



Shri Vile Parle Kelavani Mandal's

Dwarkadas Jivanlal Sanghvi College of Engineering

(Autonomous College Affiliated to the University of Mumbai)



DJCSI

PROTOCOL

17TH EDITION | 2024 ISSUE



Testimonials



Dr. Hari Vasudevan
Principal, DJSCE

The DJCSI chapter of DJ Sanghvi College of Engineering has worked tirelessly for the exposure of students to the advancements in the field of technology, complementing their regular academic curriculum. DJCSI has organized various events during this annual year, fostering a culture of collaboration and creating an environment where students can hone their skills while interacting with their peers. The scale of these events and their success are a testament to the hard work put into them by the student body and the faculty involved. DJCSI progresses and rises to new heights each year, owing to the determination and dedication of the members of the committee.

It is a pleasure to be introducing to you the 17th edition of Protocol. The DJCSI committee brings new innovations to our events every year, which helps students not only with technology improvements but also by giving them chances to confidently explore new avenues. This issue of Protocol magazine features a number of DJCSI-organized events, enlightening technical pieces, and exceptional research projects that will surely broaden your technical expertise and motivate you. Additionally, I would like to use this time to express my sincere gratitude to our Principal - Dr. Hari Vasudevan, our Vice Principal - Dr. Narendra Shekokar, and the IT Department teachers for their eternal support and encouragement.



Dr. Vinaya Sawant
Branch Counsellor, DJCSI
Head of Department, IT

Testimonials



Prof. Richa Sharma
Faculty Advisor, DJCSI

Over the years, DJCSI has diligently adapted to the swift currents of technological evolution. We've conducted an array of captivating events and enlightening seminars, all geared towards enriching technical development and fostering innovative thinking among our student body. As we proudly unveil the 17th edition of our esteemed magazine, Protocol, it serves as a testament to the collective dedication and perseverance of our DJCSI community. Within its pages lies a captivating narrative of our endeavors and remarkable student research projects, each exemplifying the remarkable talent and potential within our ranks. We extend our heartfelt appreciation to our esteemed Principal - Dr. Hari Vasudevan, Vice Principal - Dr. Narendra Shekokar, and the entire DJCSI student committee for their unwavering support and tireless efforts in guiding our journey. Their steadfast commitment serves as the beacon that propels us forward in our mission to empower the next generation of tech leaders.

In the dynamic space where imagination meets reality, technological advancements serve as the driving force reshaping our world. Within this transformative landscape, DJCSI stands as a steadfast advocate, dedicated to pioneering progress through innovative research and knowledge dissemination. As the Chairperson of DJCSI, I am honored to lead our organization in this crucial mission and represent our shared vision. This journey has been made possible by the invaluable support, guidance, and inspiration provided by Dr. Vinaya Sawant, our esteemed HOD of IT and Branch Counsellor. Despite facing formidable challenges, DJCSI has remained resilient, a testament to the unwavering dedication of our exceptional team. I extend my heartfelt congratulations to each member for their exceptional collaboration and steadfast commitment. Their encouragement has propelled me beyond limits, and together, I am confident that we will continue to ignite a fervent passion for technology and drive transformative innovation into the future!



Sara Kore
Chairperson, DJCSI

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Committee of 2023-24

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Impact of Technology on Global Supply Chain

AUTHOR: KANISHK (SE – IT)



The global supply chain refers to the interconnected network of companies, resources, and processes involved in producing and delivering goods and services worldwide. It encompasses sourcing materials, manufacturing, distribution, and logistics across multiple countries and regions. Technology has reshaped logistics and supply chain management, enhancing productivity, reducing costs, and elevating customer satisfaction.

1) Automation:

Automation, exemplified by robotic warehouses and self-driving vehicles, has streamlined processes and minimized human labour, leading to increased efficiency and decreased expenses. In

robots handle tasks such as sorting, packing, and transporting goods, significantly reducing the time required to complete these processes compared to manual labour. For example, automated guided vehicles (AGVs) and autonomous mobile robots (AMRs) navigate warehouse floors, transporting goods from one location to another with precision and speed. This not only boosts productivity but also minimizes the risk of human error.

Self-driving vehicles are transforming the logistics landscape by enabling automated transportation of goods. These vehicles can operate around the clock without the need for breaks, significantly reducing delivery times and costs. Moreover, they are equipped

with advanced sensors and navigation systems that allow them to operate safely and efficiently, even in complex traffic conditions. The integration of self-driving vehicles into supply chain operations is expected to further enhance the efficiency and reliability of deliveries.



2) Artificial Intelligence (AI):

Artificial intelligence (AI) is revolutionizing the industry by analyzing vast data sets, forecasting demand, optimizing delivery routes, and identifying potential issues, thus further lowering costs and improving customer satisfaction. AI algorithms can process and analyze large volumes of data from various sources, such as sales records, market trends, and customer feedback, to predict future demand with high accuracy. This allows businesses to optimize their inventory levels, reducing the risk of overstocking or stockouts.

AI-powered route optimization tools analyze real-time traffic data, weather conditions, and other factors to determine the most efficient delivery routes. This not only reduces fuel consumption and transportation costs but also ensures timely deliveries, enhancing customer satisfaction. Furthermore, AI systems can monitor the entire supply chain for potential disruptions, such as delays in raw material deliveries or

equipment failures, allowing businesses to take proactive measures to mitigate these risks.

3) The Internet of Things (IoT):

The Internet of Things (IoT) facilitates real-time tracking of shipments, monitoring inventory levels, and optimizing transportation routes through interconnected devices exchanging data. Sensors on products enable businesses to monitor their supply chain continuously. For instance, IoT devices can track the location and condition of goods in transit, providing real-time visibility into the supply chain. This allows businesses to identify and address any issues promptly, such as temperature fluctuations that could affect perishable goods.

IoT-enabled inventory management systems provide accurate, real-time data on stock levels, enabling businesses to optimize their inventory management processes. By continuously monitoring inventory levels, these systems can automatically reorder stock when it reaches a certain threshold, ensuring that products are always available when needed. Additionally, IoT devices can optimize transportation routes by collecting and analyzing data on traffic conditions, weather, and other factors, ensuring that goods are delivered in the most efficient manner possible.

4) Blockchain Technology:

Blockchain technology ensures secure and transparent transactions, tracing item provenance and reducing fraud risk, which is particularly beneficial in ensuring responsible sourcing and production. By

recording every transaction on a decentralized ledger, blockchain provides a transparent and tamper-proof record of the entire supply chain. This enhances traceability, allowing businesses to verify the origin and authenticity of their products.

In industries such as food and pharmaceuticals, where product safety and quality are paramount, blockchain technology can track the entire journey of a product from the source to the consumer. This ensures that products are sourced and produced responsibly, reducing the risk of fraud and ensuring compliance with regulatory requirements. Furthermore, blockchain can streamline the documentation process by providing a single, immutable record of all transactions, reducing administrative costs, and improving efficiency.

Case Studies of Leading Companies:

Leading companies like Amazon, Walmart, and DHL have successfully integrated these technologies into their operations. Amazon utilizes warehouse automation, delivery drones, and AI for demand estimation and route optimization. In Amazon's fulfillment centers, robots handle tasks such as picking and packing items, significantly speeding up the order fulfillment process. Delivery drones enable fast and efficient deliveries, particularly in remote or hard-to-reach areas. AI algorithms analyze customer data to forecast demand and optimize delivery routes, ensuring timely and cost-effective deliveries.

Walmart employs blockchain to track food origins, swiftly addressing food safety issues. By leveraging blockchain technology,

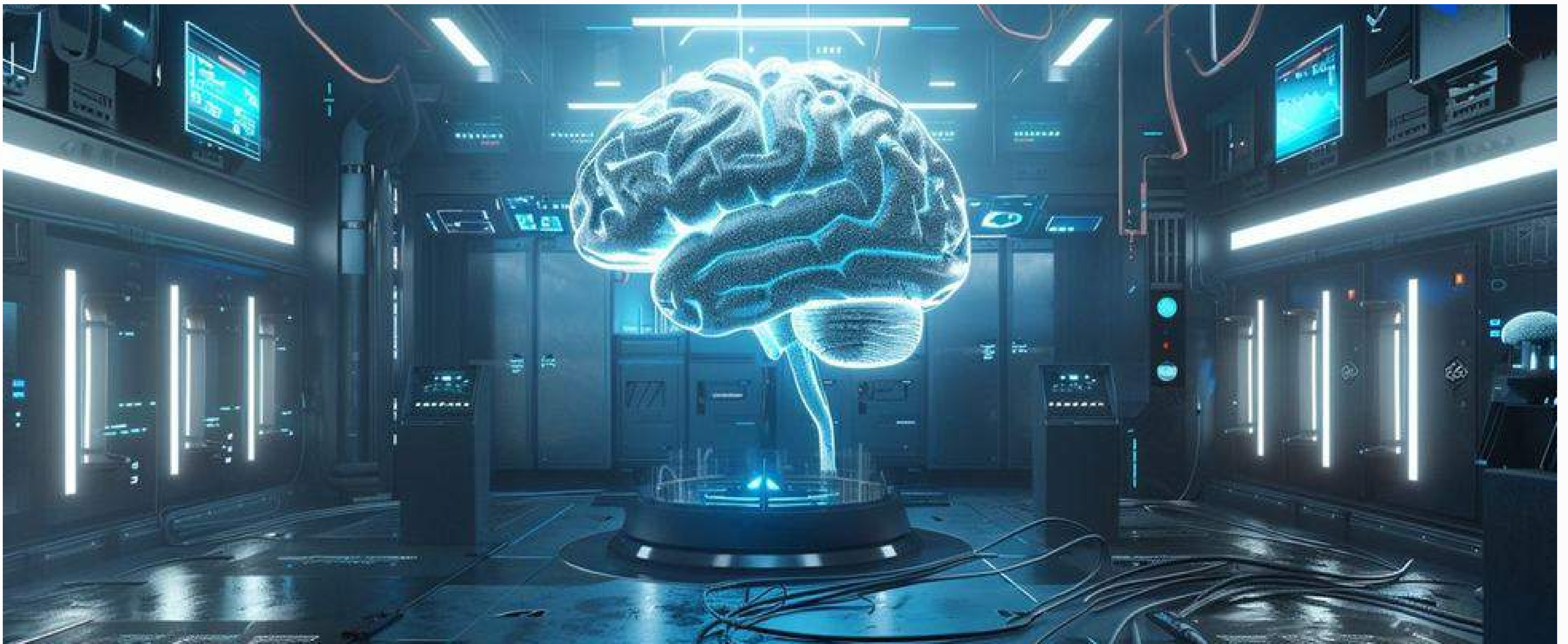
Walmart can trace the journey of food products from farm to table, ensuring that they are sourced and handled safely. In the event of a food safety issue, Walmart can quickly identify and remove the affected products from its shelves, minimizing the risk to consumers.

DHL utilizes IoT to monitor package location and condition in real time, enhancing product quality control. IoT sensors track the location, temperature, and humidity of packages in transit, ensuring that they are handled properly and arrive in optimal condition. This real-time visibility into the supply chain allows DHL to address any issues promptly, improving the reliability and quality of its services.

In conclusion, technology has significantly impacted logistics and supply chain management, fostering efficiency, cost reduction, and customer satisfaction. Automation, AI, IoT, and blockchain continue to drive innovation in the industry, with further advancements expected in the coming years. As these technologies evolve and become more integrated into supply chain operations, businesses will be able to achieve even greater levels of efficiency, transparency, and customer satisfaction. The ongoing digital transformation of the supply chain will play a crucial role in meeting the demands of a rapidly changing global market, ensuring that businesses remain competitive and responsive to customer needs.

Intel Unveils Hala Point: Revolutionizing AI with the World's Largest Neuromorphic System

AUTHOR: ASHISH (SE – IT)



As we approach a new era in technology, the need for efficient and sustainable computing solutions is more pressing than ever. The growing demands of artificial intelligence (AI) require a system that can emulate human data processing and storage. Such a system could significantly improve the energy efficiency, bias mitigation, interpretability, and adaptability of AI models. Intel's introduction of Hala Point, the world's largest neuromorphic system, represents a major breakthrough in this endeavour.

Hala Point is a revolutionary brain-inspired

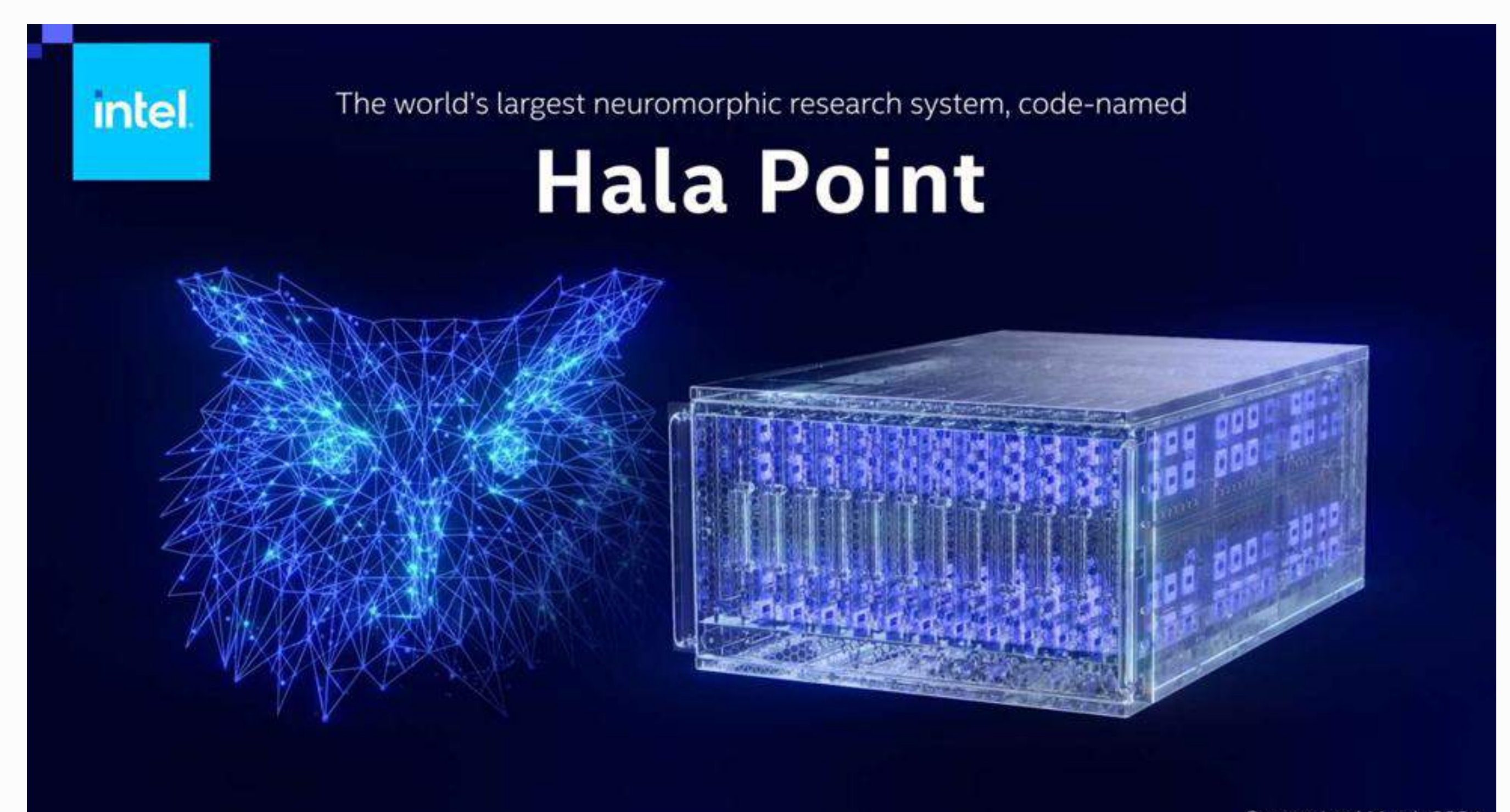
neuromorphic system designed to deliver sustainable and efficient AI solutions. Featuring 1,152 Loihi 2 processors, it can perform up to 20 quadrillion operations per second, enabling it to manage real-time AI applications and complex computational tasks with exceptional efficiency. A key feature of Hala Point is its use of neuromorphic computing to minimize energy consumption, aligning perfectly with Intel's goal of addressing the sustainability challenges posed by increasingly large AI models. By leveraging its sparse connectivity and event-driven activity, Hala Point achieves deep neural network efficiencies

that were previously unattainable. Building on the foundation of Intel's earlier system, Pohoiki Springs, Hala Point significantly enhances neuron capacity and performance, offering over 10 times more neuron capacity and up to 12 times higher performance. This makes it a formidable tool for brain-scale computing research at Sandia National Laboratories. Not only does this new system advance research capabilities, but it also serves as a testbed for future AI and machine learning models. Mike Davies, director of the Neuromorphic Computing Lab at Intel Labs, highlighted the importance of this development: "The computing cost of today's AI models is rising at unsustainable rates. The industry needs fundamentally new approaches capable of scaling. For that reason, we developed Hala Point, which combines deep learning efficiency with novel brain-inspired learning and optimization capabilities. We hope that research with Hala Point will advance the efficiency and adaptability of large-scale AI technology."

