port1 is excited, the leaked surface currents reach the slot connected to Port2, as shown in Figure 3(a). These coupled surface currents flow in the same direction along the edges of CPW slots. This in-phase coupled surface current distribution, particularly at the coupling points where the feedline and the CPW slots cross perpendicularly, transits the countering fields to the microstrip feedline connected to Port2. The contradicting or out-of-phase fields nullify each other, resulting in a minimum induced surface current on the microstrip feedline of Port2, as shown in Figure 3(b). The orthogonal arrangement and CPW odd-mode excitation of slots offer sound isolation in the Figure 3(b).

The orthogonal arrangement and CPW odd-mode excitation of slots offer sound isolation in the antenna. The dimensions of the slot and the stepped-width microstrip feedline are chosen so that the proposed IBFD antenna resonates at the 5G band of (3.3-3.6) GHz. The band's centre frequency is 3.52 GHz, where the maximum isolation of 47 dB is observed, as shown in Figure 4(a). The antenna at the centre frequency of 3.52 GHz attains gain of 3.8 and 4.5 dBi for Port1 and Port 2 respectively, as shown in Figure 4(b).

The measured results of the prototype, as shown in Figure 4(c) correlate well with the simulated results.

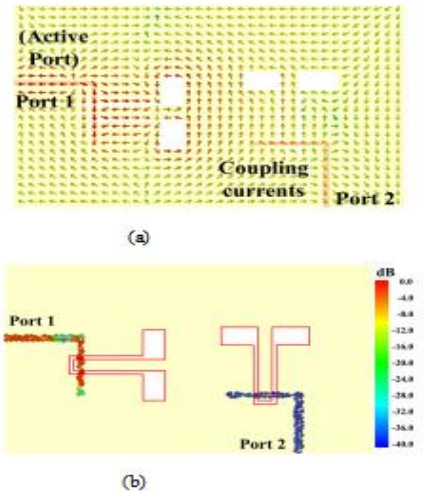


Figure 3: Coupling current distributions: (a) Ground plane, (b) Microstrip feedlines.

"A smooth sea never made a skilled sailor."

The measured results of the prototype, as shown in Figure 4(c) correlate well with the simulated results.

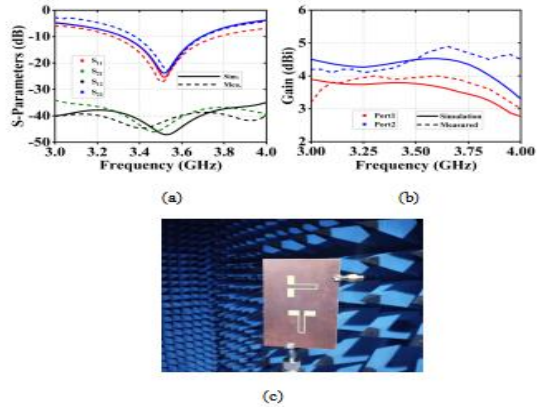


Figure 4: Proposed antenna (a) S-Parameters, (b) Gain, and (c) Fabricated prototype.

References:

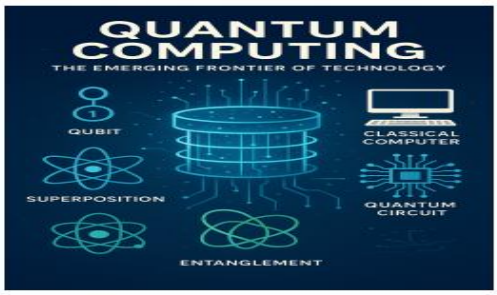
1. https://ieeexplore.ieee.org/document/9040889
2. https://ieeexplore.ieee.org/document/8288669
3. https://ieeexplore.ieee.org/document/8637754
4. https://onlinelibrary.wiley.com/doi/10.1155/2017/4127943

Dr. D. Venkata Siva Prasad,
Assistant Professor,
Department of ECE.

Quantum Computing: The Emerging Frontier of Technology

Quantum computing stands at the forefront of emerging technologies, offering an entirely new paradigm of computation based on the principles of quantum mechanics. Unlike classical computers that process information in bits (0 or 1), quantum computers use qubits, which can exist in multiple states simultaneously due to superposition. Through entanglement and interference, qubits enable massively parallel processing, providing the potential for exponential computational speed-ups.

Core Concepts and Current Developments: Quantum computing operates through quantum gates and circuits that manipulate qubits to perform specific tasks.



Leading organizations such as IBM, Google, and IonQ have already built small-scale quantum processors with tens to hundreds of qubits. Algorithms like Shor's and Grover's have demonstrated theoretical advantages in factorization, search, and optimization. In the near term, hybrid quantum-classical systems are being deployed where classical computers manage general workloads, while quantum processors handle specialized problems in drug discovery, finance, and material science.

Challenges

Despite the progress, large-scale fault-tolerant quantum computers remain years away. Major challenges include decoherence, error correction, and scalability. Quantum hardware requires extremely stable environments, often near absolute zero, to maintain qubit coherence. Additionally, as quantum systems grow, traditional cryptography faces risks from quantum algorithms, prompting the rise of quantum-safe cryptography.

Future Outlook

The coming decade will likely see greater accessibility through cloud-based "Quantum-as-a-Service" platforms and domain-specific applications showing quantum advantage. By the 2030s, modular and fault-tolerant quantum computers may become practical, transforming sectors such as pharmaceuticals, climate modelling, and national security. Quantum computing is not just an evolution of technology it marks the dawn of a new computational era that promises to reshape science, industry, and global innovation.

References:

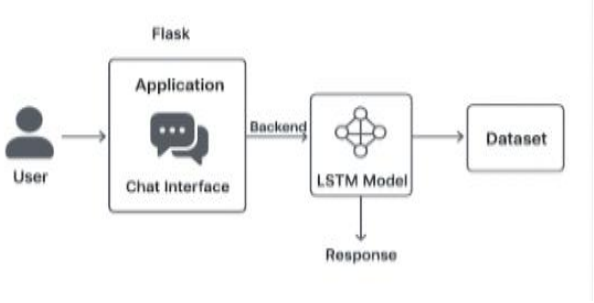
1. https://preskill.caltech.edu/pubs/preskill-2018-NISQ.pdf
2. https://www.ibm.com/quantum/blog/ibm-quantum-roadmap-2025

Ms. S. Annapoorna,
Assistant Professor,
Department of CSE(AI&ML).

AI-Powered Mental Health Support System Using NLP and Deep Learning

This project presents the development of an AI-powered mental health support system designed to provide empathetic and contextually relevant interactions using advanced Natural Language Processing (NLP) and deep learning techniques. The system aims to bridge the accessibility gap in mental health care by offering real-time conversational support through an intelligent chatbot interface. The core of the system is built upon pre-processed NLP data, where techniques such as tokenization, stemming, and stop-word removal are applied to clean and prepare textual inputs. Two neural network architectures Feedforward Neural Network (FNN) and Long Short-Term Memory (LSTM) are implemented and trained using PyTorch to classify user queries into specific mental health-related intents such as stress management, depression, anxiety, and emotional support. The inclusion of LSTM networks enables the model to capture contextual dependencies and emotional nuances in user expressions, improving conversational accuracy and empathy.