Neuromorphic computers fundamentally differ from traditional machines that depend on sequential processing. Instead, neuromorphic systems utilize parallel operations through artificial neurons that simultaneously store and process data. This architecture eliminates the need for constant data transfer between components, significantly reducing energy consumption and accelerating data processing. Hala Point exemplifies this efficiency, capable of solving optimization problems using 100 times less energy and operating 50 times faster than conventional GPU and CPU architectures. Although it is not yet publicly available for independent testing, Intel's

bold claims have sparked considerable excitement within the AI community.

To further enhance Hala Point's capabilities and gather essential feedback, Intel has provided limited access to more than 200 members of the Intel Neuromorphic Research Community (INRC). This community comprises government labs, academic institutions, and research companies, all contributing to the refinement and advancement of this groundbreaking technology. Despite being in its early stages, Hala Point has already demonstrated significant potential in offering a more sustainable and efficient method for training AI models. Researchers at Sandia National Laboratories plan to utilize Hala Point for advanced brain-scale computing research, targeting scientific computing challenges in device physics, computer architecture, and informatics. Craig Vineyard, the Hala Point team lead at Sandia, highlighted the system's potential: "Working with Hala Point enhances our Sandia team's ability to tackle computational and scientific modeling challenges. Researching with a system of this magnitude will enable us to keep up with AI's progression across various domains, from commercial applications to defense projects to fundamental scientific research."



Hala Point's distinctive features could revolutionize real-time continuous learning for AI applications, including scientific and engineering problem-solving, logistics, smart city infrastructure management, and large language models (LLMs). By integrating memory and computing within its massively parallel architecture, Hala Point achieves unprecedented energy efficiency and performance. Its deployment at Sandia National Laboratories marks the initial rollout of a new generation of large-scale neuromorphic research systems that Intel intends to share with its research collaborators. This collaborative initiative aims to address the power and latency limitations that currently hinder the real-world application of AI technologies.

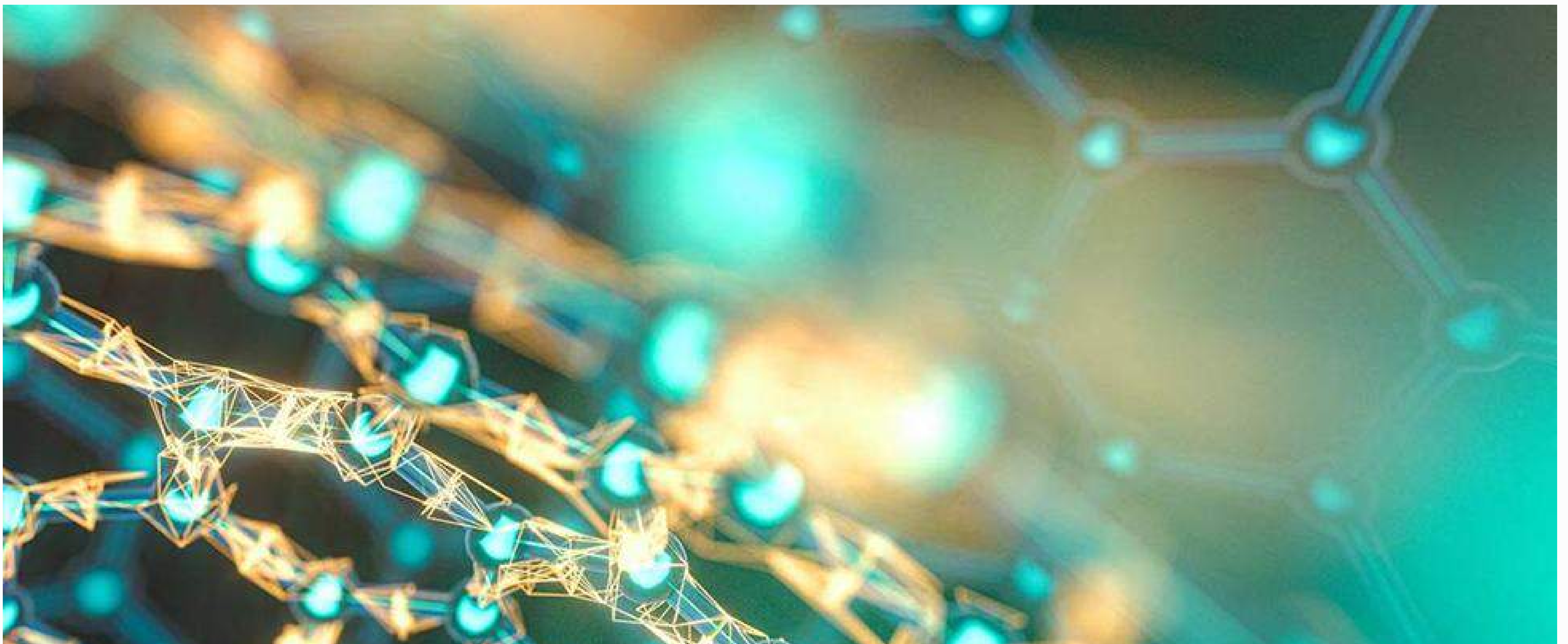
Intel envisions a future where brain-inspired computing pushes the boundaries of AI technology. By leveraging neuroscience principles, Intel aims to further reduce power consumption while enhancing performance. If Hala Point fulfills its promise, it will likely spur increased competition in the industry. Other neuromorphic supercomputers, such as DeepSouth, which can simulate human brain synapses at full scale, are already under development and expected to be released this year. The recent trend of scaling deep learning models to trillions of parameters has underscored significant sustainability challenges in AI, necessitating innovation at the foundational hardware level. Neuromorphic computing provides a novel approach, combining memory and computing with fine-grained parallelism to minimize data movement and enhance efficiency.

Intel expects that the insights gained from Hala Point will pave the way for tangible advancements in AI technology. For instance, large language models (LLMs) could learn continuously from new data, drastically reducing the unsustainable training demands of widespread AI implementations. These improvements could save significant amounts of energy by eliminating the need for periodic retraining with ever-expanding datasets. Intel's launch of Hala Point marks a major milestone in the pursuit of efficient and sustainable AI solutions. By employing neuromorphic computing principles, Hala Point is set to transform AI research and development with its unparalleled energy efficiency and computational power. As Intel continues to collaborate with global research partners, the future of AI technology appears increasingly promising and sustainable.

Hala Point represents more than just a technological breakthrough; it offers a vision of the future where brain-inspired computing fosters the development of more efficient, adaptable, and sustainable AI models. As we delve deeper into the potential of neuromorphic systems, the effects on AI research and practical applications will be substantial. Intel's dedication to advancing neuromorphic computing embodies its forward-looking vision for AI technology, fostering innovation and addressing real-world challenges in ways we are only beginning to envision.

Self-Healing Materials: Autonomous Repair for Extended Lifespan and Reduced Maintenance

AUTHOR: DHARA (SE – IT)



For millennia, humanity has witnessed the impermanence of materials writ large in the crumbling facades of ancient structures and the rusting remnants of forgotten machines. But what if materials could defy this inevitability? What if they possessed the remarkable ability to autonomously repair themselves, rewriting the narrative of material degradation?

This captivating vision, once the stuff of science fiction, is rapidly becoming a reality with the emergence of self-healing materials. This revolutionary field represents a

paradigm shift in material science, offering the tantalizing prospect of extended lifespans, reduced maintenance burdens, and a new level of resilience across countless applications.

Delving into the Mechanisms: How Self-Healing Works

Self-healing materials are a unique class of engineered substances that boast the remarkable ability to autonomously repair small cracks and damages without external intervention. Inspired by the inherent regenerative capabilities of living organisms,

these materials offer a transformative approach to material durability and functionality.

There are two primary mechanisms by which self-healing can occur: intrinsic and extrinsic healing. Intrinsic healing leverages the material's own inherent chemical properties to trigger self-repair. Imagine polymers with built-in reversible bonds, akin to microscopic molecular zippers. When these materials experience damage, the broken connections can reform under specific conditions, such as exposure to heat or light, essentially stitching the material back together at the molecular level.

Extrinsic healing, on the other hand, takes a more compartmentalized approach. Embedded within the material are tiny capsules or microvascular networks, acting as microscopic first-aid kits. These capsules are filled with healing agents, waiting for their moment of action. Upon damage, the capsules rupture, releasing the healing agent which then interacts with the surrounding material. This interaction fills the crack and restores the structural integrity of the material, much like a built-in repair crew working on a microscopic level.

A Universe of Applications: Redefining Industries and Everyday Life

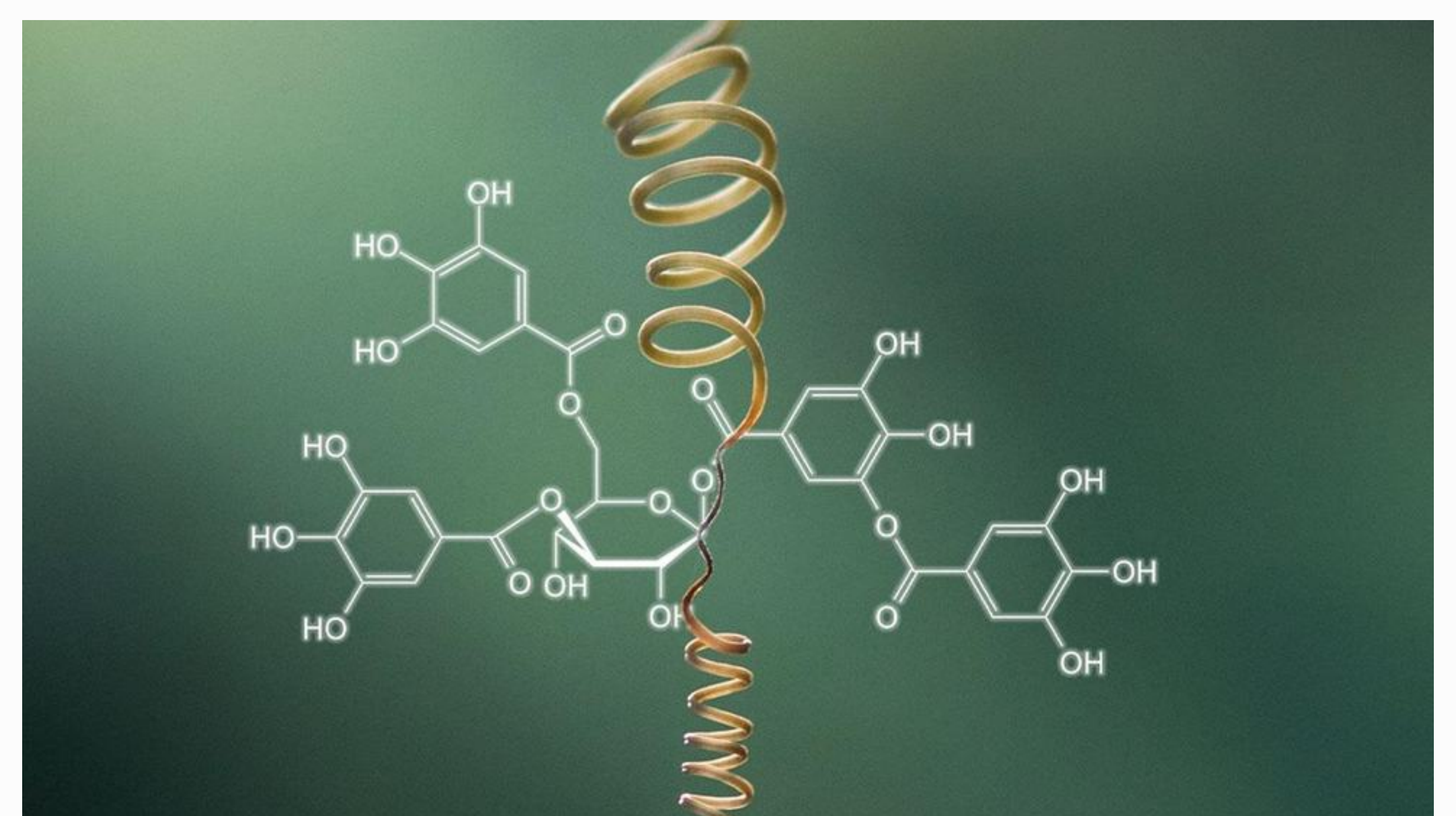
In the construction industry, self-healing concrete could revolutionize the landscape. They could autonomously repair minor cracks before they escalate into major structural issues. This wouldn't just significantly reduce the need for costly and disruptive repairs, but also extend the lifespan of critical infrastructure by decades, leading to a more sustainable built

environment with a reduced environmental footprint.

Moving beyond infrastructure, self-healing materials hold immense promise in various fields. Surgeons could utilize self-healing biomaterials for implants and prosthetics. These materials could automatically address minor damage, potentially minimizing the risk of post-operative complications and enhancing patient outcomes.

The realm of electronics is another exciting frontier. Imagine smartphones or other devices that can automatically repair minor circuit damage, improving their reliability and extending their lifespan. A self-healing phone wouldn't need to be replaced due to a cracked screen or a minor malfunction, leading to a more sustainable future for consumer electronics.

Challenges and Opportunities: Paving the Way for a Self-Healing Future



However, significant challenges remain. Triggering self-healing under diverse environmental conditions and achieving complete restoration of mechanical properties are ongoing research areas. For instance, a self-healing bridge material needs to function effectively in extreme heat and cold, while a self-healing coating for an airplane needs to withstand the harsh

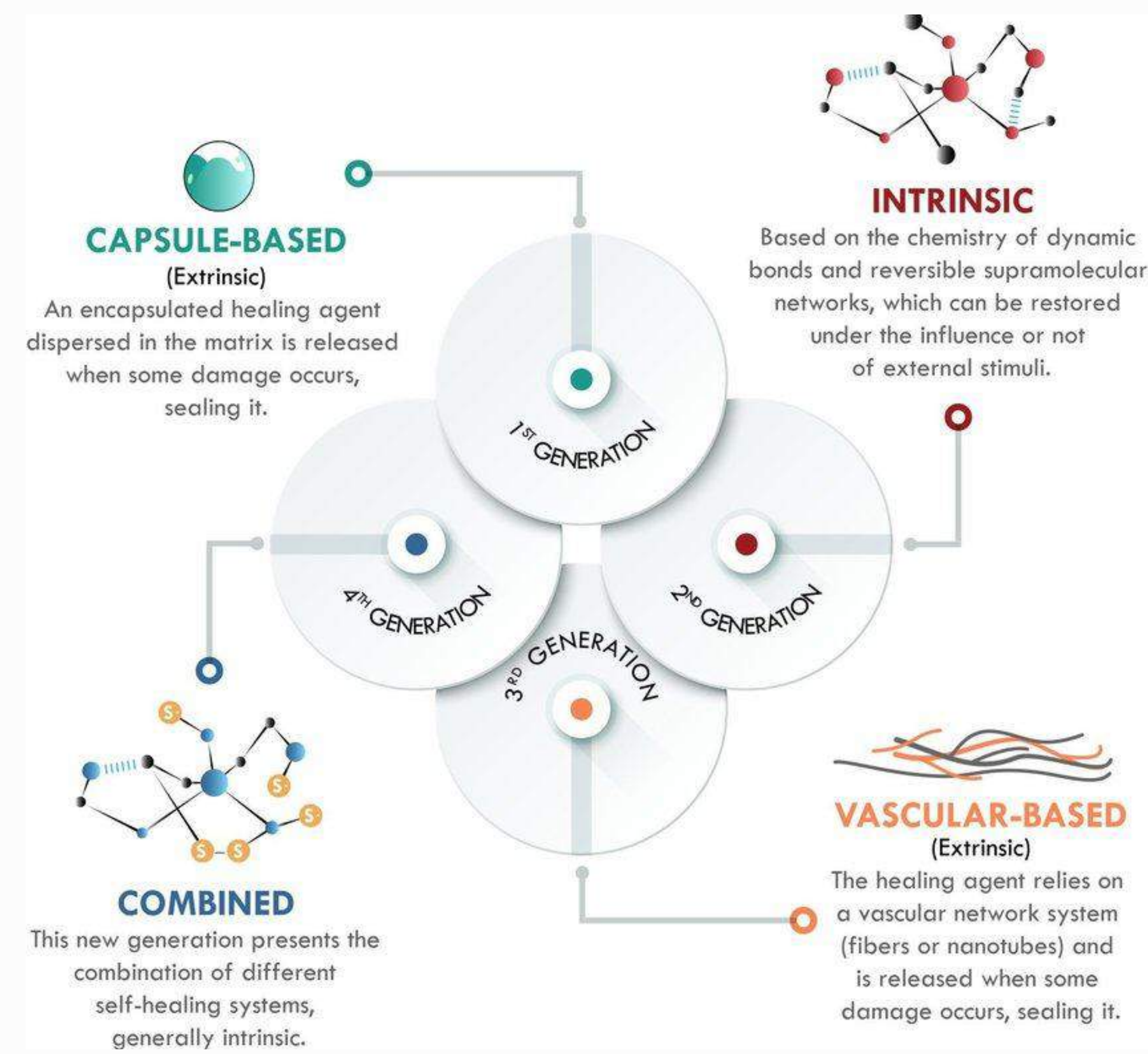
conditions of high-altitude flight. Additionally, for widespread adoption, the cost and scalability of production for these materials need further optimization. Currently, some self-healing materials are still in the early stages of development and can be expensive to produce on a large scale.

Recent Developments and Trends: Recent trends in self-healing materials include the rise in demand for biomaterials and biomimetics during production, the development of self-healing concrete, and the improvement in performance of self-healing materials. For instance, the automotive end-user already utilizes aftermarket self-healing coatings, and several R&D activities are focused on escalating the performance of self-healing coatings that comply with industry standards. The surge in demand and use of fragile composites in automotive end-users is also considered a strong driver for self-healing materials.

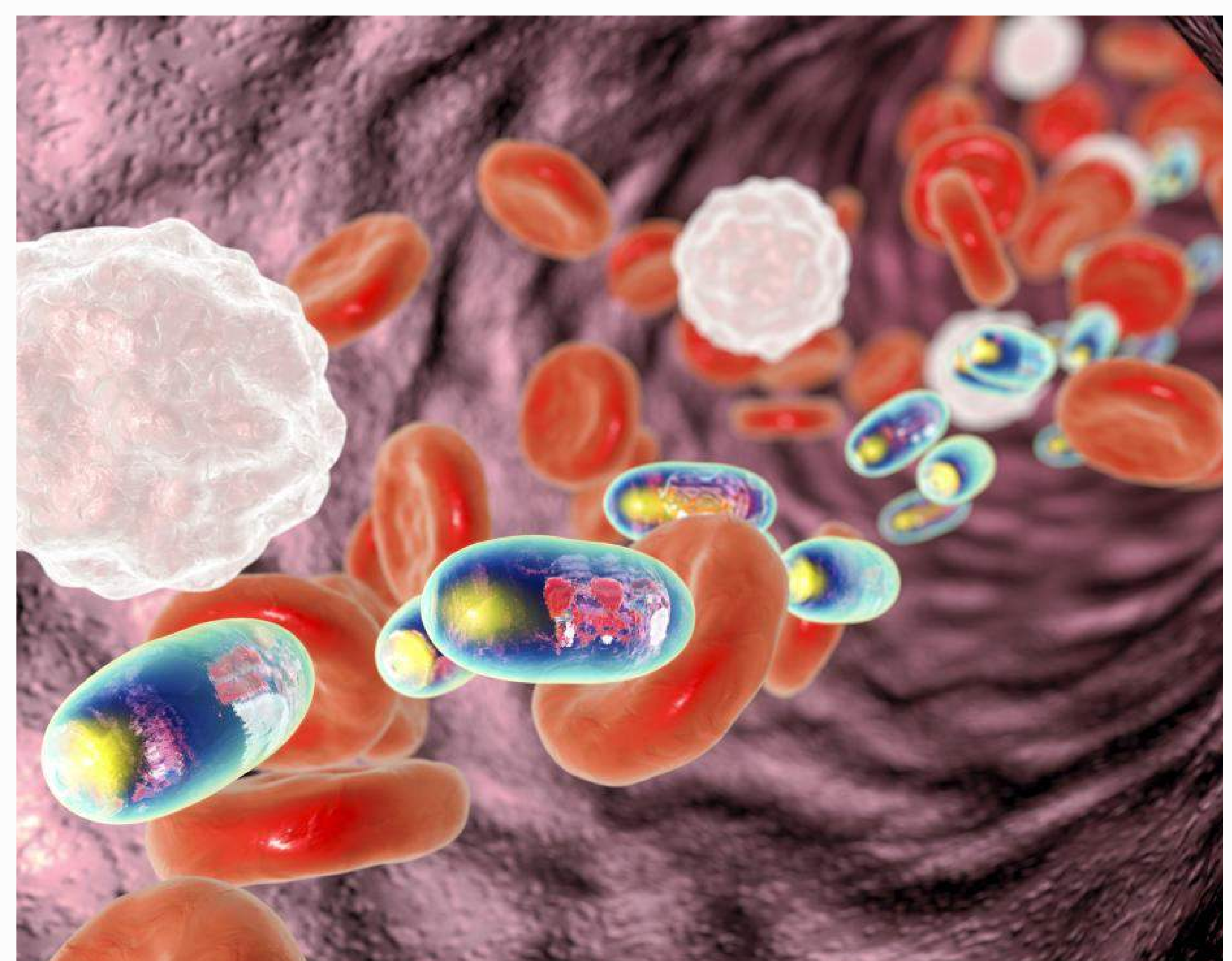
Manufacturing Challenges: Manufacturing self-healing materials poses several challenges, including the preparation of the healing agent carrier, embedment with reinforcement, and healing efficiency. These challenges are addressed through various techniques such as microcapsules, nanocapsules, and microvascular networks.

Future Directions: Future directions for self-healing materials include the development of more efficient and scalable manufacturing processes, the exploration of new healing mechanisms, and the integration of advanced microfluidic technologies. Additionally, the application of self-healing materials in extreme conditions, such as high-temperature and high-pressure

environments, is an area of ongoing research.



In conclusion, Self-healing materials represent a groundbreaking innovation that has the potential to transform various industries and aspects of our daily lives. By harnessing the power of nature and leveraging cutting-edge technology, we can create a more resilient and sustainable future where materials can heal themselves, reducing waste and extending their lifespan.



From Noob to Ninja: Mastering the Art of Online Gaming Security

AUTHOR: DHWANI (SE – IT)



Late-night gaming sessions are a cherished pastime for many college students, offering a much-needed escape from academic pressures and a chance to bond with friends, but the digital world they explore is not risk-free. While the online gaming community continues to flourish, particularly in India, the accompanying surge in cybersecurity threats is cause for concern. Cybercriminals are increasingly targeting gamers' virtual assets using various tactics, posing a significant security challenge for gaming platforms.

Gamers face a wide range of threats, from malware disguised as game mods or cheats that steal login credentials and infect

systems, to cunning phishing scams. These scams, often impersonating game developers or support staff, aim to trick players into giving away sensitive information or downloading malicious files. The consequences can be devastating. Massive data breaches can steal huge amounts of player information, while ransomware attacks hold entire player computers hostage. Even worse, account takeovers can leave you locked out of your virtual world, potentially wiping out years of progress and in-game purchases.

These are a few instances from actual life. Gamers eagerly awaited Grand Theft Auto 6, but hackers crashed the party. Leaked

footage, not from a casual source, but straight from Rockstar Games, exposing the developer's vision prematurely. It wasn't just a game anymore; it was a stolen artistic reveal. Even seemingly harmless platforms can be vulnerable these days. In another incident, confidential US intelligence data was exposed on a Minecraft Discord server used by the military. In 2020, a group of teenagers in the UK were duped into giving away their high-value Fortnite accounts. The attackers used fake login pages that looked identical to the real Fortnite website. The attackers took over the teenagers' accounts when they submitted their login details, and because of the unique in-game items, these accounts might be sold for hundreds of dollars on the illicit market. This shows that cybercriminals can target anything, highlighting the need for everyone in the online gaming world to be aware about security.

Just like any bustling city, it needs proper rules to keep things running smoothly. We need clear guidelines for microtransactions, loot boxes, and virtual currencies. Here's where organizations like India's Competition Commission step in. By stricter rules and regulations, we can fight unfair practices and stop money laundering that uses virtual currencies.

Education is key in combating cyber threats in the gaming community. Players can learn about cybersecurity best practices through public awareness campaigns, and minors can be prevented from accessing inappropriate content or making illegal purchases by using age verification procedures and strict parental restrictions. Gamers need to make constant efforts to protect their accounts and personal information. Ditch the

"password123" approach! Use a password manager to store passwords securely and unique for each gaming account. Enable two-factor authentication (2FA) to add an extra layer of security, and download software or game modifications only from trusted sources minimizes risks. Just like your character needs new armor and weapons as they level up, keep your operating systems, game clients, and security applications updated to patch any vulnerabilities. Maintaining backups of important information helps mitigate the impact of ransomware attacks.



Though the internet is a great place to connect, gamers need to be cautious. Social engineering attackers target people's mindsets, not computer weaknesses. Not everyone online is who they seem. Treat new online friends with suspicion until you trust them. They might pose as friends, gamers, or even game support to gain your trust. Once they have it, they'll manipulate you into giving away valuable information like passwords or bank details. This could lead to identity theft or financial loss. Stay safe by being suspicious of messages or requests from strangers. Get to know someone online before sharing personal information. Never give out passwords or account details, no matter who they claim to be. Verify directly with the company if someone asks for this

information. And remember, if something online seems too good to be true, it probably is. Be wary of offers that seem too easy or free like the chances to have unlimited gems. Finally, reporting suspicious activities, phishing attempts or hacking incidents to game developers and relevant authorities ensures a proactive approach to cybersecurity.

In addition to the direct cybersecurity threats gamers face, the impact of this on player's mental health and well-being is often neglected. The constant alert required to navigate the online arena can be mentally taxing. The fear of losing cool in-game assets or personal information can overshadow the excitement of gaming, which can turn what should be a relaxing activity into a source of tension. Moreover, the competitive nature of online gaming may increase this stress. The pressure to perform well and keep up with friends can sometimes become overwhelming, contributing to burnout and even gaming addiction, which in turn can affect college students' academic performance, social life, and physical health.

Toxic behavior, cyberbullying, and harassment are prevalent issues in many online gaming environments. These negative interactions can lower self-esteem, lead to feelings of isolation, and even cause anxiety and depression. Gaming platforms must implement and enforce robust anti-harassment policies to create a safer and more inclusive environment for all players. Encouraging positive interactions can enhance the overall gaming experience, making it more enjoyable and supportive.

Ultimately, at its core gaming is about creating moments of joy, laughter, and

excitement. Think about the thrill of scoring a last-minute goal in FIFA, the giggles that erupt over a hilarious in-game mishap, or the sense of achievement after completing a challenging battle with friends. These are the moments that truly define why people game. By protecting their virtual spaces, they can ensure these precious experiences remain safe.

As players prepare for their next late-night session, they can dive into the adventure with a sense of excitement as well as caution. Gaming should always be about creating connections and making memories, not dealing with stress and anxiety. So, as they gear up for their next game, they should safeguard their digital space and remember that the joy of gaming comes from the moments shared and the stories created together. Players should enjoy their gaming, stay safe, and cherish every moment spent in the virtual world.



Metaverse and Education: Transforming Learning and Collaboration.

AUTHOR: MRINMAYEE (SE – IT)



The metaverse, a collective virtual shared space, created by the convergence of virtually enhanced physical reality and physically persistent virtual space, is revolutionizing various sectors, and education is no exception. By integrating augmented reality (AR), virtual reality (VR), and other immersive technologies, the metaverse offers unprecedented opportunities for transforming learning and collaboration.

The traditional classroom, with its four walls and rigid schedules, has long been the norm. However, the limitations of this model have become increasingly apparent, especially in light of the COVID-19 pandemic. The shift to online learning highlighted both the

potential and the pitfalls of digital education. While technology enabled continuity of education, it also exposed gaps in engagement, interaction, and practical application. This is where the metaverse steps in, offering a more immersive, interactive, and engaging learning experience.

In the metaverse, learning becomes an active, participatory experience. Students can explore historical sites, conduct scientific experiments, and engage in complex simulations, all within a virtual environment. For instance, instead of reading about ancient Egypt, students can virtually visit the pyramids, interact with

historical figures, and participate in archaeological digs. This level of immersion can significantly enhance understanding and retention of information.

Moreover, the metaverse can accommodate diverse learning styles and needs. Visual learners can benefit from 3D models and virtual tours, while kinesthetic learners can engage in interactive simulations. Audio learners can immerse themselves in soundscapes and discussions. This personalization of learning experiences can help address individual strengths and weaknesses, fostering a more inclusive and effective educational environment.

Collaboration, a critical component of education, is also transformed in the metaverse. Virtual classrooms can bring together students from different geographical locations, enabling global collaboration. Students can work on projects with peers from around the world, gaining diverse perspectives and developing cross-cultural competencies. Virtual study groups and clubs can provide social interaction and support, combating the isolation often associated with online learning.



Teachers, too, can benefit from the metaverse. It offers innovative tools for creating engaging content and delivering it

in dynamic ways. Educators can design virtual lessons that go beyond traditional lectures, incorporating interactive elements and real-time feedback. For example, a biology teacher can create a virtual lab where students can dissect a frog without the ethical and logistical issues of using real animals. This hands-on experience can deepen understanding and make learning more memorable.

Professional development for teachers can also be enhanced through the metaverse. Virtual workshops, seminars, and conferences can provide ongoing training and support, enabling educators to stay updated with the latest pedagogical strategies and technologies. Collaborative platforms in the metaverse can facilitate peer-to-peer learning and mentoring, fostering a community of practice among educators.

Furthermore, the metaverse can democratize education. By breaking down geographical and financial barriers, it can provide access to quality education for students in remote or underserved areas. Virtual classrooms and resources can reach students who might otherwise be excluded from traditional educational opportunities. This can play a significant role in bridging the educational divide and promoting equity in education.

However, the integration of the metaverse into education is not without challenges. One major concern is the digital divide. Access to the necessary technology and internet connectivity is not universal, and this disparity can exacerbate existing inequalities. Ensuring equitable access to the metaverse will require significant

investment in infrastructure and resources, particularly in underserved communities.

Another concern is the potential for distraction and over-reliance on technology. The immersive nature of the metaverse can make it easy for students to become distracted or disengaged from the real world. Educators will need to find a balance between leveraging the benefits of the metaverse and maintaining focus on learning objectives. Developing digital literacy and self-regulation skills in students will be crucial in this regard.

Privacy and security are also critical issues. The collection and use of data in the metaverse raise concerns about privacy and security. Safeguarding students' personal information and ensuring secure virtual environments will be essential. Developing robust policies and practices to protect users in the metaverse will be a priority for educational institutions and technology providers.

Despite these challenges, the potential benefits of the metaverse in education are immense. It offers a platform for creating engaging, interactive, and personalized learning experiences. It enables global collaboration and fosters inclusivity. By breaking down barriers to access, it can democratize education and promote equity.

The future of education in the metaverse is promising. As technology continues to evolve, the possibilities for enhancing learning and collaboration will expand. Educators, students, and policymakers will need to work together to harness the potential of the metaverse while addressing its challenges.

In conclusion, the metaverse represents a transformative shift in education. By integrating immersive technologies, it can provide personalized learning experiences. It facilitates global collaboration and fosters inclusivity, breaking down barriers to access and promoting equity. While challenges such as the digital divide, distraction, and privacy concerns must be addressed, the potential benefits of the metaverse in education are significant. As we move forward, embracing this new frontier can lead to a more dynamic and effective educational system, preparing students for the challenges and opportunities of the future.



Additionally, the metaverse can foster creativity and innovation among students. By providing a flexible and open-ended environment, it encourages students to think outside the box and experiment with new ideas. This can be particularly beneficial in subjects such as art, design, and technology, where creativity and innovation are crucial. For example, in a virtual art class, students can create and manipulate 3D models, collaborate on large-scale projects, and even exhibit their work in virtual galleries. This not only enhances their creative skills but also prepares them for future careers in the digital and creative industries.

The Trend of AI hardware startups launching products with bugs

AUTHOR: VATS S. SHAH (SE – EXTC)



The ubiquity of AI hardware startups launching products plagued by bugs and glitches has become an increasingly concerning trend, mirroring the issues that have long been pervasive in the smartphone and gaming industries. This phenomenon underscores the formidable challenges faced by companies venturing into the intricate and multifaceted realm of AI hardware development. The recent case of the Rabbit device, a highly anticipated AI hardware product, serves as a poignant illustration of the significant hurdles that these startups must surmount, ranging from hardware malfunctions to software glitches and

everything in between.