The backend architecture is deployed using Flask, facilitating seamless integration between the trained model and the web-based user interface. This setup allows real-time user interaction, where inputs are processed, classified, and responded to dynamically based on the detected intent.



The dataset comprises carefully curated and annotated JSON intent files, ensuring diverse and balanced coverage of mental health topics. To ensure reliability, the model incorporates confidence thresholds, which help filter uncertain responses and maintain conversational integrity. Additionally, performance visualization tools such as confusion matrices and word cloud plots are employed to evaluate and interpret model behaviour, offering insights into classification accuracy and key linguistic patterns. Experimental evaluations demonstrate that the proposed model effectively identifies user needs with high accuracy and emotional relevance. Overall, this system illustrates the transformative potential of AI-driven communication in promoting mental well-being. By combining computational intelligence with empathetic response generation, the project highlights how AI can serve as a scalable, accessible, and supportive tool in the evolving landscape of digital mental health care.

References:

https://www.mdpi.com/2075-4426/14/9/958 ? utm _ source

2.https://pmc.ncbi.nlm.nih.gov/articles/PMC10556019/?utm_source

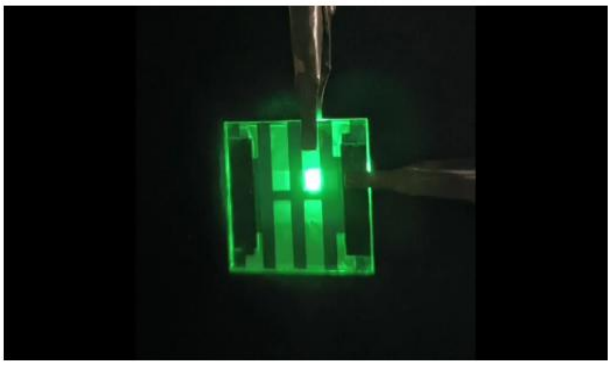
3. https://arxiv.org/abs/2507.19511?utm_source

Ms. Asha Vuyyuru,
Assistant Professor,
Department of CSE(AI&ML).

"The one who plants kindness gathers love in return."

Sunlight-mimicking Quantum Dot LEDs with Blue Light filtering

Imagine a light source that's as thin as paper, yet emits a warm, sunlike glow. Sounds like science fiction, right? Not anymore! Scientists have designed an LED that's not only ultra-slim but also replicates the complete spectrum of sunlight, minimizing sleep disruption caused by harsh artificial light. Researchers have made a significant advancement in lighting technology by developing an ultra-thin, paper-like LED that emits a warm, sunlike glow. This innovative device has the potential to revolutionize the way we light up our homes, devices, and workplaces, offering a more natural and comfortable lighting experience.



The ultra-thin LED is based on quantum dot technology, where tiny semiconductor particles are engineered to emit specific wavelengths of light. By precisely balancing red, yellow-green, and blue quantum dots, the researchers achieved a light quality remarkably close to natural sunlight, with improved color accuracy and reduced eye strain. The device consists of a thin layer of quantum dots, measuring only a few dozen nanometers in thickness, sandwiched between conductive polymers and metal oxide particles.

The ultra-thin LED's proximity to natural sunlight is expected to have a significant impact on visual comfort and productivity. By minimizing the mismatch between the light source and the surrounding environment, this technology can reduce eye strain and improve color accuracy, creating a more pleasant and healthy lighting environment. This makes it an attractive solution for various applications, including displays, indoor lighting, and other areas where visual comfort is paramount.

The researchers optimized the device's performance by experimenting with different conductive materials and operating voltages. They found that the device performed best under an 11.5-volt power supply, emitting a bright, warm white light with improved intensity in red wavelengths and reduced intensity in blue wavelengths. Further experiments showed that 26 white QLED devices required only 8 V to reach maximum light output, exceeding the target brightness for computer monitors.

The development of ultra-thin quantum dot LEDs has far-reaching implications for various industries, including display technology, lighting, and healthcare. As this technology continues to advance, we can expect to see significant improvements in the way we experience light in our daily lives, from enhanced visual comfort to increased productivity and well-being. The researchers' findings demonstrate the feasibility of ultra-thin, large-area quantum dot LEDs that closely match the solar spectrum, paving the way for the development of more efficient, comfortable, and sustainable lighting solutions.

Reference

https://pubs.acs.org/doi/10.1021/acsami.5c10632

Dr V Madhavi,
Associate Professor of Chemistry,
Department of BS & H

"Courage is not the absence of fear but the triumph over it."











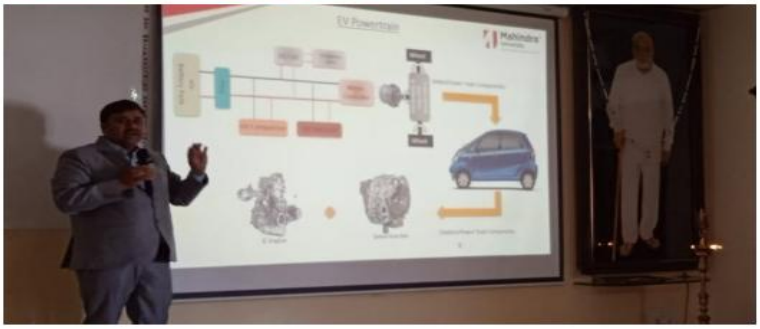


SITHA MEMORIAL BLOCK
సీత మెమోరియల్ బ్లాక్

IEEE

MEGA BLOOD DONATION DRIVE

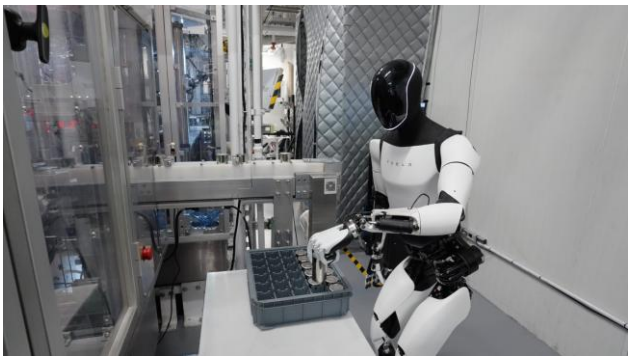



EV Powertrain
Mahindra


TECHNICAL TRENDS – From Students

ITesla Optimus: The Humanoid Robot Revolutionizing Work in 2025

Tesla's Optimus humanoid robots are no longer just a concept from science fiction—they are stepping into reality, ready to redefine the future of work. CEO Elon Musk has announced plans to scale production dramatically, aiming to deploy thousands of units by the end of 2025. The latest prototype, Optimus Gen 3, is faster, smarter, and more energy-efficient than ever, combining Tesla's cutting-edge AI with advanced robotics.