Embarking on the journey of launching an AI hardware startup requires an exceptional blend of ambition, resilience, and an unwavering commitment to innovation. In stark contrast to their software counterparts, hardware ventures necessitate substantial upfront investments for prototyping, establishing manufacturing setups, and meticulously managing inventory. The extended development timelines, coupled with the intricate complexities of mass manufacturing and stringent quality control measures, further compound the myriad challenges faced by these startups. Securing

adequate funding to navigate these capital-intensive phases can prove to be a daunting task, particularly for early-stage startups without an established track record or substantial backing from investors or industry partners.

Moreover, the inherent lack of flexibility to iterate and refine hardware products, compared to the relative ease of software updates and bug fixes, exacerbates the risks associated with launching flawed devices. Hardware startups must contend with the unforgiving nature of physical products, constrained by the immutable laws of physics and the limitations imposed by the materials they work with. These constraints add layers of complexity to the development process, rendering it inherently more challenging than software development, where iterative updates and bug fixes can be relatively seamless and rapid.

The case of the Rabbit device exemplifies the pitfalls that AI hardware startups can encounter, serving as a cautionary tale for the industry. Issues such as unusable battery life, hardware malfunctions, and software bugs not only tarnish the reputation of the product but also erode consumer trust in the brand and the technology itself. While post-launch bug fixes are commonplace in the industry, shipping products with critical flaws can be detrimental to a startup's success and credibility, potentially leading to financial losses, negative publicity, and diminished investor confidence.

Despite the plethora of challenges and risks associated with hardware startups, there remains a fertile ground for innovation and growth in the burgeoning AI hardware market. Companies like Rewind (now

Limitless) have successfully pivoted from software to hardware, demonstrating that a strategic shift in product offerings can lead to success, provided it is executed with meticulous planning and a thorough understanding of the unique nuances of hardware development. However, this transition requires a comprehensive grasp of the hardware development lifecycle, supply chain management, and the unique challenges inherent in physical product design and manufacturing.

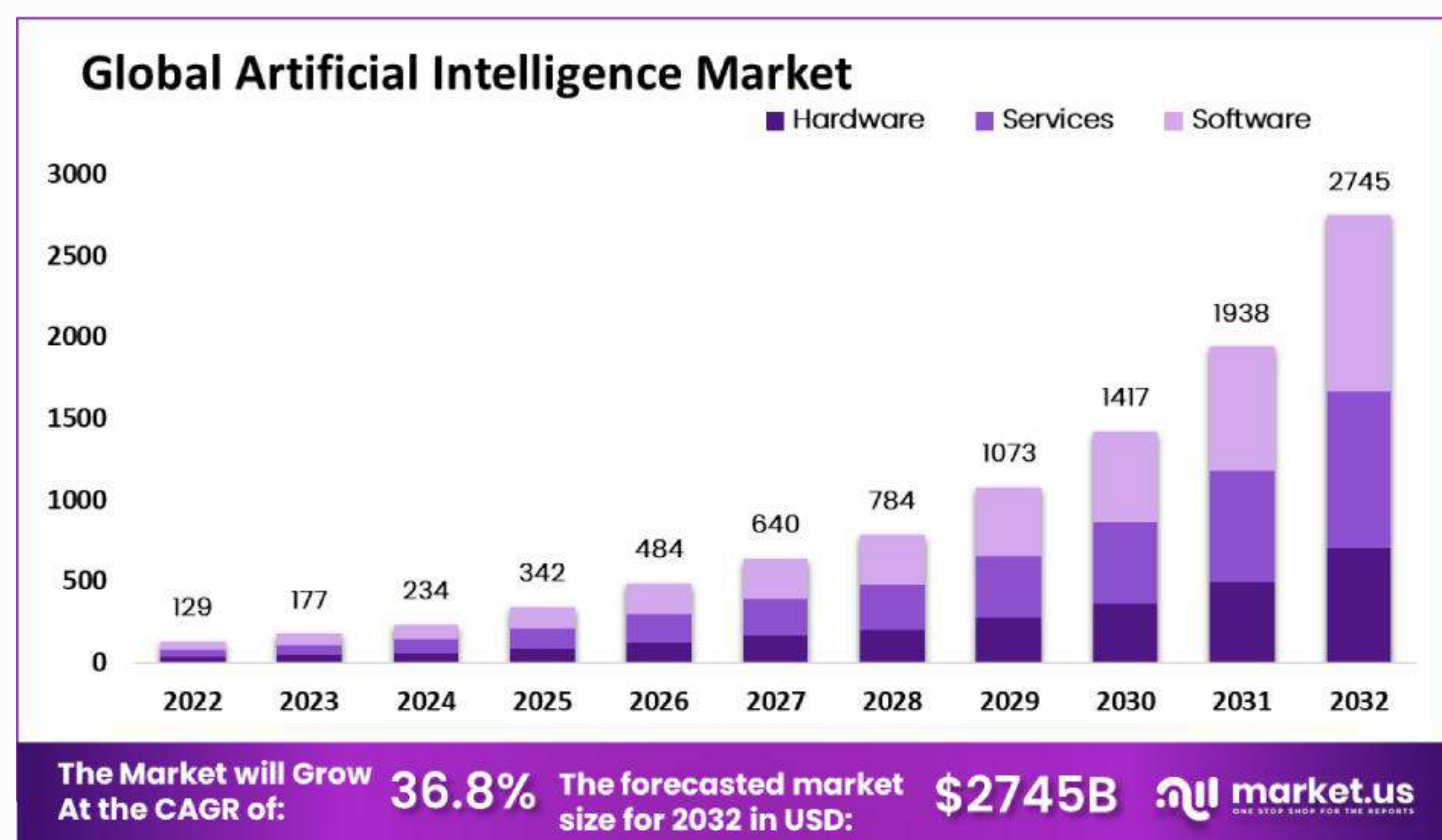


Embracing an agile and experimental approach, coupled with a laser-sharp focus on user-centric design and functionality, can enhance the prospects of AI hardware startups in a competitive market landscape. Rapid prototyping, extensive testing, and iterative refinement can help identify and address potential issues early in the development cycle, thereby reducing the likelihood of launching products with critical flaws that could prove detrimental to the startup's success.

Furthermore, fostering a culture of quality assurance and continuous improvement within AI hardware startups is paramount. Implementing robust testing protocols, rigorous quality control measures, and proactive monitoring of user feedback can

aid in identifying and addressing bugs and performance issues promptly. Establishing effective communication channels with end-users and maintaining transparency regarding product updates and bug fixes can help build trust and maintain customer loyalty, which is essential for the long-term viability of any hardware startup.

In addition to the technical aspects of hardware development, AI hardware startups must also navigate the complexities of regulatory compliance, intellectual property management, and the intricate web of supply chain logistics. Failure to adhere to industry standards and regulations can result in legal consequences, product recalls, and irreparable reputational damage, all of which can be catastrophic for a fledgling startup.



While the path to success for AI hardware startups is fraught with challenges and obstacles, those that successfully navigate these hurdles can reap the rewards of a burgeoning market brimming with opportunity. The growing demand for AI-enabled devices across various industries, from consumer electronics and smart home technology to industrial automation and healthcare, presents unparalleled opportunities for innovative startups to disrupt established players and unlock new frontiers in AI hardware development.

Collaboration and knowledge sharing within the AI hardware ecosystem can also prove invaluable. Engaging with industry experts, forming strategic partnerships, and leveraging open-source resources can provide access to invaluable insights, best practices, and lessons learned from previous successes and failures. Such collaborations can foster a spirit of innovation, cross-pollination of ideas, and the development of industry-wide standards that can elevate the entire AI hardware sector.

In conclusion, the prevalence of bugs in AI hardware products underscores the complexities and risks inherent in this sector, but it also highlights the immense potential for innovation and growth. While challenges persist, there is a world of opportunity for startups that navigate these hurdles adeptly. By prioritizing quality assurance, user experience, and iterative development processes, AI hardware startups can mitigate the risks of launching products with critical flaws and carve a niche in the evolving landscape of artificial intelligence hardware. Embracing an agile mindset, fostering a culture of continuous improvement, and leveraging industry collaborations can create a fertile environment for AI hardware startups to thrive and drive the next wave of transformative technologies that will shape the future of numerous industries and our daily lives.

DestinE system

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The European Commission announced the launch of the DestinE, short for Destination Earth. It is a digital twin system, accessing the powers of European high-performance computers (EuroHPC), such as the LUMI supercomputer in Kajaani, Finland to simulate extreme weather conditions and the effects of climate change. DestinE is a headlining EU project that aids our battle against climate change by creating a digital twin of the Earth.

This innovative digital twin technology will be essential for enhancing and refining mitigation and adaptation strategies to address the growing climate challenges that we face on Earth.

DestinE was launched on the 10th of June, 2024 by Margrethe Vestager - Executive Vice President of the EU, and Arto Satonen -

Finnish Minister for Employment.

“The launch of the initial DestinE is a true game changer in our fight against climate change. DestinE will provide us with a highly accurate twin of the Earth”, quoted Vestager. She also added, “It means that we can observe environmental challenges, which can help us predict future scenarios - as we have never done before. This first phase shows how much we can achieve when Europe puts together its scientific excellence and its massive supercomputing power. Today, the future is literally at our fingertips.”

Arto Satonen, Finnish Minister of Employment said, “The project opens up completely new opportunities for cooperation between universities, research institutes, and the business world, which, in

turn, promotes well-being and economic growth throughout Europe and Finland.”

But how does this ground-breaking digital twin work?

DestinE was launched in 2022 by the European Commission in collaboration with the European Centre for Medium-Range Weather Forecasts (ECMWF), the European Space Agency (ESA), and the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT).

Although it is operational now, the entire digital twin of the world is expected to be completed by 2030.

The ‘Core Service Platform’ form the initial set of features of DestinE, providing users access to services, tools and applications. Two high-res digital twins of the Earth are also included in the core services. One focuses on climate change adaptation, while the other focuses on extremes which are driven by the weather. This enables the analysis and testing of various scenarios that the Earth may find itself in.

The data obtained from the digital twins will be maintained and stored on the “DestinE Data Lake”. It will allow quick and smooth access to the data of the digital Earths, as well as information from other sources such as the EU’s Earth observation programme - Copernicus.

This groundbreaking initiative aims to prepare Europe for natural disasters. It helps understand and implement climate change adaptation, and aids the assessment of potential socioeconomic and policy impacts.

DestinE is accelerating the development of

machine learning techniques that can dramatically improve the accuracy of extreme weather simulations and climate change projections. “Machine learning is revolutionising our industry,” says Florian Pappenberger, deputy director-general at the European Centre for Medium-Range Weather Forecasts (ECMWF). “I’ve never seen anything else revolutionise the industry like this,” he adds.

Weather forecasting earlier used to improve 10% every 10 years. But now, Pappenberger says machine learning-based forecasts have improved 90% over the past four years and are now competitive with traditional weather forecasting models in several aspects.

“The DestinE initiative’s substantial investment in machine learning, along with the higher resolution weather and climate datasets produced by the DestinE Digital Twins, will significantly enhance the use of machine learning in meteorology and climate sciences,” says Pappenberger. “This effort, combined with the collaborative endeavours on machine learning at ECMWF and in our Member and Cooperating States, positions us to secure European leadership in machine learning applications for the Earth system. It also aids the creation of a machine learning-based digital twin of the Earth.”



The AI present in DestinE covers a wide range of undertakings. These include helping understand uncertainty and making the digital twins both more interactive and easy to use, as well as more accessible and dynamic. Pappenberger comments that the DestinE initiative's entire is helping with these activities either through producing and making resolution data for training or working hands-on on the large subset of AI activities.




Mariana Clare, a mathematician at ECMWF, is deploying machine learning advances to quantify the “uncertainties” that have always resided in the field of weather forecasting and climate analysis. “Weather is chaotic and this makes it inherently uncertain,” she quotes. “There are also additional uncertainties that come from the forecasting itself, for example, uncertainty in the starting point of the weather forecasts and from the model when you run a simulation. As you forecast further out into the future, this uncertainty and randomness become larger and therefore it is important that you capture it. If you are a policymaker, it’s important to both be aware of the likely scenarios, some more probable than others, and to be aware of potential worst-case scenarios and know how probable those are, too.”

In traditional non-AI enhanced weather


forecasting models, multiple situations have to be run at the same time. The starting point of these situations as well as the parameters of the model are changed to analyze the corresponding change in the weather. A weather forecaster’s role is then to understand these scenarios and predict what is most likely to occur, as well as analyzing the probability and the risk of the other scenarios. This human-intensive approach is replaced by algorithms which can take a forecast and introduce “noise” and “uncertainty” into the scenario in a fraction of the computing power that the traditional approach would have required.

Launched in 2022, Over €315m have been allocated to the Digital Europe programme. The completed first phase and the ongoing second phase have each received funding of over €150m. The third phase’s funding is yet to be decided. It will be determined by aims and goals of the final Digital Europe programme for 2025-2027, which is as of now in progress. Additionally, further funding has been provided by Horizon Europe for enhancing and innovating additional digital twin capabilities.


OUR PROJECTS

01  **Android Powered Distributed ML Training**

The diagram shows two workers, labeled 'WORKER 1' and 'WORKER 2', each with a vertical bar representing data. Arrows from both workers point to a central 'compute gradients' box. From there, an arrow points to a 'compute gradients' box, and another arrow points to a 'compute model' box. The background is a light gray with a faint grid.

02  **Automated Chart Analysis**

The background features a financial candlestick chart with various colored lines and markers, overlaid on a light gray background.

03  **TrutiShodhak**

The background shows a close-up of a keyboard with keys containing Hindi characters, set against a light gray background.

04  **IntelliTutor**

The background features a keyboard, a computer mouse, and a glowing blue 'AI' logo on a circuit board, all on a light gray background.

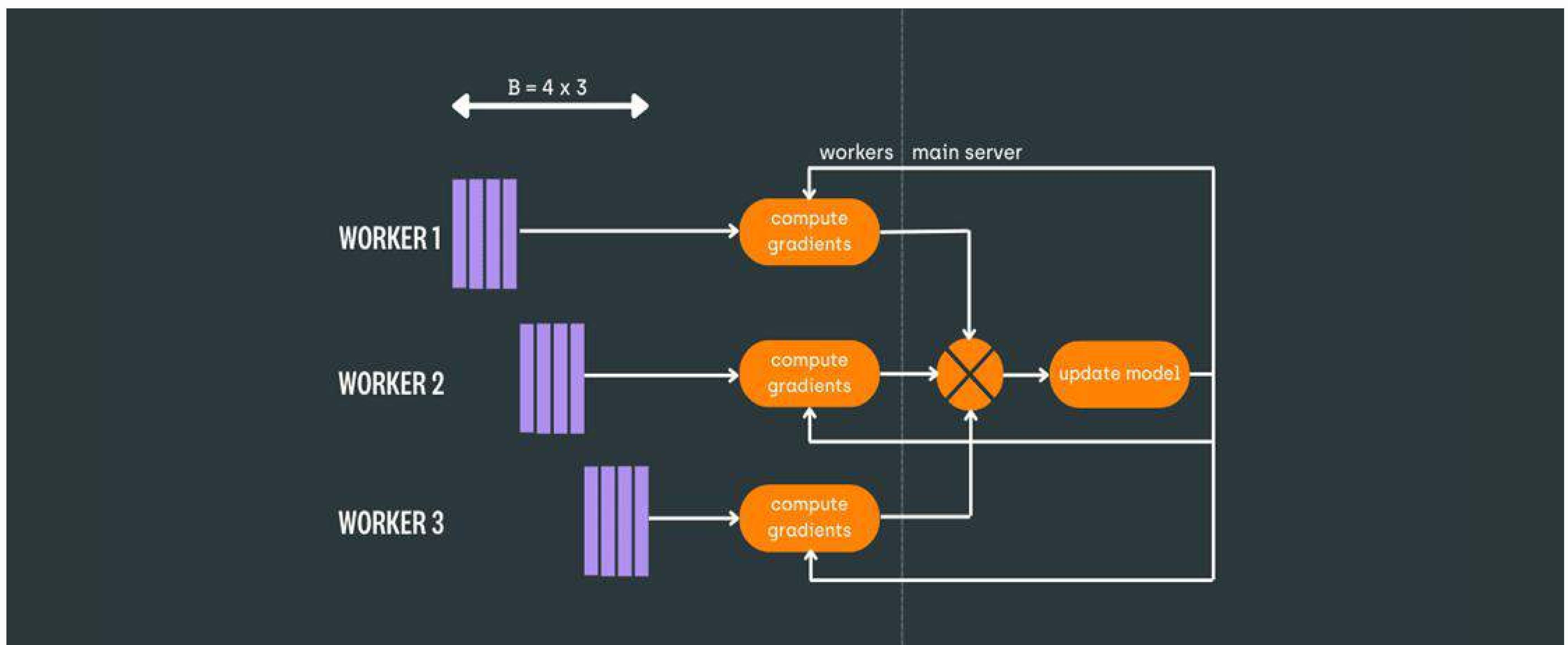
05  **Cryptanalysis**

The background shows a grid of numbers and letters, with a faint image of a person's face, all on a light gray background.