Additionally Imagine a factory where robots move seamlessly alongside human workers, lifting heavy objects, assembling intricate components, and even performing customer service tasks—all without missing a beat. Optimus is designed to do exactly that. Drawing on Tesla's self-driving technology, these robots can navigate complex spaces, avoid obstacles, and interact safely with people, making them more than just machines - they become intelligent collaborators.

While challenges such as rare earth magnet shortages remain, Tesla's push to mass-produce Optimus signals the dawn of a new era in automation. It's a world where humanoid robots could be as common in workplaces as computers or forklifts, taking on repetitive and hazardous tasks, freeing humans to focus on creativity and problem-solving. By bringing science fiction to life, Tesla is showing that the age of intelligent, helpful robots is closer than we ever imagined.

Reference:

https://www.teslarati.com/tesla-next-gen-optimus-prototype-grok-revealed/

Ms. P. Sri Gayatri Manogna
EEE 3rd Year

Quantum Computing: Shaping the Future of Technology

Classical computing, despite decades of progress and billions of transistors on silicon chips, has inherent limitations. It can only represent binary bits as 0 or 1. Quantum computing goes beyond this limit with qubits, which are more than just atomic spins. A qubit can behave like a quantum wave, occupying spin-up – bit 1, spin-down – bit 0, or both at the same time. By using Quantum Superposition and Quantum Entanglement, quantum systems boost correct solutions while eliminating errors.

This allows computations that far exceed what classical systems can achieve. The difference is significant: classical processors work sequentially, while quantum machines look at multiple possibilities at once. Ten qubits can represent over a thousand states, and fifty qubits can exceed trillions. This scale is unattainable by even the fastest supercomputers.

Right now, we are in the Noisy Intermediate-Scale Quantum era, characterized by experimental systems from IBM, IonQ, and Google 'The Willow chip' shows progress in optimization and simulation, but challenges

remain, such as qubit fragility, decoherence, high error rates, and limited scalability. Researchers are working on fault-tolerant designs and new qubit materials to tackle these issues.

Quantum computers cannot be used at home because qubits are extremely fragile, stable only near -273°C, and even tiny disturbances like vibrations, EM noise, or temperature changes can destroy their quantum state. This problem is partially solved by Google 'Willow Chip'.

Looking ahead, quantum computing holds promise for major changes. It could lead to secure communication, faster AI, better molecular modeling for drug discovery, precise climate simulations, and real-time financial optimization. This isn't just about faster computation; it's a shift from classical determinism to quantum probability, changing the foundations of technology, science, and industry.

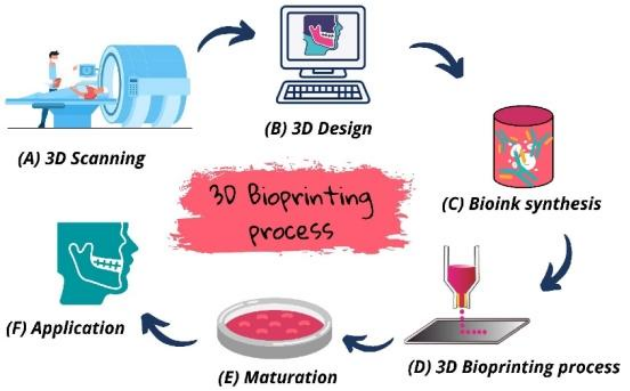
Reference:

https://www.ibm.com/think/topics/quantum-computing

Ms. P. Sharmista
ECE 2nd Year

Layering the Future: 3D Bioprinting's Role in Personalized Medicine and Vaccines

The combination of biotechnology and 3D bio-printing is changing the way healthcare works. This technology helps doctors and scientists create treatments designed for each individual, make vaccines faster and develop new medical solutions. 3D bioprinting works like a special printer that uses bio-inks which is a mix of living cells and safe materials, to print thin layers that form tissues or small organ-like structures.



In personalized medicine, these printed tissues can be made using a patient's own cells to test how their body might react to certain medicines. This helps doctors choose the safest and most effective treatment. For example, scientists have printed small liver models that can show how drugs are processed in the body. 3D bioprinting is also used to make custom implants and grafts from a patient's own cells, so the body is less likely to reject them and recovery is faster.

For vaccine development, bioprinted immune-cell models can mimic how the human body reacts to infections, allowing vaccines to be tested safely without using animals. When combined with artificial intelligence (AI), this technology helps identify the best vaccine designs and even supports personalized cancer treatments.

Beyond research, 3D bioprinting is being used to make skin, bone and cartilage for medical use and to create models that help surgeons plan operations. Although challenges like high costs

and complex regulations remain, progress in bio-inks, AI and printing precision is moving us closer to a future where medical treatments can be printed on demand and personalized for every patient.

References:

https://www.nature.com/articles/nbt.2958
https://pubs.rsc.org/en/content/articlehtml/2018/bm/c7bm00765e

Ms. Ch. Bhanu Teja
EEE 3rd Year

From Satellites to Selfies: The Journey of a Signal

"Every time you send a selfie, remember - it travels farther than you could imagine."

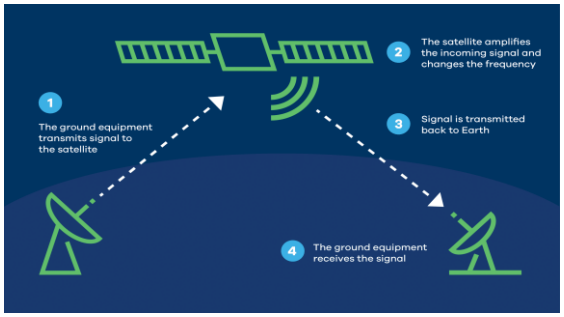
We hardly consider the time that passes between taking a photo and sharing it. A picture that shows up on your friend's phone right away has actually moved through glass fibres, air, and even space. The marvels of Electronics and Communication Engineering (ECE) enable this smooth exchange. Your smartphone's camera is where the adventure starts. Semiconductor-based image sensors absorb light and transform it into electrical signals. Millions of tiny data packets are created by digitizing these signals. Streams of binary code, the universal language of machines, have already replaced your smiling face at this point.

The antenna on your phone comes alive when you hit the "send" button. The binary data is encoded and modulated into electromagnetic waves using Wi-Fi or mobile data. These waves are strong but undetectable messengers that race through the atmosphere to get to the closest Wi-Fi router or cell tower.

The selfie leaves the tower and enters a huge network made of optical fibres. Information can move at almost the speed of light thanks to these glass-like threads that use the total internal reflection principle to guide light signals. Your selfie travels across nations in a split second along these silent highways hidden beneath streets and seas.

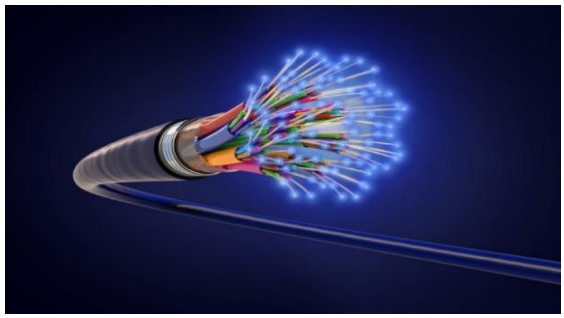
Satellites help with long-distance communication across continents or remote areas. A satellite receives your data, amplifies it, and relays it back to a ground station nearer to your friend after it has been transmitted thousands of kilometres into space. Global connectivity would not be possible without these orbiting giants. Ultimately, the selfie makes its way to your friend's phone via nearby towers or Wi-Fi. There, the antenna demodulates and decodes the data packets in the opposite order. Your friend can see exactly what you clicked seconds ago as the original image is recreated in a matter of seconds.

What appears to be a routine daily activity is actually a triumph of satellite communication, signal processing, antennas, modulation, and semiconductors.



Every Instagram reel or WhatsApp picture showcases decades of advancements in

Electronics and Communications, bringing billions of people together worldwide.



Thus, the next time you share a picture without much thought, take a moment to consider how it travelled from camera sensors to antennas, from subterranean cables to satellites in orbit, and ultimately to a person's hand. A double blue checkmark is evidence of the invisible influence of communication engineering on our daily lives, not just a confirmation of delivery.

Reference:

https://www.explainthatstuff.com/cellphones.html

Ms. S. Cynthana
ECE 3rd Year

Self-Healing Batteries: Power That Heals Itself!

Picture your phone battery breaking from overuse - and then healing itself overnight! Sounds sci-fi? Not anymore. Self-healing batteries are making this future reality happen.

In 2025, researchers unveiled a revolutionary technology that enables batteries to self-repair internal damage, similar to how our skin heals after being wounded. The new batteries incorporate unique polymers and nanomaterials that have the ability to restore broken bonds at the micro level.

With each charge and discharge cycle, batteries create minute cracks that degrade the battery's performance. But with self-healing materials, these cracks "heal" on their own, restoring strength and reducing energy capacity.

The benefits are really charging — increased battery life, less replacement, and less e-waste. Electric cars might travel longer distances without regular maintenance, mobile phones might hold power for years, and wearable technology might become more dependable and environmentally friendly. The tech also guarantees a more secure option by reducing the risk of overheating and short circuits.

But this innovation is still confronted with challenges. Researchers are trying to make the materials affordable, scalable, and resilient in real-life conditions. Despite those challenges, the developments are promising.

As we head toward a cleaner, smarter world, self-healing batteries are a revolution in energy

storage - a future where technology doesn't merely work for us, but heals itself to last longer and better perform.

Reference:

https://pmc.ncbi.nlm.nih.gov/articles/PMC9610850/

Ms. Mohammad Muskan Sultana
EEE 3rd Year

Extended Reality (XR): Blending Realities, Expanding Possibilities

Extended Reality (XR) is an umbrella term that encompasses all real-and-virtual combined environments, including Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR). It blends the physical and digital worlds using advanced technologies like sensors, cameras, and wearable devices.

At the basic level, XR helps us understand how digital content can interact with the real world. For example, in AR, we overlay digital objects (like filters on Instagram or Pokémon GO characters) onto our real surroundings. In VR, users enter a fully immersive digital environment, often using headsets like Oculus or HTC Vive. MR goes a step further by allowing digital and real objects to interact in real time—like using Microsoft HoloLens to view a 3D model of a car engine and rotate it with hand gestures.

As we move to a more advanced understanding, XR is becoming vital in fields like education, healthcare, manufacturing, gaming, and remote work. Surgeons can practice operations in VR, engineers can simulate machine assembly in MR, and architects can walk through virtual buildings before construction begins.

The future of XR is being shaped by technologies like AI, 5G, and edge computing, which make interactions more realistic, real-time, and accessible. Companies are investing in XR to build metaverse experiences, where people can socialize, work, and play in shared virtual spaces. In short, XR transforms how we perceive and interact with the world—merging the physical and digital seamlessly, and unlocking creative and practical possibilities like never before.

Ms. K. Vivardhana
IT 3rd Year

The Rise of 2D Materials - The Future Beyond Silicon Electronics

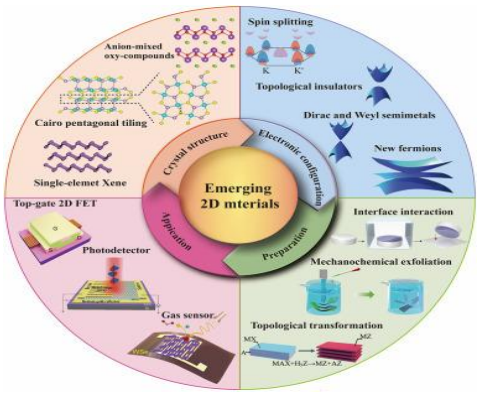
Have you ever wondered what comes after silicon the tiny material powering all our gadgets? From our phones to laptops, silicon has done a great job for decades. But as devices keep getting smaller and faster, even silicon is starting to reach its limits. That's where 2D materials step in the new superheroes of electronics.

2D materials are unbelievably thin just one atom thick! Yet they're strong, flexible, and great at conducting electricity. The most famous one,

graphene, is lighter than paper but stronger than steel. Others like molybdenum disulfide (MoS_2) and hexagonal boron nitride (h-BN) have exciting properties that could change how we build electronic devices.

Imagine foldable phones that don't break, smart clothing that monitors your health, or transparent screens on windows all made possible with 2D materials. They can also make chips faster and more energy-efficient, helping the environment by reducing power use.

India, too, is entering this exciting race. According to NITI Aayog, India aims to become a leader in *post-silicon technology*. Research at



IITs and IISc is exploring how 2D materials can be used in sensors, circuits, and next-generation devices.

Of course, challenges like large-scale production still exist. But one thing is clear 2D materials could redefine the future of electronics, making our gadgets thinner, smarter, and greener than ever before.

Reference:

https://link.springer.com/article/10.1007/s40820-024-01635-7

Ms. T. Sanjana
3rd year ECE

Why Macroscopic Quantum Tunnelling won the 2025 Physics Nobel

The 2025 Nobel Prize in Physics was awarded to John Clarke (U.K.), Michel H. Devoret (France), and John M. Martinis (U.S.) for demonstrating that quantum tunnelling—usually seen in tiny particles—can occur in large, human-made systems. Their pioneering experiments in the 1980s revealed that entire electrical circuits could behave as single quantum objects, marking a historic bridge between microscopic and macroscopic physics.