06  **Deterministic Finite Automata**

The background features a flowchart with nodes and arrows, labeled 'Sec. 3.2.1', 'Sec. 3.2.2', and 'Sec. 3.2.3', along with social media-style tags like '#keyboard', '#issue', and '#link', all on a light gray background.

Android Powered Distributed ML Training



The realm of artificial intelligence (AI) is on the cusp of a major transformation. Mobile devices, once relegated to basic tasks, are now evolving into potential powerhouses for on-device machine learning (ML). This research addresses the growing need for accessible and adaptable AI solutions by introducing a groundbreaking system for distributed ML training on Android devices. This system, leveraging the efficient MobileNet architecture, specifically focuses on image classification tasks, but its potential extends far beyond.

The core strength of this approach lies in its decentralized training strategy. Imagine a network of Android devices forming a collaborative community. They bypass the limitations of a central server by establishing a peer-to-peer (P2P) network using Wi-Fi Direct. Instead of a single server bearing the brunt of the training workload, these devices

become active participants. They share model weights - the essential building blocks for machine learning models - and train models collectively. This ingenious method distributes the training workload across multiple devices, significantly reducing the strain on any single smartphone. An added benefit is the minimization of data transmission. User privacy is paramount, and this approach ensures that sensitive data remains local on the devices themselves. Furthermore, by reducing data transfer, the system minimizes bandwidth usage, making it ideal for areas with limited connectivity.

By harnessing the collective processing power of individual Android devices, this system empowers a broader audience to access cutting-edge AI. It eliminates the need for expensive cloud platforms, which can be a significant barrier for many users. With this system, users gain the ability to train

models directly on their smartphones, fostering a new era of user-centric AI. Imagine a world where your smartphone can instantly analyze images you encounter in your daily life, identify objects with ease, or even translate languages on-the-go - all powered by a local, user-controlled AI model trained collaboratively with other devices in the network. This opens doors for a multitude of personalized and privacy-preserving mobile applications.

Privacy is another area where this research shines. The system prioritizes user data security by keeping sensitive data local throughout the training process. This decentralized approach stands in stark contrast to traditional cloud-based training, which often raises privacy concerns due to the inherent need to upload data to external servers. Here, data remains within the trusted confines of the user's device, mitigating privacy risks and fostering trust in AI technology.

The research meticulously explores the design, implementation, and testing of the system, all built upon the foundation of the MobileNet architecture. This architecture is known for its efficiency, making it well-suited for resource-constrained devices like smartphones. Looking towards the future, the researchers envision expanding the system's capabilities to encompass a broader range of ML models. This includes complex architectures like Generative Adversarial Networks (GANs) for creative content generation on mobile devices and speech recognition for natural language processing tasks. Additionally, they are exploring the integration of frameworks like PyTorch, which would offer greater flexibility in

model development and training, further enriching the system's potential.

In conclusion, this research on distributed mobile machine learning training represents a significant leap forward. By unlocking the latent potential of Android devices, it paves the way for a more accessible and user-centric approach to AI. The decentralized methodology offers a promising path towards revolutionizing AI accessibility, optimizing resource utilization across devices, and shaping the future of AI integration into our daily lives. This research holds immense promise for a future where AI becomes a ubiquitous and empowering tool, readily available for everyone to leverage and personalize their mobile experience, fostering a new era of intelligent and privacy-conscious applications.

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Tanmai Kamat

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Automated Chart Analysis



The realm of data analysis is often shrouded in mystery for those without a specialized background. Deciphering charts and graphs, the silent storytellers of data, can be a daunting task, hindering informed decision-making across various domains. This research unveils a groundbreaking approach that bridges this gap, leveraging the power of Large Language Models (LLMs) to usher in a new era of automated chart analysis and democratized data insights.

With this newfound understanding, the LLM then generates natural language descriptions, highlighting critical trends, patterns, and insights. This empowers users, regardless of their technical expertise, to grasp the essence of the data without wrestling with complex visualizations. Imagine a world where anyone can understand the financial performance of a company by simply looking at a bar chart, or glean insights into market trends from a line graph - all thanks to the insightful

explanations provided by the LLM.

But the story doesn't end there. The system offers an additional layer of interactivity. Users can zoom in on specific sections of the chart, prompting the LLM to provide targeted insights. This personalized approach caters to individual needs, allowing users to delve deeper into areas of particular interest. Perhaps you're an investor analyzing a company's quarterly earnings report. By focusing on the sales bar for a specific quarter, the LLM can provide a detailed breakdown of contributing factors, empowering you to make informed investment decisions.

To ensure the effectiveness of this LLM-powered analysis, the research team meticulously evaluated the performance of three distinct LLM models: MixtralMoE, Llama 7b, and Gemma. MixtralMoE, a keen observer, excels at identifying even subtle trends within the data. Llama 7b, the

storyteller, weaves a clear and concise narrative from raw data points, making complex information readily understandable. Gemma, the analyst, brings a robust statistical analysis edge, particularly valuable for charts teeming with numerical data.

The implications of this research extend far beyond user-friendly chart analysis. Integrating LLMs unlocks significant improvements in three key areas: accuracy, resilience, and flexibility. Additionally, these systems become more resilient, capable of handling a broader spectrum of chart types, data formats, and complexities. Finally, the integration of LLMs fosters flexibility, allowing the system to adapt to diverse analytical tasks and cater to a wider range of user needs. Imagine a system that can effortlessly analyze everything from simple bar charts to intricate network diagrams, all while tailoring its insights to the specific task at hand.

Looking ahead, the possibilities for further innovation are truly captivating. The research explores the potential for integrating this LLM-based approach with cutting-edge technologies like Augmented Reality (AR) and Natural Language Generation (NLG). AR integration could revolutionize data exploration by creating immersive and interactive experiences. Imagine "stepping into" the data, manipulating and interacting with visualizations in real-time to gain a deeper understanding. NLG integration, on the other hand, could transform how results are presented. The system could automatically generate clear and concise summaries and explanations in natural language, further enhancing the accessibility and readability

of data insights. This would truly democratize data analysis, making it a tool readily available to everyone, regardless of technical background.

In conclusion, this research sheds light on the challenges and opportunities of automated chart analysis. By leveraging the power of LLMs, it proposes a groundbreaking approach that aims to democratize access to data insights. This research paves the way for a future where data visualizations are no longer an exclusive domain, but rather accessible tools that empower a broader audience to make informed decisions and solve problems. This represents a significant leap forward, promising user-friendly data visualization tools that unlock the true potential of data for everyone. As we move forward, the possibilities for integrating LLMs with other cutting-edge technologies offer a glimpse into a future where data analysis becomes not just accessible, but truly engaging and insightful.

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TrutiShodhak



TrutiShodhak is an innovative project aimed at improving the accuracy and correctness of Hindi language usage through a sophisticated correction model. Developed as a React-based web application, it addresses the growing need for digital tools to enhance Hindi language skills in an increasingly connected world.

The project leverages a meticulously curated dataset sourced from Hindi Wordnet by IIT Bombay. This comprehensive dataset encompasses a wide range of Hindi linguistic components, including stopwords, nouns, pronouns, and various other grammatical elements. The richness of this dataset forms the backbone of TrutiShodhak's correction capabilities.

Key features of TrutiShodhak include: Real-time correction with instant feedback, Virtual Hindi keyboard integration for ease of input, Voice-to-text functionality for Hindi input, User-friendly interface with

document management features, Seamless integration with the computer's keyboard.

The system employs a two-pronged approach for error correction: Word-level correction and Sentence-level correction. For word-level correction, when a single word is entered, the system processes it through an API call to a model enriched by the Hindi Wordnet dataset. It uses cosine similarity to compare the input word with the dataset, calculates semantic proximity between the processed word and words in the dataset, and generates a list of suggestions for meaningful words, ordered by descending cosine similarity.

For sentence-level correction, it translates Hindi to English using the Translate package, applies grammar correction to the English text using the custom TrutishodhakLanguageTool Python library, identifies and rectifies various grammatical errors including syntax, punctuation, and contextual appropriateness, and then

translates the corrected English text back to Hindi.

The user interface, developed with React, offers a dynamic and responsive experience. It includes a text area for entering Hindi words or sentences, a virtual Hindi keyboard for seamless typing in Hindi, a 'Check' button to initiate the grammatical correctness analysis, a suggestion box to display grammatically accurate forms of input, and a field to enter document titles. The sidebar provides additional functionality: Toggle for the virtual keyboard, Document management features (create new, download, print) and Text editing tools (cut, copy, paste, select all).

The methodology combines several technological components: Machine translation using the Translate package, Grammar correction algorithms via TrutishodhakLanguageTool, React-based user interface development, Virtual keyboard integration, and Voice-to-text conversion for Hindi.

This multi-step approach allows TrutiShodhak to handle the linguistic nuances of the Hindi language effectively. The initial translation from Hindi to English serves as a foundational step, enabling standardized grammar correction. The subsequent retranslation to Hindi ensures that the final output maintains coherence and contextual integrity.

The integration of a virtual Hindi keyboard addresses the diverse needs of users, accommodating both those comfortable with standard keyboards and those who prefer a virtual Hindi input method. This inclusive feature significantly enhances the tool's

practicality and applicability across various user scenarios.

TrutiShodhak represents a significant leap forward in the field of language correction, particularly for Hindi. It offers a practical and accessible solution for users seeking to refine their Hindi language skills, from native speakers looking to polish their writing to learners aiming to improve their proficiency.

The accuracy of the tool heavily relies on the effectiveness of machine translation and grammar correction algorithms. Future developments should focus on refining these algorithms and exploring advanced natural language processing techniques to further enhance the system's performance.

In conclusion, TrutiShodhak demonstrates the potential of integrating various technologies to address linguistic challenges in non-English languages. As digital communication continues to evolve, tools like TrutiShodhak play a crucial role in preserving and promoting language accuracy, especially for languages that may have fewer digital resources compared to English. The project not only contributes to the field of natural language processing but also serves a practical purpose in enhancing written communication in Hindi across various domains, from education to professional settings.

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IntelliTutor: Revolutionizing Interview Preparation through AI-Powered Learning and Guidance



IntelliTutor is an innovative AI-powered tool designed to fill a significant gap in digital interview preparation. While there are many resources available for aptitude test preparation, the digital landscape lacks comprehensive interview preparation tools. It bridges this gap by providing aspiring professionals with personalized feedback, real-time progress tracking, and multimedia recommendations for ongoing development. The platform leverages advanced AI technology to deliver detailed performance feedback, helping users assess their readiness for interviews.

IntelliTutor benefits both individuals and organizations, offering tools for students to prepare for interviews and for companies to automate interview processes efficiently.

Traditional interview preparation methods often lack the sophistication needed to close this gap, with platforms missing essential features like individualized feedback and real-time progress tracking. IntelliTutor aims to transform interview preparation by offering a user-friendly platform that empowers candidates to confidently showcase their potential. The core of

IntelliTutor's functionality is a machine learning algorithm that analyzes recorded interviews, providing visual and audio feedback to help users improve. By using visualization, candidates can see their progress and identify areas needing improvement.

Some existing systems provide automated interview scheduling, while others focus on offering question banks tailored to specific sectors or positions. These platforms help candidates prepare for interviews by curating questions based on specific skills, experience levels, or job openings. AI systems evaluate responses and offer feedback on various factors, including body language, facial expressions, speech intelligibility, and response content.

IntelliTutor builds on these advancements by offering an end-to-end AI-based interview system. Students sign into their accounts, sit for mock interviews, and receive feedback on their performance. The system extracts audio and video from recorded interviews, analyzes them, and provides a score. Students receive suggestions for improvement and can track their progress through a dashboard. For companies, IntelliTutor offers tools to post job requirements, review resumes using a resume analyzer model, and schedule interviews. The system's model determines whether a candidate is a good fit for the position based on their interview performance. The FER2013 dataset, consisting of grayscale facial photos classified into seven emotions, is used as a benchmark for facial emotion identification in IntelliTutor. This dataset has proven essential for training and evaluating

machine learning models, enabling researchers to benchmark their algorithms. Although the dataset has limitations, such as a narrow range of emotions and potential data imbalances, it remains a valuable resource for developing facial expression detection systems.

IntelliTutor ensures thorough interview preparation, covering all aspects of the process and providing immediate feedback for prompt performance reviews and targeted improvements. Its intuitive interface makes it accessible to users with varying levels of technical proficiency. For companies, IntelliTutor streamlines interview processes, reduces administrative workload, and lowers costs through automation. The resume score tool enhances resume visibility and alignment with job requirements, and the response accuracy model provides precise feedback to improve preparation accuracy.

In conclusion, IntelliTutor is a comprehensive AI-powered interview preparation platform that addresses a critical gap in the digital preparation landscape. By providing personalized feedback, real-time progress tracking, and customized support, IntelliTutor empowers candidates to perform confidently in interviews and helps companies streamline their hiring processes. With its innovative approach and advanced technology, IntelliTutor is set to revolutionize the way candidates prepare for and interact with the hiring process.

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Cryptanalysis



In the field of secure communication and data protection, cryptography is essential for keeping sensitive information safe from unauthorized access and malicious actors. Over time, cryptographic methods have evolved from simple techniques like Caesar ciphers to advanced systems such as RSA (Rivest-Shamir-Adleman). However, as computing power has increased and new methods have emerged, the ongoing battle between those creating cryptographic methods and those trying to break them—known as cryptanalysts—has also evolved.

Cryptanalysis is the process of breaking cryptographic systems to decrypt data without the original key, exposing vulnerabilities in the encryption methods. The rise of deep learning, particularly neural networks, has introduced new possibilities for cryptanalysis. Neural networks, with their ability to identify complex patterns in large datasets, have shown potential in various fields, including natural language

processing and pattern recognition. This study explores the application of deep learning models to perform cryptanalysis on RSA-encrypted text.

RSA is one of the most widely used public key cryptosystems, relying on the difficulty of factoring large prime numbers to ensure security. This study aims to test the robustness of RSA against attacks using deep learning models. Specifically, the research examines the ability of different neural network architectures, including Deep Neural Networks (DNNs), Recurrent Neural Networks (RNNs), and Transformers, to decrypt RSA-encrypted text without knowledge of the private key. The performance of these models is evaluated based on their ability to decrypt text encrypted with RSA keys of varying sizes.

The dataset used in this study consists of transcripts from TED Talks, containing over 51,000 sentences. The text was tokenized

using the BERT tokenizer, and the RSA encryption keys (p and q) were generated using the Crypto library in Python. For each sentence, a new set of p and q values was used for encryption, with a fixed encryption key (e) of 65,537, which is commonly used in industry. The dataset was split into training, testing, and validation sets to ensure accurate assessment of the models.

The first model, DNN, employed a 14-layer architecture designed to capture nonlinear relationships between encrypted integers and their corresponding plaintext. Despite its deep architecture, the DNN struggled to effectively decrypt RSA-encoded messages, indicating limitations in its ability to capture the complex relationships in the encrypted data.

Next, a sequence-to-sequence (seq2seq) RNN was used, leveraging its ability to handle sequential data and capture contextual information. The RNN demonstrated improved performance over the DNN but still fell short of achieving high accuracy in decryption. The model was able to make correct predictions but with limited accuracy, showcasing its potential in handling sequential data and capturing essential dependencies.

The most promising results were obtained with the Transformer model, which utilizes self-attention mechanisms to process sequences. The Transformer model in this study was a modified version of the original architecture proposed by Vaswani et al., with adjustments made to reduce computational complexity. The Transformer outperformed the other models, achieving higher accuracy in decrypting RSA-encrypted text. It was able to capture the grammatical structure of

sentences effectively, although it sometimes struggled with identifying specific nouns accurately.

For example, when decrypting a sentence encrypted with a 16-bit RSA key, the Transformer model predicted "it's a little like your reputation" instead of the ground truth "it's a little like your genes." In another instance, the model predicted "snapshremicance increased isn't true" instead of "sami osmakac isn't alone." These results indicate that while the Transformer is adept at capturing the overall structure of sentences, it may require further fine-tuning to improve its precision in specific word choices.

In conclusion, this study demonstrates the potential of deep learning techniques, particularly Transformers, in cryptanalysis of RSA encryption. While DNNs showed limited effectiveness and RNNs displayed potential, the Transformer model emerged as the most capable, highlighting its ability to efficiently capture dependencies in encrypted data. Despite some limitations in precise noun identification, the Transformer's performance in decrypting RSA-encrypted text underscores its promise for future applications in cryptanalysis. This research opens the door to further exploration of deep learning models in enhancing cryptographic security and developing more resilient encryption methods.

IMPLEMENTED BY:

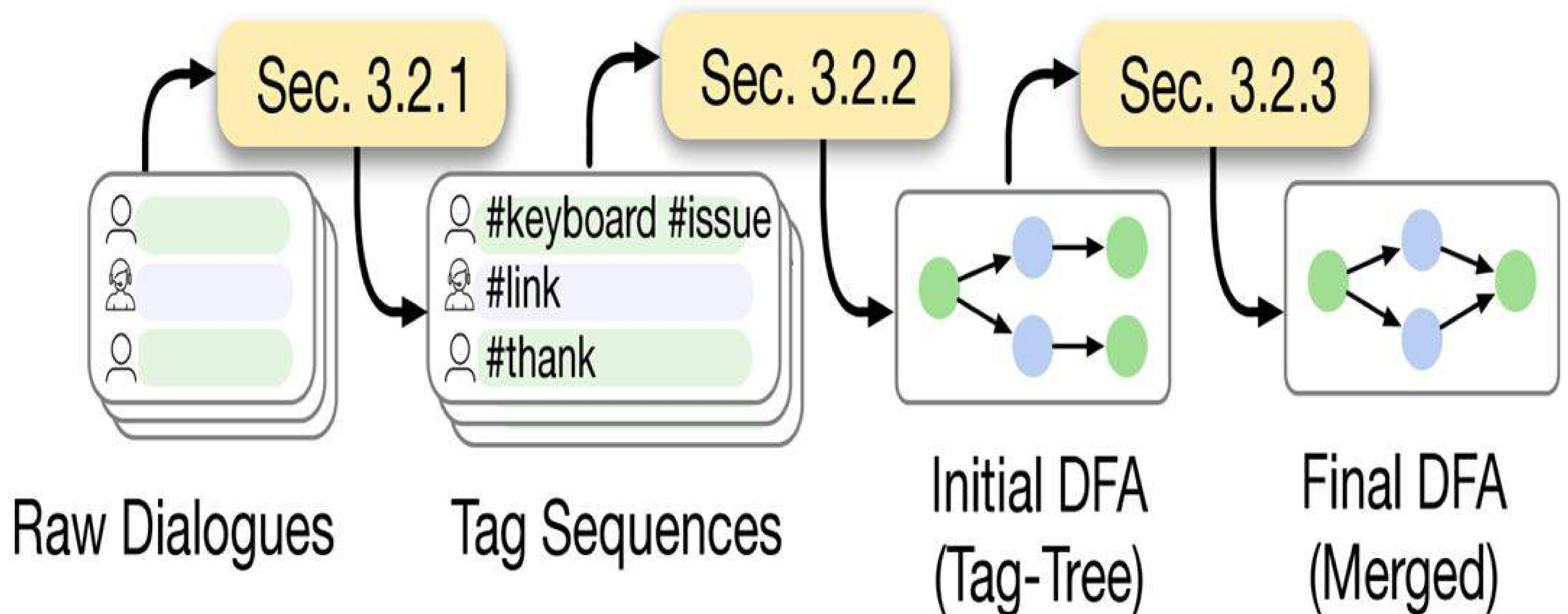
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Intelligent System To Convert Natural Language Queries to Deterministic Finite Automata



Automata theory is an essential part of computer science, focusing on abstract machines and how they process information. It's used in many areas, like text processing, creating compilers, and designing hardware systems. However, automata theory can be intimidating due to its abstract ideas and complex string manipulations. This project aims to make these concepts less daunting by offering a user-friendly system that turns natural language questions into DFAs. By using Natural Language Processing (NLP) and smart algorithms, the system can understand user questions, turn them into regular expressions, and then build DFAs. This process not only helps with grasping how DFAs work but also makes the underlying theory more accessible, helping students and professionals in fields like

network protocol analysis, bioinformatics, digital circuit design, and software verification.

Turning natural language queries into regular expressions (regex) has been explored with different models and techniques. For example, the CCG-based parsing model uses Combinatory Categorical Grammar to pair words with logical expressions, converting them into regex. The DeepRegex model is another example, using a sequence-to-sequence approach to predict regex from natural language with minimal domain knowledge. Models like SemRegex and SoftRegex tackle issues of semantic equivalence through syntax-based and deep learning methods. Datasets such as KB13, NL-RX-Synth, and NL-RX-Turk have been crucial

in training and testing these models, though achieving high accuracy and scalability remains challenging.

Converting regex to DFA involves two main methods: Thompson's Algorithm and the syntax tree approach. Thompson's Algorithm first creates a Non-deterministic Finite Automaton (NFA) from a regex, which is then turned into a DFA using the subset construction method. The syntax tree approach directly builds a DFA from a regex by navigating a syntax tree of the expression, skipping the NFA stage. Each method has its downsides, like the possible exponential growth in states with Thompson's Algorithm and the complexity of the syntax tree method. Advanced models like LLaMA and Gemini enhance natural language processing, boosting the accuracy and efficiency of systems that convert natural language queries into computational models.

This system combines NLP techniques to interpret and extract keywords from natural language questions, matching these keywords against predefined cases to create accurate regular expressions. These expressions are then transformed into DFAs using both the syntax tree approach and Thompson's Algorithm followed by subset construction. This dual method ensures the system is robust and efficient, handling different levels of regex complexity effectively.

The implementation process involves several steps: understanding the query, generating regex, and constructing the DFA. First, NLP techniques parse the natural language input to understand it. Next, the parsed input is turned into a regular expression using set rules and patterns. Finally, the system

applies the syntax tree approach and Thompson's Algorithm to create a deterministic finite automaton from the regex.

Testing the system with standard datasets showed that it accurately converts natural language queries to DFAs. The combination of the syntax tree approach and Thompson's Algorithm proved effective in managing complexities and ensuring the correctness of the DFAs—this user-friendly interface made interacting with the system easy, aiding in learning and applying automata theory.

In conclusion, the system developed in this project successfully translates natural language queries into deterministic finite automata. The system simplifies understanding and applying automata theory by using advanced NLP techniques and robust algorithms. Future improvements will focus on enhancing the system's scalability and extending its capabilities to more complex computational models.

IMPLEMENTED BY:

Dr. Abhijit Joshi

Yash Bijoor

Rushi Kantode

Om Chavan

OUR EVENTS

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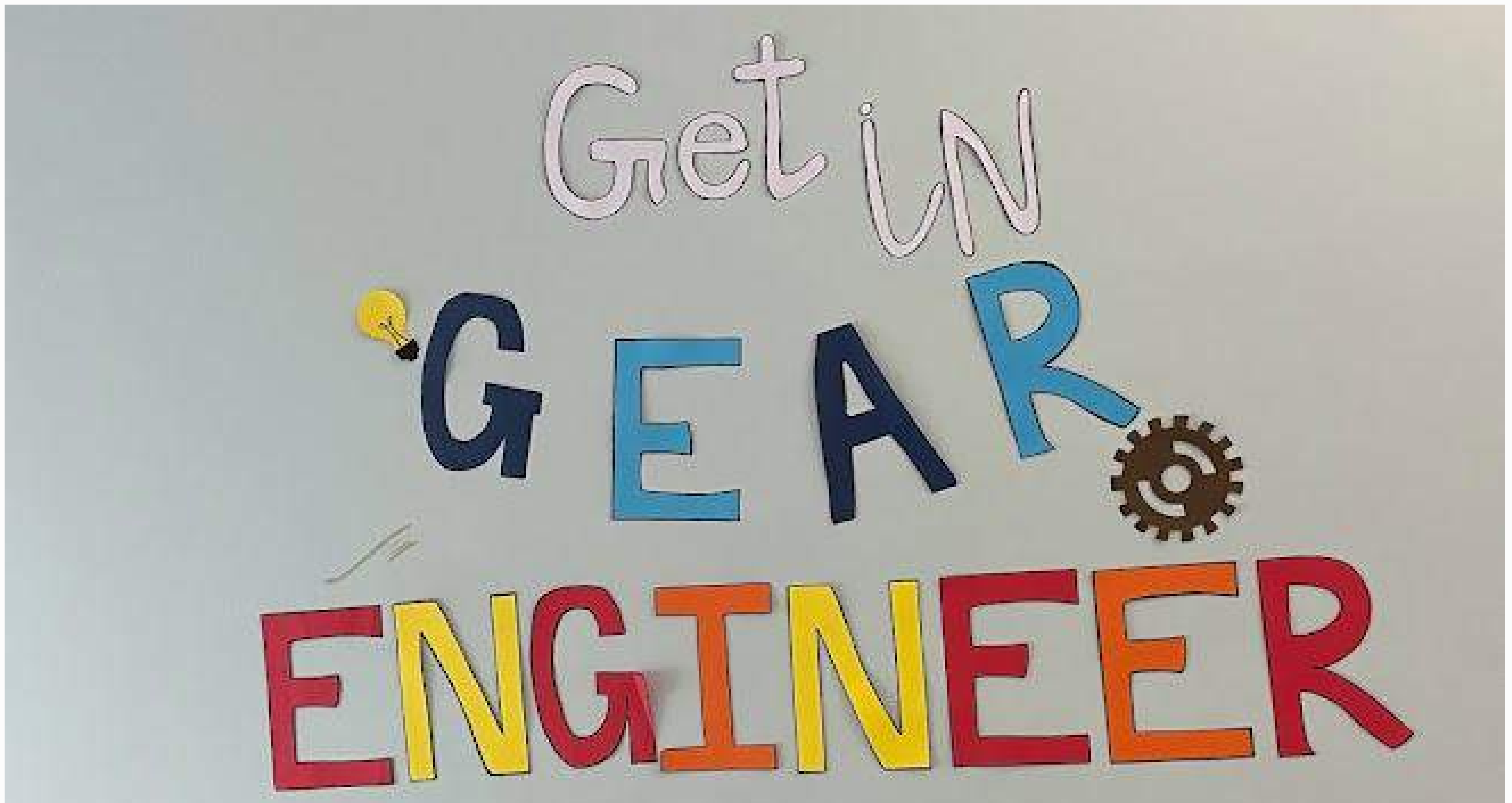
Industrial Visit

05

CodeShastra X

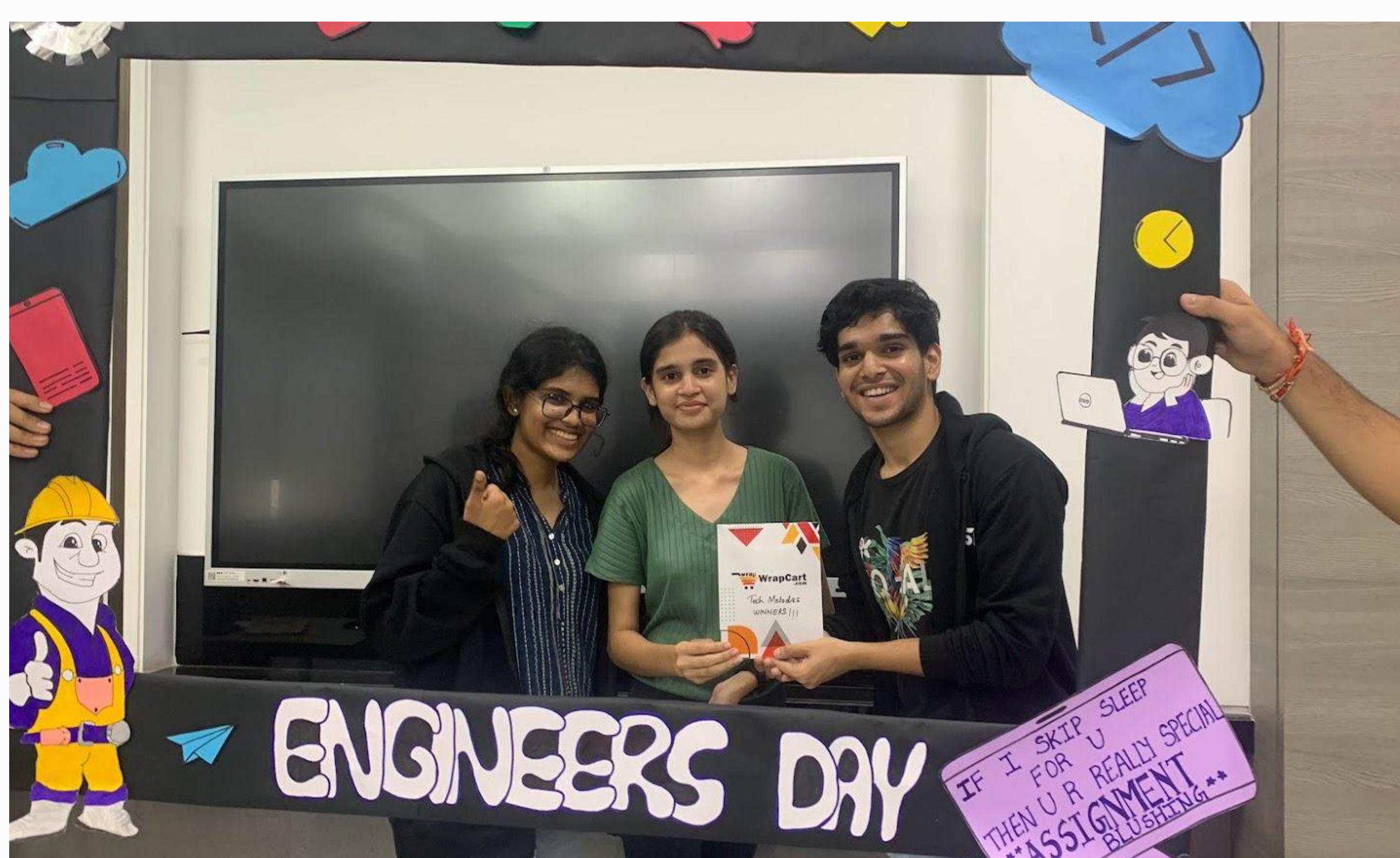
Engineer's Day 2023

15TH SEPTEMBER 2023



On September 15, 2023, the DJCSI Student Chapter held a lively Engineer's Day celebration, honoring the vital contributions of engineers around the world. The event took place from 2:30 PM to 5:00 PM in person and was open to IT students from all academic years. This inclusive event fostered interaction and collaboration among students from different generations. Carefully designed to mix technical skills with creativity, the event ensured that every

participant had a fun and memorable experience. The day began with an air of excitement and anticipation as students gathered for a series of engaging activities. The event aimed not only to honor the importance of engineering but also to offer students a platform to display their talents, build friendships, and inspire innovation. The celebration emphasized the crucial role engineers play in society, showcasing the creativity and enthusiasm of the next generation of engineers.



One of the most eagerly anticipated activities of the day was "Tech Melodies," a creative adaptation of the classic game of Musical Chairs. This innovative game introduced a fresh twist to the familiar dynamics, blending fun with technical skill.