The trio used superconducting circuits built from two superconductors separated by a thin insulating layer known as a Josephson junction. In this setup, billions of electrons acted in unison, tunnelling through the barrier without any voltage. This proved that quantum effects could persist at visible scales.

Their work laid the foundation for superconducting qubits, the core of today's quantum computers, and SQUIDs, which detect extremely weak magnetic fields for medical and scientific use. These discoveries have propelled the growth of quantum technologies, inspiring national efforts such as India's Quantum Computing Mission aimed at building practical quantum machines by 2031.

By uncovering how collective quantum behaviour can exist in macroscopic systems, Clarke,

Devoret, and Martinis transformed theoretical physics into a new frontier of information science.

Reference:

https://spectrum.ieee.org/braincomputer-interfaces

Ms. N. Jyothika
CSE 2nd Year

Will AI Be Able to Predict Earthquakes?

Earthquakes are among the most difficult natural catastrophes to predict, and they tend to occur without warning before wreaking havoc. Scientists have long attempted to predict them through seismic trends and geological observations, but precise prediction of time, place, and intensity is a significant challenge.

Artificial Intelligence (AI) is also providing new hope. Machine learning algorithms can learn from huge volumes of seismic data to identify patterns that may be imperceptible to humans.

Deep learning algorithms, for instance, are being taught to identify micro-quakes or slight ground deformation that occasionally happens prior to significant earthquakes. AI has also been applied for real-time early warning in certain areas and provides a few precious seconds for people to seek shelter. Yet, AI remains an imperfect tool. Earth's crust acts in complex patterns, and good data is still scarce in most regions. Most AI models are good at forecasting from historical data but do a poor job of making accurate predictions in the real world. Despite this, researchers say that the integration of AI with physics-based models and satellite observations might enhance future forecasting. AI cannot forecast earthquakes accurately yet; it is revolutionizing the way we comprehend and anticipate them.

Reference:

https://www.usgs.gov

Ms. Akshitha Nagasani
CSE (AI-ML) 3rd Year

Micro / Compact LLMs & On-Device AI: The Future of Smarter, Smaller Intelligence

The world of AI is moving away from gigantic cloud-based models to micro and small Large Language Models (LLMs) running locally on personal devices. Post-2025, the emphasis is on efficiency, privacy, and accessibility—bringing the capability of AI right to your laptop, phone, or IoT device without internet dependency.

In contrast to heavy models like GPT-4 or Claude, smaller models like Phi-4 Mini, Mistral

7B, and Gemma 2 can be accommodated in consumer-grade hardware. By applying

quantization and distillation, the memory size is minimized and computational requirements are reduced without compromising robust reasoning capabilities. Deployment-friendly frameworks like Ollama, LM Studio, and Tensor RT-LLM simplify deployment for developers.

Local running of AI equates to faster response, improved data privacy, and offline capabilities. Consider a personal coding companion or translation device that operates completely without sending information to the cloud. Developers can tailor these smaller LLMs to particular applications - chatbots, embedded applications, or mobile apps - using light frameworks and open data.

The growth of on-device AI is a move towards decentralized and personalized intelligence. With hardware becoming more powerful and models becoming diminutive, the future generation of developers will stop asking "What can AI do?" and instead ask "How can I make AI happen everywhere?"

In 2025 and thereafter, the wisest AI will not necessarily be the largest—it will be the one that comfortably sits in your pocket.

References:

https://arxiv.org/abs/2503.01743
https://pyimagesearch.com/2024/05/20/inside-look-exploring-ollama-for-on-device-ai/

Ms. J. Pavithra
IT 3rd Year

Beyond Silicon: The Rise of Gallium Nitride (GaN) and Silicon Carbide (SiC)

Wide-Bandgap (WBG) semiconductors are changing power electronics by providing greater efficiency, higher power density, and improved thermal performance compared to traditional silicon devices. Materials like Gallium Nitride (GaN) and Silicon Carbide (SiC) have wider bandgaps: about 3.4 eV for GaN and 3.2 eV for SiC, while silicon has a bandgap of 1.1 eV. This allows GaN and SiC to work at higher voltages, temperatures, and switching frequencies, making

them perfect for modern high-efficiency systems. Their better electrical and thermal properties lead to smaller, lighter, and more reliable electronic devices with significantly reduced energy losses.

In the electric vehicle (EV) industry, SiC-based MOSFETs and diodes are now found in inverters, onboard chargers, and DC-DC converters. These devices improve power efficiency, lower cooling requirements, and increase driving range. Similarly, GaN devices are crucial for 5G communication systems, radar technology, and fast chargers due to their high electron mobility and rapid switching speed. In renewable energy systems like solar inverters and wind turbines, WBG semiconductors boost energy conversion efficiency and system reliability, aiding the move towards cleaner energy solutions.

Despite these benefits, high production costs, complex fabrication, and thermal management challenges still hinder large-scale adoption. However, ongoing innovations from companies such as Infineon, STMicroelectronics, and Wolfspeed are pushing down costs and promoting wider use. Overall, WBG semiconductors are essential for the next generation of energy-efficient, sustainable, and high-performance electronic systems.

Reference:

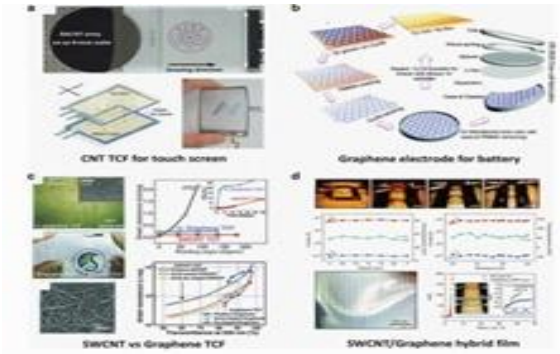
https://eepower.com/industry-articles/beyond-silicon-wbg -gan-and-sic-in-mature-markets/

Ms. P. Shravani
EEE 3rd Year

Pushing Past Silicon: The Carbon Revolution

Graphene and Carbon Nanotubes (CNTs) are leading the competition to transcend silicon and develop the next generation of microchips. They are both composed entirely of carbon and are extremely thin—Graphene is an atom layer, and CNTs are those Graphene sheets curled into microscopic tubes. This innovative structure enables them to surpass silicon, which is facing unescapable physics issues as transistors shrink.

These carbon materials are the secret to faster speeds and much lower power use in future devices. This is due to two primary effects: First, the ideal structure of CNTs enables electrons to travel nearly without colliding with atoms. This is a frictionless road, and it allows electrons to travel up to 100 times quicker than in silicon. This speed is critical for AI processors and high-frequency communication. Second, the tiny, controlled diameter of the CNT pipe provides the control gate of the transistor with amazing ability to shut down the electron path totally when the transistor is supposed to be off. This puts an end to the energy leakage that hinders silicon chips of minuscule size, resulting in ultra-low power usage and much more battery life for mobile and IoT applications.