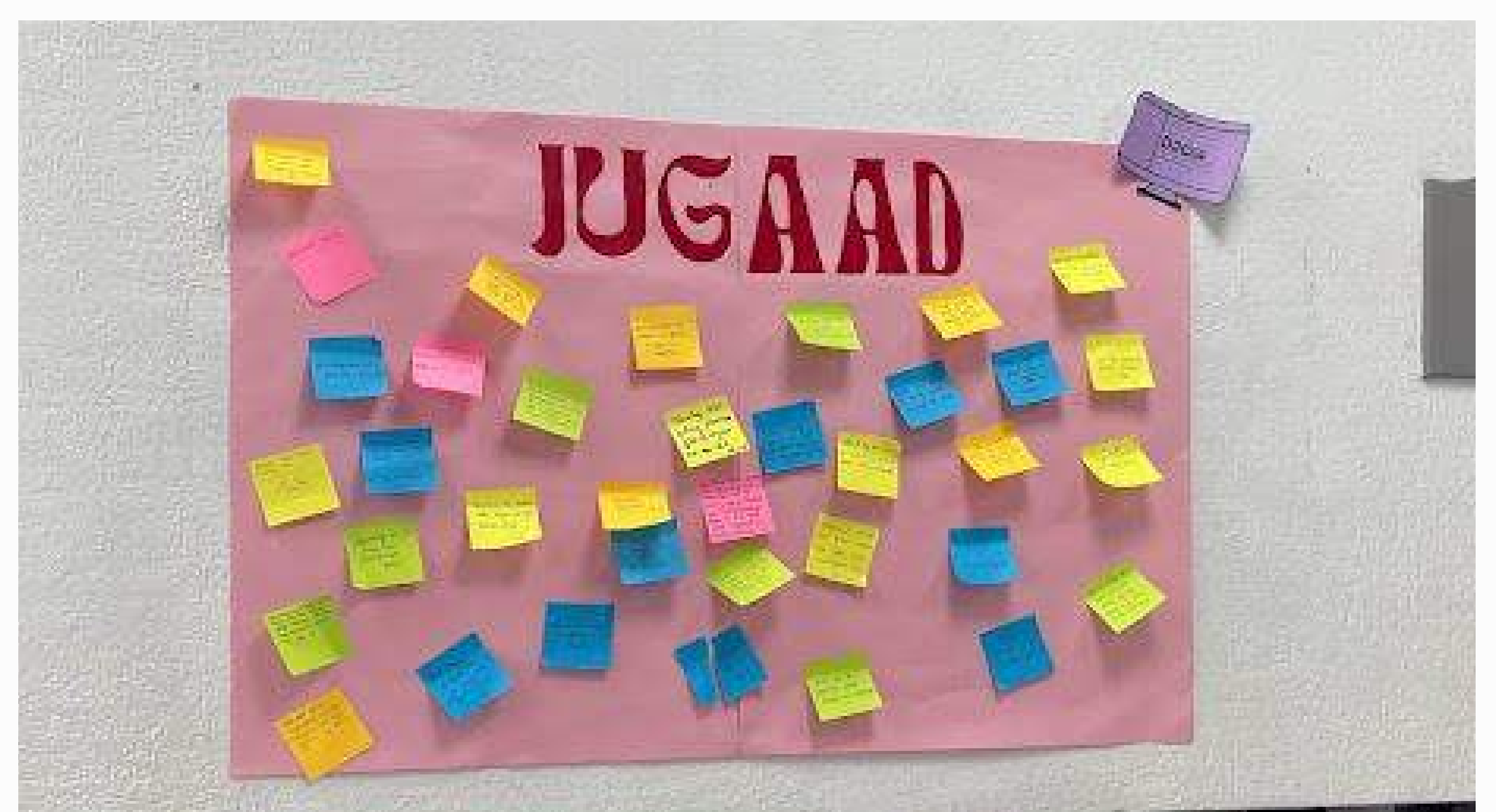


In Tech Melodies, participants faced the thrilling challenge of finding a specific word within a crossword puzzle each time the music stopped. With only 15 seconds to locate the word, the game added an element of suspense and urgency. The ultimate goal was to be the first to decipher all ten hidden words in the crossword, earning the coveted title of the ultimate champion. However, failing to find a word within the allotted time led to immediate elimination, heightening the competitive spirit among participants. The students' enthusiasm and energy were so high that organizers had to conduct three separate rounds to accommodate the large turnout. The winners of the Tech Melodies contest, Mili Shah, Devansh Raulo, and Mohammed Parkar, were awarded gift hampers from WrapCart, much to their delight and the applause of their peers.

Another captivating segment of the celebration was the Tech Quiz, an intellectually stimulating competition designed to test the participants' knowledge and quick thinking. The quiz featured two distinct rounds: a technical round and a non-technical round. The stakes were high as teams vied fiercely for a spot in the finals.

Two formidable teams, Half Byte and Algorizzm, emerged as the finalists, demonstrating exceptional skills and teamwork throughout the competition. Ultimately, it was Team Algorizzm that rose to the challenge, securing victory largely due to their outstanding performance in the non-technical round. The winning team, composed of Manan Desai, Soham Patil, Yash Asgaonkar, and Varad Girolla from the IT department, were awarded gift cards from WrapCart, adding a rewarding finish to their triumph.

The festive spirit of the day was further enhanced by a creatively designed photo booth, which quickly became a popular spot for students. This setup provided a fun backdrop for themed pictures, allowing students to pose with playful memes and relatable themes, capturing the joy and excitement of the celebration. The hashtag #JUGAAD gained traction among the students as they shared their personal life hacks and tricks to make daily life more interesting and manageable. This element of the event not only added an extra layer of enjoyment but also fostered a sense of community and shared experience among the participants.



Throughout the event, the DJCSI Student Chapter ensured that every activity was imbued with a sense of purpose and celebration. The organizers meticulously planned every detail to ensure a smooth flow of events, maintaining

experience that appealed to a wide range of interests and talents. By blending fun and learning, the event successfully created an atmosphere where students could showcase their abilities, connect with peers, and enjoy the day dedicated to celebrating the contributions and creativity of engineers. In conclusion, the Engineer's Day celebration organized by the organized by the DJCSI Student Chapter was a resounding success.



The event highlighted the importance of engineering, providing a platform for students to display their talents, forge new friendships, and inspire innovation. It underscored the crucial role engineers play in society, showcasing the creativity and enthusiasm of the future generation. This memorable day will be cherished by the IT department, serving as a beacon of inspiration for future engineers. The success of this event can be credited to the unwavering dedication and hard work of the organizing committee, who meticulously ensured every aspect of the celebration was flawlessly executed. Their efforts to create an inclusive and engaging environment were clearly reflected in the enthusiastic participation and positive feedback from the students. The DJCSI Student Chapter's commitment to fostering a sense of community and emphasizing the significance of engineering was evident throughout the celebration, making the Engineer's Day event

a truly remarkable occasion.

As the day drew to a close, participants departed with a profound sense of accomplishment and a renewed appreciation for the field of engineering. The event not only offered a chance for students to relax and enjoy themselves but also reinforced core values such as teamwork, innovation, and perseverance, which are integral to the engineering profession.

ServerSide Story

24TH SEPTEMBER 2023



DJCSI hosted its long-awaited event "ServerSide Story," which dived into the world of backend development. The purpose of this event was to give all students from any academic year an understanding of how sites and apps they use every day work by teaching them related technologies and frameworks.

The event covered three major backend frameworks—Node.js, MongoDB and Express.js—in detail. Led by Dr. Vinaya Sawant, our branch coordinator and Prof. Richa Sharma, our faculty incharge, the sessions featured invaluable insights from Mithil Bavishi, Priyanka Ramchandran, and Het Nakhua. These speakers, with their impressive track records and practical expertise, brought the subject matter to life, sharing real-world examples and case studies.

start off deeply on Node.js where emphasis was put on ports and servers. To ensure understanding and bridge the gap between theory and practice, the sessions incorporated practical components. Participants were guided through the process of setting up their servers. This wasn't merely a routine setup; they actively constructed a server from scratch, gaining priceless experience in establishing the foundation for a web application. This approach enabled



students to apply their learning in real-time, reinforcing concepts and igniting an enthusiasm for deeper exploration.

Participants then delved into Mongoose, a tool for linking projects to databases, and utilized Postman, a widely-used API client. It highlighted the essential role APIs play in facilitating communication between frontend and backend components of a web application.

To infuse some fun and competitiveness among attendees, interactive quizzes were strategically placed within different stages. At the end, Prince (Round 1 winner), Pranav Pawar (Round 2 Winner) and Lakshita Chellaramani, Nupur Rawal, Sean Rumao (Round 3 Winners) deservedly received various prizes for their outstanding.

The “ServerSide Story” event also stands out because of its diversity. All students regardless of academic year were invited to take part in the program so that an all-inclusive learning environment can be created. Such an initiative promoted teamwork among individuals with varying backgrounds and levels of skills and created an atmosphere of collaboration and support, where everyone had the opportunity to grow and learn together.



The success of the event can also be attributed to the fact that its organizers kept up with the latest trends and technologies in backend development. By concentrating on such widely-used frameworks like Node.js, MongoDB, and Express.js, participants could learn the most applicable and currently sought after within the industry. This furnished the students with the information required for their present studies while also prepared them for challenges and opportunities they may face as backend developers in the future.

Through an interactive, informative, and interesting interface, it not only enhanced students' understanding of backend development but also instilled interest in many towards becoming developers. This new knowledge base lays the foundation upon which learners can start their journeys into being tomorrow's creators capable of developing strong applications that run the digital space. We are left yearning for more by the victories achieved by the occasion because through them we know these scholars will mold our future technological world with inventive works while stretching limits on what can be done within the online sphere.

All in all, by providing a comprehensive learning experience that combined theory and practice, the event exposed students to backend development theory and hands-on skills that will enable them to succeed. For many years to come, this event's aftermath will be felt as these students forge ahead with their digital exploits and take over the world through web development innovation.

The Weekend

1ST - 2ND DECEMBER 2023



The official student chapter of the DJSC, in association with DJSC Codestars, conducted a two-day offline event titled “THE WEEKEND” at D. J. Sanghvi College of Engineering on 1st-2nd December. This event aimed to foster collaboration among several universities across Mumbai by offering team activities and competitions, open to technical and non-technical participants.

Day 1: 1st December 2023

Participants assembled in the seminar hall with excitement. The chief guests Dr. Hari Vasudevan, the Principal, and Dr. Vinaya Sawant, H.O.D (IT), started the seminar with a lamp-lighting ceremony and motivational remarks, encouraging students to participate actively to enhance their academic and social potential.

Code Bounty: A Programming Challenge

The coding competition, Code Bounty, conducted on the 6th floor, attracted many students due to its competitive nature. Participants, either individually or in teams, had two hours to solve six problems, which ranged in difficulty and required quick problem-solving. Points were awarded for each question solved correctly depending on how many test cases passed. The top ten teams advanced to a unique auction round. BOGAN BREAKERS emerged as winners, taking home Rs. 5000, while #INCLUDE and 3/4 BOILED RICE were runners-up, winning Rs. 3000 and Rs. 2000 respectively. These challenges were to test coding skills and encourage participants to step outside their comfort zones.



Caribbean Conquest: A Fun-Filled Non-Tech Adventure

To liven up the event, a non-tech game called Caribbean Conquest was introduced for players to relax from the rigorous coding tasks. The first round tested participants' knowledge of well-known films through quizzes. The second stage involved solving puzzles and drawing conclusions. Team Allu Arjun, consisting of Anish Shetty, Saniyaa Shetty, Vansh Mehta, and Yash Parikh, won goodies for their intelligence and teamwork.

Mini Games: Light-Hearted Fun For All

Mini-games like Ring Toss and Stack The Nuts were available in the 6th-floor lobby for those not participating in the main events. In Ring Toss players had to throw rings to knock down cups while in the other game, contestants used sticks to balance metal nuts one on top of another. This made it possible for students to enjoy themselves with their friends.

Day 2: 2nd December 2023

The Pixel Paranoia, a UI/UX design competition, kicked off the second day, providing competitors a chance to showcase their innovative approaches to

problem-solving.

Pixel Paranoia: The Creativity Challenge

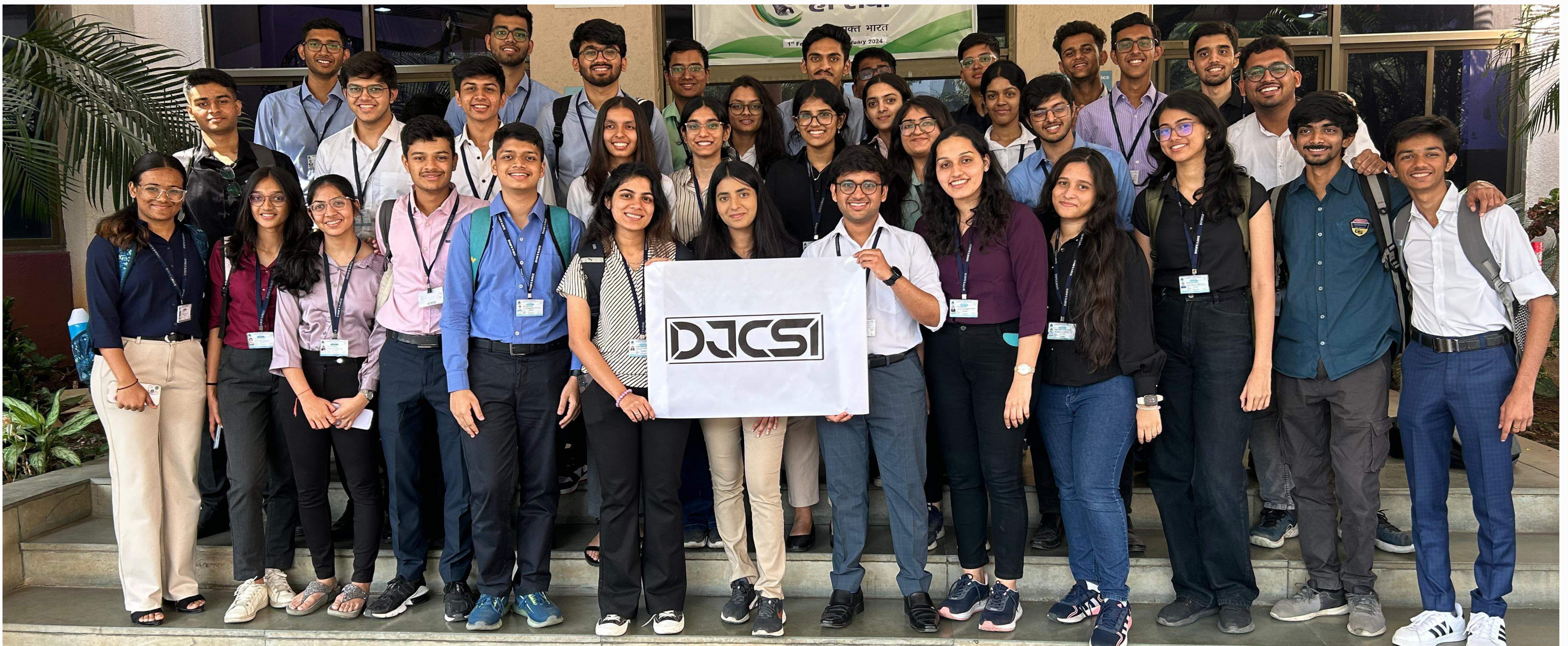
Participants received issue statements the previous evening for preparation. Challenges included remodeling the CoffeeChat app, the title sponsor, that would make it more visually appealing than the current one while another sponsor, Procreator gave out the task of creating an interactive map for quizzes to make scavenger hunt events lively. These and other real-world issues were among the few that set the stage for an interesting competition.

Mentors provided them with essential guidance throughout the creation procedure to help them refine their projects. Projects were assessed based on creativity, functionality, and aesthetics. The top eleven groups presented their work to a panel of judges and instructors in the final stage. After a thorough evaluation, TEAM.JPEG, WHITESPACE, and UI-AHOY-VENGERS emerged as the top three, and they were each given a cash prize of Rs. 12000, 8000, and 5000 for their outstanding achievement.



Industrial Visit 2024

15TH FEBRUARY 2024



DJCSI organized a meticulously planned and highly enriching industrial visit for its students to the prestigious C-DAC Kharghar campus on February 15, 2024. C-DAC, the Centre for Development of Advanced Computing, is a pioneering research and development organization under the Ministry of Electronics and Information Technology, Government of India, renowned for its groundbreaking contributions to advanced computing and its allied technologies. This visit was conceived with the primary goal of providing students with an invaluable opportunity to transcend the confines of theoretical knowledge and gain practical insights into the cutting-edge advancements shaping the ever-evolving landscape of advanced computing.

The journey commenced with an air of excitement and anticipation as students embarked on the trip to the esteemed C-DAC Kharghar campus. Upon arrival, they were warmly welcomed by a team of esteemed professionals and renowned researchers, setting the tone for a day filled with learning and inspiration. The itinerary commenced with an engaging interactive session, during which students engaged in stimulating discussions about the cutting-edge ongoing projects and



groundbreaking innovations being developed at C-DAC. This initial session served as an introduction to the vast array of technological advancements being pursued at the institution, fostering a sense of curiosity and eagerness among the students.

One of the most captivating aspects of the visit was the series of demonstrations showcasing the practical applications and far-reaching potential impact of the technologies being developed at C-DAC. These demonstrations spanned a variety of domains, including data analytics, artificial intelligence, high-performance computing, and cybersecurity. Each demonstration was meticulously designed



to not only reinforce the students' theoretical understanding but also to spark their curiosity about the boundless possibilities at the intersection of technology and innovation. For instance, the artificial intelligence segment featured advanced machine learning models capable of performing complex tasks with remarkable accuracy, while the cybersecurity demonstration highlighted

the latest techniques in safeguarding digital infrastructure against evolving threats.

As the visit progressed, students were given the opportunity to delve deeper into the intricacies of these technologies through hands-on experiences and interactive sessions. These sessions were led by C-DAC's seasoned researchers and professionals, who provided detailed explanations and real-world examples of how these technologies are applied in various industries. The students were particularly fascinated by the high-performance computing segment, where they witnessed the immense computational power and speed of supercomputers used for scientific research, weather forecasting, and complex simulations. This hands-on exposure not only solidified their theoretical knowledge but also provided a tangible sense of the transformative impact of these technologies.

As the visit concluded, students departed the C-DAC campus with a profound sense of appreciation for the pivotal role that advanced computing plays in shaping our collective future. The hands-on experiences, interactive sessions, and invaluable insights gained during this visit have undoubtedly ignited a renewed passion and unwavering motivation within the students to excel in their academic endeavors and contribute to the advancement of this dynamic field. They returned with a deeper understanding of the practical implications of their studies, inspired to push the boundaries of knowledge and innovation.