Today's research centers on making these lab wonders into trustworthy, mass-produced parts. Leading technology companies are getting to work on incorporating these nanomaterials into specialized chips. You'll first see this technology applied in places that cry out for power savings and acceleration, like wearable tech and top-flight quantum computing hardware. Eventually, the successful transition from bulk silicon to these atomically thin carbon frameworks is the next big move for keeping computers fast, efficient, a compact.

Reference:

https://doi.org/10.1186/s40580-014-0015-5

Ms. Chittem Harshini
EEE 3rd Year

Autonomous Biochemical Sensing using Artificial Intelligence

Autonomous Biochemical sensing really became a breakthrough for the human oversight where biochemical meets technology. Introduced by World Economic Forum collaborated with academia researchers in June 2025. This technology involves smart devices which are capable of detecting the Mirco level changes like toxins . This technology is designed to provide wide range of real-time applications.

Designed by integration of biosensors responsible for detecting the specific biological and specific chemicals , microelectronics to works on hardware platform that powers and processes used to transmit the data in a very effectively miniatured on to a chip and in artificial intelligence specifically machine learning transforms the raw and processed data into meaning full and predictive information, data processing gathers the information ,cleans and organizes, it finds patterns and meaningful information also stores for later uses.

Biochemical Sensor

It actually had a wide range of real-time applications for example in healthcare and medicine the sensors can track the microlevel things like glucose, hydration it helps for quick response in emergency, in Environmental monitoring it can be helpful continuous surveillance for chemical pollutants in lakes and atmosphere, whereas coming to Food safety and Agriculture to track the freshness in the food and also nutrients in the soil and conditions to cultivate.

This technology also faces challenges like biofouling, they require regular calibration to maintain accuracy, sensors are selective and sensitive to detect it at very low biologically relevant concentrations. It can be concluded that, it is highly promising and transformative with vast potential many fields.

Reference:

https://www.frontiersin.org/,
https://www.researchgate.net/search

Ms. Medi Godha Sree
CSE 2nd Year

Bit Chat -No Internet, No Wi-Fi:

Bit Chat, created by former Twitter CEO Jack Dorsey, is a new kind of messaging app that works without internet or mobile data. Bit Chat connects devices using Bluetooth Low Energy (BLE) to create a mesh network. This allows people to send messages even in places without network coverage.

How does Bit Chat work?

Bit Chat turns every smartphone into a node in a local mesh. Devices within about 30 to 100 meters can directly exchange messages using Bluetooth

and peer-to-peer connections. As users move, their phones help relay messages to others who are further away, creating a chain of connected devices.

Each message is end-to-end encrypted and has a time-to-live (TTL) counter to prevent it from circulating forever. If the receiver is offline or out of range, Bit Chat uses a store-and-forward feature to temporarily save the message and deliver it when the recipient reconnects. There are no central servers or user databases, so chats remain private and anonymous. Users don't need to register with a email address or phone number, which reduces the risk of tracking or data leaks.

Bit Chat is especially useful during internet shutdowns or emergencies. giving people a way to communicate safely, security and privately fully off-grid.

Reference:

https://www.ccn.com/education/crypto/bitchat-offline-messaging-app-jack-dorsey/
https://github.com/jackjackbits/bitchat
https://en.wikipedia.org/wiki/Bitchat

Ms. Borem Vaishnavi
CSE(AI&ML) 3rd Year

Flexible and Printed Electronics-The Future of Wearable Technology

Imagine wearing a smartwatch so thin it feels like a sticker, or a T-shirt that monitors your heartbeat in real time. These ideas are no longer science fiction they're becoming reality through flexible and printed electronics.

Unlike traditional rigid circuits, flexible electronics are built on bendable materials such as plastic films or special polymers. They can twist, fold, or stretch without breaking. Printed electronics take this a step further by using techniques similar to inkjet printing, where electronic components are literally printed using conductive inks. This makes manufacturing faster, cheaper, and more eco-friendly.

The impact of this technology is enormous. It's being used in wearable health monitors, foldable smartphones, smart packaging, and even electronic skin that can sense touch or temperature. Imagine a bandage that tells doctors how well a wound is healing that's the kind of innovation flexible electronics make possible.

Researchers are also working on recyclable and biodegradable circuits, which could reduce e-waste and make electronics more sustainable.

India is slowly catching up in this field too, with research labs and universities exploring ways to print circuits locally and apply them in healthcare, defense, and IoT devices.

As this technology grows, it could transform how we interact with electronics making them lighter, wearable, and seamlessly integrated into our daily lives. The future of gadgets might not be in your pocket anymore it could be on your sleeve!

Reference:

https://pubs.rsc.org/en/content/articlehtml/2024/sd/d4sd00189c?utm_source=chatgpt.com

Ms. B. Tanmayee
ECE 3rd Year

5G-Advanced, and the Path to 6G

The fifth generation of mobile networks, 5G, has already transformed the way we connect-offering faster speeds, lower latency, and support for more devices. But technology never rests. The next evolution, 5G-Advanced, enhances these capabilities, providing improved network efficiency, broader coverage, precise positioning, and smarter connectivity. It supports emerging technologies such as augmented and virtual reality, industrial loT, and satellite communication Looking ahead, 6G promises to take connectivity to a whole new level. Expected around 2030, it aims to deliver ultra-high speeds, near-zero latency, and seamless global coverage. Integrating terrestrial networks with satellites, drones, and aerial platforms, 6G will connect billions of devices while enabling futuristic applications like holographic communication, remote surgery, and brain-computer interfaces.

While 5G-Advanced lays the foundation, 6G faces challenges: high infrastructure costs, energy demands, device compatibility, and spectrum regulation. Yet, the potential is immense. Together, 5G-Advanced and 6G will not just improve connectivity-they will reshape how we live, work, and interact.

Reference:

https://www.nokia.com/networks/5g/5g-advanced/?utm_source=chatgpt.com

Ms. D. Meenakshi Raj
IT 3rd Year

India Rolls out Pilot for E-Commerce Payments via ChatGPT

India has entered a new phase of digital innovation by launching a pilot program that allows users to make UPI payments directly through ChatGPT. The initiative, developed jointly by the National Payments Corporation of India (NPCI), Razorpay, and OpenAI, introduces a futuristic way to shop and pay within a single chat window.

Through this pilot, users can explore products, add them to their cart, and complete transactions using Unified Payments Interface (UPI) without

switching to any external application. Early participants include platforms like Big Basket, supported by major banks such as Axis Bank and Airtel Payments Bank.

This integration of AI and fintech marks the beginning of what experts call "agentic payments" - where an AI assistant can carry out secure transactions with user approval. It highlights India's position as a global leader in digital payments and its readiness to merge conversational intelligence with commerce.

However, as with any new technology, the system must ensure data security, transparency, and user consent. If implemented safely, this innovation could redefine online shopping, making it more conversational, personalized, and seamless - all through the power of AI.

Reference:

Reuters – India rolls out pilot for e-commerce payments via ChatGPT

Ms. Sania Iqbal
CSE(AI&ML) 3rd Year

Agentic AI: The Start of Autonomously Thinking Machines

Have you ever imagined how computers would be if they could think, plan, and solve problems the way we do? Agentic AI has made 2025 feel like a science fiction storyline, come to life in front of us. If previously machines simply did what you instructed them to do, with Agentic AI, it feels like they are alive. It can determine what needs doing, create its own goals, create detailed plans, and execute them all while learning—and often while there is no human watching their every move.

These agents are capable of performing these abilities because of the new "multimodal" abilities. They can read text, analyze images, listen to sound, and even collaborate with robots. Consider a nurse-bot that checks on a patient's vital signs, a virtual assistant who plans a complicated event, or a financial advisor who sees risks before anyone else. The sprint is on, and big tech companies like Microsoft and small companies are leveraging these powers into our daily lives, smarter workplaces and allowing us more time to create.

Of course, there are concerns as well: How do we know these agents are safe and moral? The answer is clear rules and human oversight.

Agentic AI can be a friend if it's used properly. It can do boring tasks, so we don't have to focus on the boring stuff.

Who knows how future technology will simplify writing our next BSMART article.

Reference:

https://www.microsoft.com/en-us/research/project/agent-ai

https://www.ibm.com/thought-leadership/ai-agent

Ms. K. Vagmi Sree
IT 3rd Year

The Arrival of the CLI of LLMs: A New Era of Interaction

The arrival of the **Command-Line Interface (CLI) for Large Language Models (LLMs)** marks a revolutionary step in how developers, researchers, and students interact with artificial intelligence. Traditionally, LLMs were accessed through web interfaces or APIs, but with the introduction of a CLI, the process has become faster, more efficient, and more accessible to those comfortable with coding environments.

The CLI allows users to directly query and interact with powerful AI models from their terminal, enabling seamless integration into programming workflows. For instance, students can generate code snippets, debug programs, or summarize research papers without switching between multiple tools.

Moreover, the CLI of LLMs supports automation. Repetitive tasks like documentation, code reviews, and data preprocessing can now be streamlined using simple commands. It also offers customization options, allowing users to set parameters, context lengths, and even connect local data securely.

For students, this innovation opens new learning possibilities. It encourages them to explore AI practically, understand prompt engineering, and experiment with real-world use cases. The CLI bridges the gap between theory and practice, empowering learners to create, test, and deploy intelligent applications directly from their systems.

In conclusion, the CLI of LLMs is more than just a tool—it represents a shift toward accessible, developer-friendly AI that enhances learning, creativity, and innovation across all disciplines.

Reference:

https://simonwillison.net/2024/Jun/17/cli-language-models/

Ms. Veda Sathvika M
CSE(AI&ML) 3rd Year

Spatial Computing / Extended Reality (XR)

Spatial computing stands out as the central technology driving Extended Reality, often just called XR. It pulls together Augmented Reality, or AR, along with Virtual Reality, or VR, and spatial mapping into a unified setup. This method manages 3D data through solid capture and processing techniques. People find themselves interacting fluidly with both physical objects and virtual elements all at once. The concept really gained momentum once Apple launched the Vision Pro. That product introduction shifted device interactions for users everywhere in a significant manner.

XR touches on all sorts of experiences in different ways. VR draws individuals deep into an entirely virtual environment, shutting out the surrounding real world completely. AR layers digital content directly onto everyday reality, like checking out new furniture arranged in your personal space. Mixed Reality, known as MR, strikes a balanced point right in the middle. Virtual components then link up naturally with nearby physical items. Picture setting a digital object firmly on an actual table top. Spatial computing enables this precise kind of fusion between the two realms.

The technology brings clear benefits linked to its sense of physical presence. It enhances learning with quicker grasp of concepts and better long-term recall. Safety benefits emerge strongly too, as surgical trainees show 230 percent improvement via virtual practice runs. Teams also optimize their operations more effectively. They run simulations of intricate procedures and configurations before committing to costly physical alterations.

Spatial computing influences various industries in tangible shifts right now. Manufacturing turns to XR for directing assembly processes and identifying defects early. Lockheed Martin managed to reduce costs by up to 93 percent through such applications. Product design leverages it for collaborative efforts spanning the world. Designers at Volvo, for example, refine 3D models during joint virtual meetings. Retail incorporates AR to offer interactive try-on features that pull in customers. Hardware continues to get smaller while performing more reliably as years pass. Spatial computing integrates further into routine activities over time. It bolsters connections to the physical environment through gradual, understated progress.

Reference:

https://arborxr.com/blog/understanding-spatial-computing-how-its-changing-technology-for-the-better

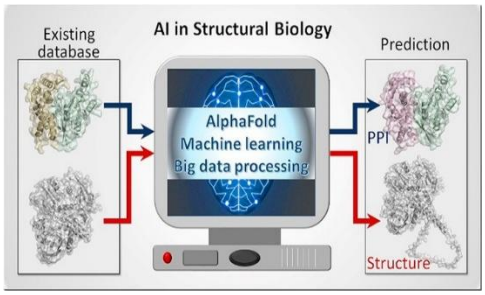
Ms. Vanga Sreshta Reddy
CSE-C 3rd Year

"Courage is the bridge between intention and achievement."

DeepMind's AlphaFold 3: Mapping the Molecular Blueprint of Life with AI

Google DeepMind, in partnership with Isomorphic Labs, has unveiled AlphaFold 3, a next-generation artificial intelligence model that marks a major leap in biological research and drug discovery. Building upon the groundbreaking achievements of AlphaFold 2—which solved the decades-old problem of protein structure prediction—AlphaFold 3 expands its capabilities to model the 3D structures and interactions of all key biomolecules, including proteins, DNA, RNA, and small molecules (ligands) such as drugs.

This AI system takes an input list of molecules and predicts how they come together to form complex biological assemblies, showing their collective 3D structures and interconnections with remarkable precision. Unlike its predecessors, AlphaFold 3 uses a diffusion network, an approach similar to the technology behind AI image generators, allowing it to simulate chemical and structural alterations that occur naturally in cells. These simulations help researchers understand how molecular changes can influence health or trigger diseases.



Through Isomorphic Labs, DeepMind is collaborating with pharmaceutical companies to apply AlphaFold 3's predictive power to accelerate drug design and address long-standing challenges in creating effective, life-saving treatments. By accurately mapping molecular interactions, the model enables scientists to explore new drug targets and understand biological mechanisms at an unprecedented scale. With its ability to model all of life's essential molecules, AlphaFold 3 represents a revolutionary step in computational biology. It not only enhances our understanding of the molecular foundations of life but also promises to transform biomedical research, personalized medicine, and therapeutic innovation worldwide.

Reference:

Google Deepmind's new AlphaFold 3 AI can model proteins, DNA & RNA: Details here

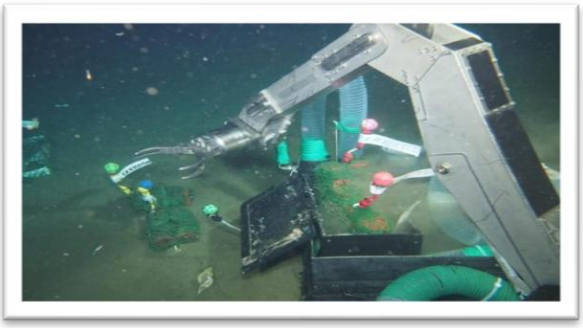
Ms. Niharika Gowrisetty
CSE-A 3rd Year

LAHB: The Bioplastic Poised to Solve Marine Plastic Pollution

In a world where we often feel trapped by our own creations, a new bioplastic called poly(D-lactate-co-3-hydroxybutyrate), or LAHB, offers hope. This innovative material addresses the pressing issue of marine plastic pollution and urges us to rethink our connection with nature. As we find ourselves at the crossroads of progress and preservation, can we truly accept a future where our inventions live in harmony with the environment? (Beadle, 2025).

LAHB has shown great potential by biodegrading in conditions that leave traditional plastics like polylactide (PLA) unaffected. In tests conducted deep beneath the ocean at 855 meters near Hatsushima Island, LAHB lost over 80% of its mass in just 13 months. This raises important

questions about strength and weakness. How can something that seems so strong break down into harmless substances like carbon dioxide and water? The answer is in nature's processes, where microbial biofilms work hard to break down this bioplastic, while regular plastics stubbornly hold their form (Shaikh, 2025).



The effects of LAHB's biodegradability go beyond simple numbers; they challenge us to rethink our habits regarding consumption and waste. Imagine a world where plastic waste does not build up in the oceans but instead returns to the elements that support life. In this scenario, every discarded item becomes part of a never-ending cycle rather than a permanent mark on our planet. As we delve deeper into LAHB's capabilities, we must ask: can humanity change its mind set from exploitation to stewardship?

Reference:

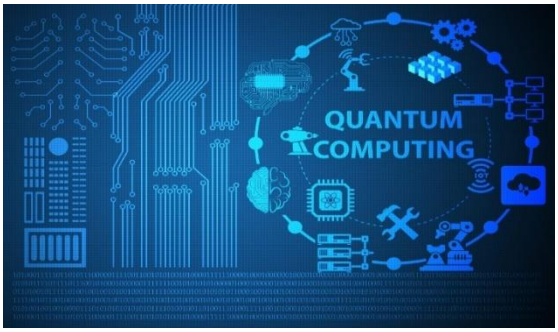
https://interestingengineering.com/science/bioplastic-vanishes-80-in-deep-sea.

Ms. G. Himavarsha
CSE 2nd Year

Quantum Computing: India's Next Technological Revolution

Quantum computing is a cutting-edge technology that uses qubits, which can exist in multiple states simultaneously. Unlike classical computers, which process one calculation at a time, quantum computers exploit superposition and entanglement to solve complex problems faster, including molecular simulations, cryptography, and optimization tasks.

Quantum computers use the principles of quantum mechanics to process multiple possibilities at once. A qubit can represent both 0 and 1 simultaneously, collapsing into a single outcome when measured. This allows quantum systems to tackle problems beyond the reach of classical machines.



The Government of India launched the National Mission on Quantum Technologies and Applications (NM-QTA) in 2020 with ₹8,000 crore funding, focusing on computing, communication, sensing, and quantum materials. Institutes like IIT Madras and IISc Bengaluru are advancing research, with IBM providing cloud-based quantum access to students.

Companies such as TCS, Infosys, and Tech Mahindra, along with startups like QpiAI and BosonQ Psi, are applying quantum algorithms in

logistics, finance, and simulations. Collaboration between academia and industry is expanding India's quantum ecosystem. Quantum computing promises breakthroughs in healthcare, cybersecurity, AI, finance, and climate research. Challenges include qubit fragility, high costs, and a shortage of skilled professionals.

With strong research infrastructure and government support, India has the potential to become a global leader in quantum computing, turning innovation into practical solutions for science and industry.

Reference:

https://www.ibm.com/think/topics/quantum-computing

Ms. Bobbili Hasini Reddy
CSE 3rd Year

Trash to Track: Every journey matters - even that of waste

Myself, G. Siva Durga, along with my friend B. Hasini Reddy, has started working on an innovative solution, for a daily recurring problem. Our idea, T2T – Trash to Track, grew from a simple observation: waste often gets lost in the system, making the overall process inefficient and difficult to monitor. We wanted to rethink this flow by designing a concept that brings more visibility, structure, and coordination to waste handling. T2T focuses on creating a smoother and smarter pathway for waste right from the point where it is generated to the stage where it is processed. Instead of addressing just one step, our approach looks at the broader picture and aims to make the entire process more organized, timely, and easier to manage.

At its core, T2T combines technology-driven thinking with practical, user-friendly methods. It encourages better tracking, improved planning, and clearer communication between the people and systems involved in waste management. By doing so, it supports communities, institutions, and authorities in making informed decisions and reducing unnecessary burdens on landfills. The vision is to treat waste not as something that disappears once thrown away, but as something that can be monitored, understood, and handled with responsibility.

We spent many evenings discussing different scenarios, understanding user challenges, and improving how we presented the concept. These conversations filled with teamwork, creativity, and even a few funny moments helped bring our idea to life and strengthened our confidence.

Being selected for the ISF Junicorn Summit in Dubai to present this idea, is an exciting milestone for us. It gives us the chance to share our idea on an international platform, learn from global innovators, and grow as young changemakers.

To our fellow students, we hope our journey reminds you of one thing: innovation starts small. Even the simplest idea can create impact when you believe in it and keep building on it.

Ms. G. Siva Durga
CSE 3rd Year


VRITH
IT HYDERABAD
of Engineering for Women
VISHNU
NIVERSAL LEARNING


BVRIT HYDERABAD COLLEGE OF
ENGINEERING FOR WOMEN
PARICHAY


BVRITH
BVRIT HYDERABAD
College of Engineering for Women
VISHNU
UNIVERSAL LEARNING


BVRITH
BVRIT HYDERABAD
College of Engineering for Women
VISHNU
UNIVERSAL LEARNING
www.bvrithyderabad.edu.in






Contact us:

BVRIT HYDERABAD College of Engineering for Women

Plot no, 8-5/4, Rajiv Gandhi Nagar, Nizampet Road, Bachupally,

Hyderabad- 500090

Phone: 040-42427773

info@bvrithyderabad.edu.in

principal@bvrithyderabad.edu.in

Technical Magazine: newsletter@bvrithyderabad.edu.in