CodeShastra X

31ST - 1ST APRIL 2024



On March 30th and 31st, 2024, DJCSI, the official student chapter of the Dwarkadas Jivanlal Sanghvi College of Engineering, hosted the 10th edition of their flagship event, Codeshastra. This 24-hour hackathon has solidified its reputation as not only Mumbai's oldest but also one of its most illustrious tech gatherings. Drawing participants from across the country, Codeshastra X saw an overwhelming response with over 1600 registrations and more than 400 teams actively competing. The event showcased a vibrant tapestry of talent and innovation, attracting teams not just from Mumbai but also from Bangalore, Chandigarh, and Pune. This diverse participation not only enriched the competitive spirit but also fostered a unique atmosphere of collaboration and knowledge sharing. Emphasizing its milestone anniversary, this year's theme,

"Decade Alchemy," resonated deeply as it celebrated a decade of fostering creativity, pushing technological boundaries, and nurturing a community passionate about cutting-edge solutions. Codeshastra 2024 stood out not only for its scale and participation but also for its impact in inspiring the next generation of tech leaders and innovators.



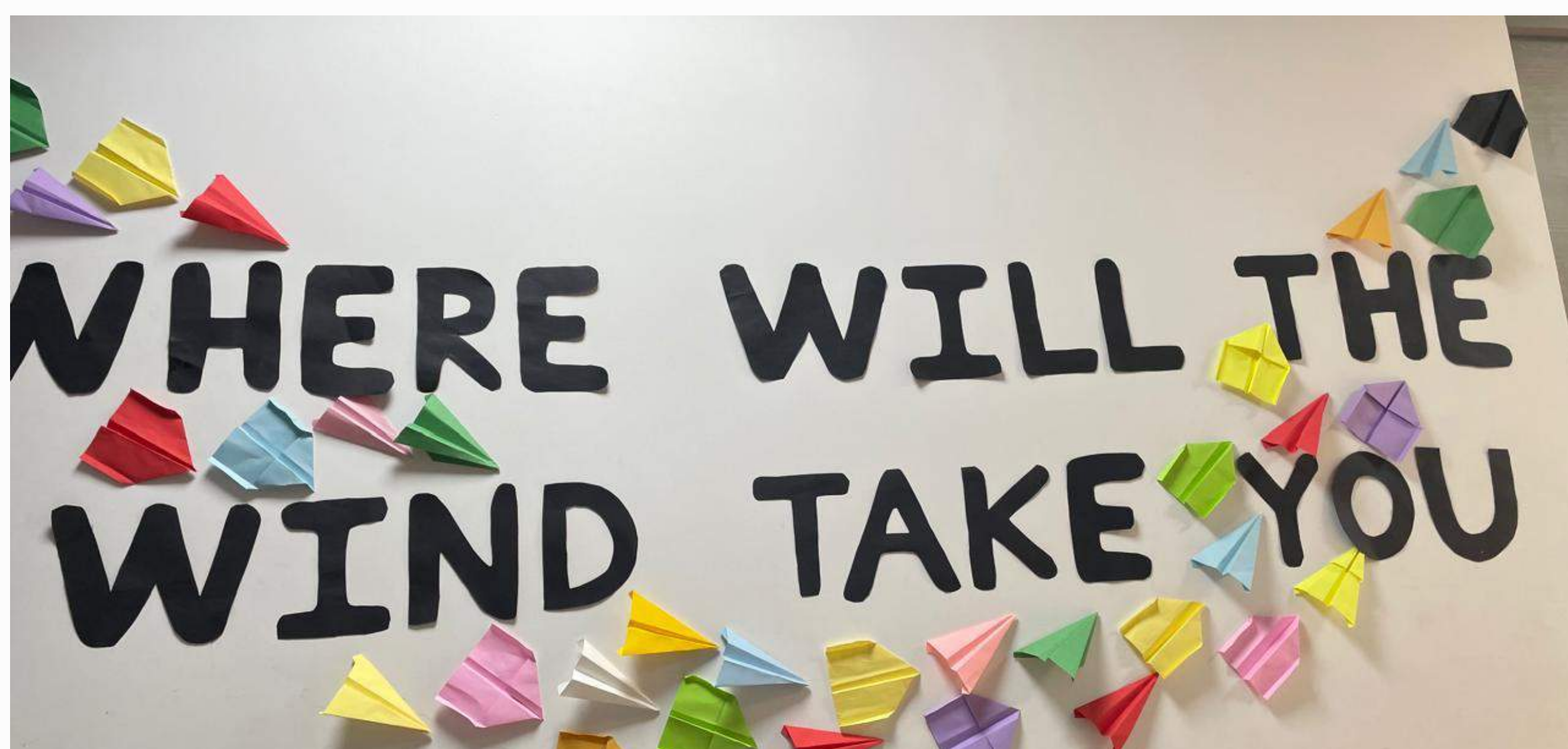
Day 01: Saturday, 30 March 2024

Preparations began early, with DJCSI committee members arriving at 06:30 am. Participants arrived at 07:30 am,

welcomed by event organizers and guided through a streamlined check-in process facilitated by a newly developed app. The inauguration ceremony started at 08:30 am in the Seminar Hall with speeches from dignitaries including Honourable Principal Dr. Hari Vasudevan sir and Branch Counsellor Dr. Vinaya Sawant ma'am, emphasizing the importance of hackathons in fostering innovation and collaboration. Following the speeches, rules and regulations were explained, and the event officially began at 09:45 am.

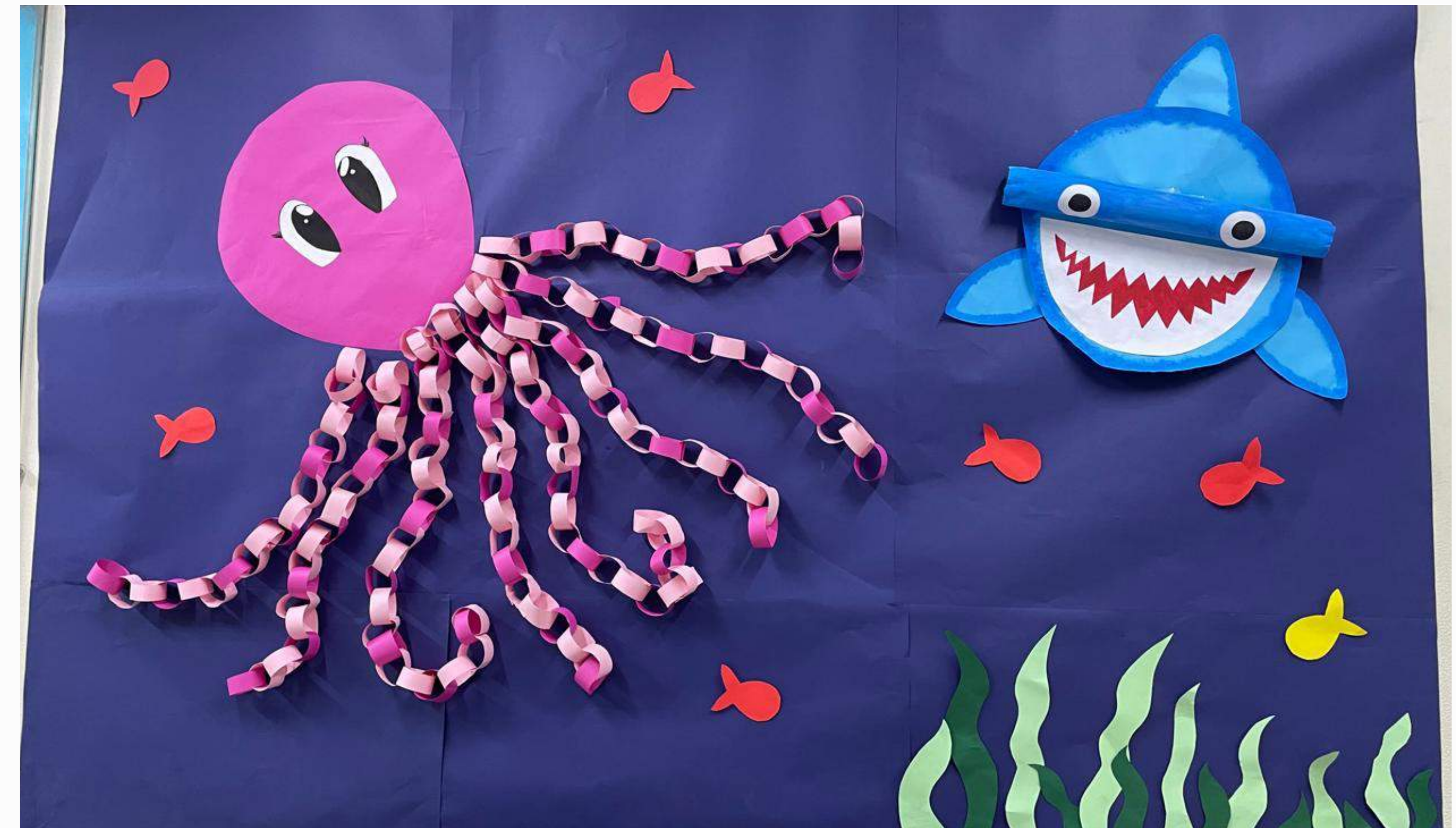
Participants tackled problem statements in domains like Artificial Intelligence and Machine Learning (AIML), Web/App Development, Open Innovation, and Blockchain.

Teams engaged in brainstorming sessions, discussing features, tech stacks, and timelines for their projects. A delicious lunch at 1:30 pm energized participants, followed by the first round of mentoring at 3:30 pm, where industry professionals provided valuable guidance. This session ended at 5:30 pm, and a tea break followed.



As teams worked diligently on their solutions, dinner was served at 9:00 pm. Participants had the option to rest on comfortable beds provided in classrooms. The second round of mentoring began at 11:00 pm, with final-year IT students

offering further advice to refine projects. This session concluded at 01:00 am, and participants received midnight snacks and energy drinks at 2:00 am to help them through the night.



Day 02: Sunday, 31 March 2024

Participants were served breakfast at 7:30 am to prepare for the final stages. Coding ended at 9:45 am, with teams making their final commits on GitHub and submitting projects on Devfolio. Judging began at 10:30 am, with teams presenting to a panel of domain specialists. The first round of judging concluded at 01:30 pm, announcing the top 12 teams who were treated to a special lunch.

Judging Round 2 commenced at 3:00 pm in the Seminar Hall. The top 12 teams pitched their projects to a distinguished panel of judges including Mr. Kunal Shah from Real Vision, Mr. Vijay Agarwal from Dextra Labs, Mr. Mahendra Bhoir from X38, Mr. Sagar Doshi from Dextra Labs, Mr. Shiv Bhonde from BuidlGuidl, Mr. Lekhraj Varshney from JP Morgan Chase and Co., and Mr. Atharva Wagh from App2Build. Projects were assessed on impact, feasibility, scalability, and implementation. After careful deliberation winners were announced during the closing ceremony.



CodeShastra X marked a decade of innovation, collaboration, and excellence with a memorable event that celebrated the best in tech creativity. The competition culminated in a grand prize distribution ceremony, where team Mango DB claimed first place, winning ₹1.5 lakhs, certificates, and round-trip tickets to Singapore. Team All Stackers secured second place with ₹1 lakh, while teams - <Block.sol/> and Enemies of Syntax jointly earned ₹50,000 for third place, each team also receiving certificates and Singapore tickets. Behind this success was meticulous planning and execution by various DJCSI departments.

The Chairperson and the Vice-Chairpersons seamlessly managed and co-ordinated the flow of the event while ensuring that the judges and mentor's needs were taken care of.

Secretaries secured permissions, ensuring regulatory compliance, while treasurers managed finances transparently, and keeping them up-to-date. Marketing efforts enabling an unprecedented price pool of ₹3 lakh, boosting the event's profile. The Technical team created the highly praised website for CodeShastra, drafted the problem statements and assisted with technical difficulties.

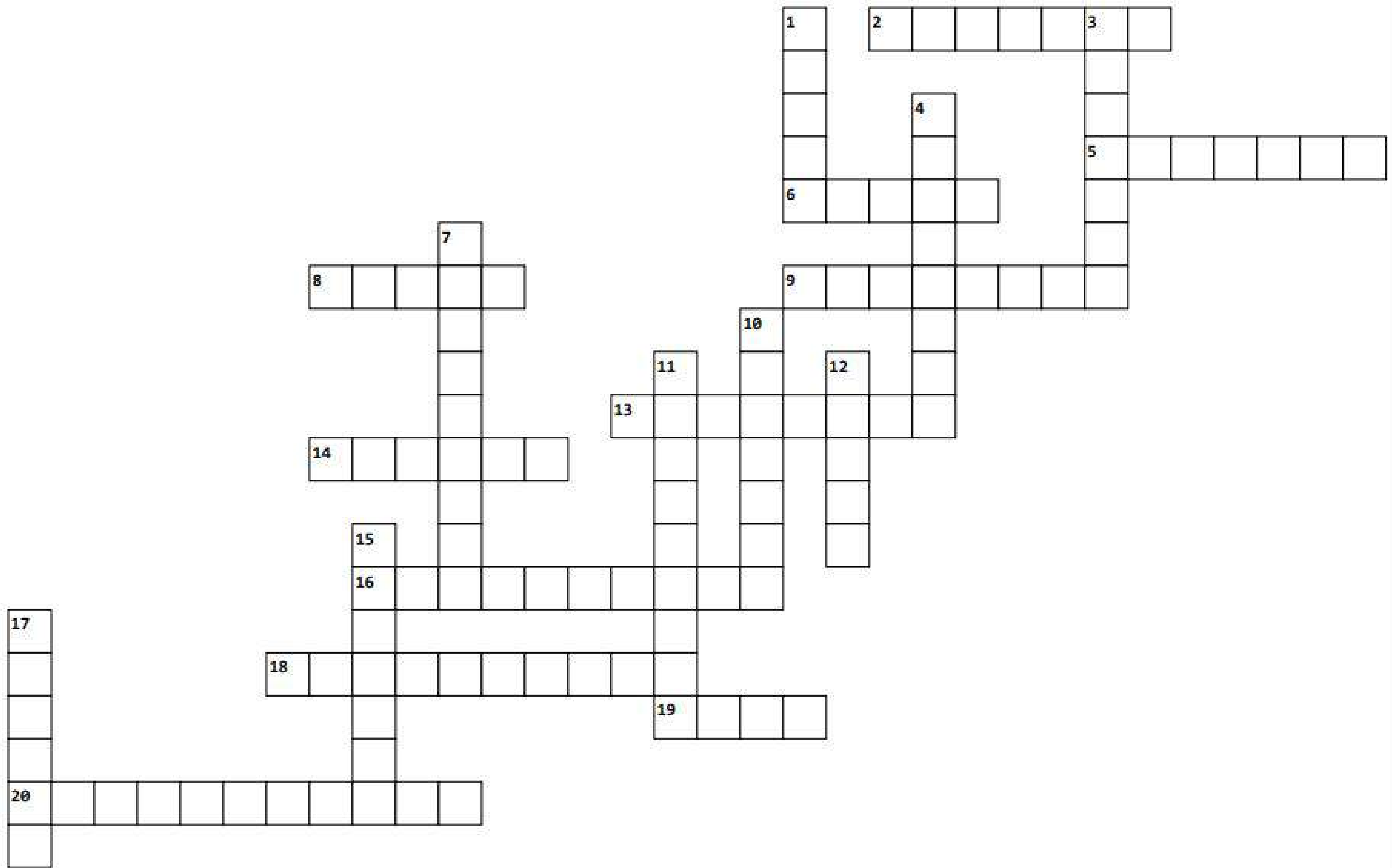
Creativity flourished with stunning venue designs from the creatives team, enhancing the event's festive atmosphere. The publicity team's strategic promotions maximized visibility, drawing participants and media coverage from Saamna, Navbharat Times, RKP News, and HindEkta Times.

The events team ensured smooth functioning of the event while the logistics team managed operations seamlessly. The editorial team crafted compelling content that resonated on social media, with real-time updates engaging a wide audience.

CodeShastra X's success underscores its impact within the tech community, setting high standards for future hackathons. It celebrated not just technical prowess but also DJCSI's collaborative spirit and organizational excellence, leaving a lasting legacy of innovation. The event's meticulous planning, dedication, and collective effort ensured it was a resounding success, embodying DJCSI's commitment to excellence and innovation in every aspect.



CROSSWORD 2024



ACROSS

- 2. Mean value
- 5. Pattern of parallel lines used for product identification
- 6. Musical drama or internet tool
- 8. Secure protocol for transferring data over the internet
- 9. Unit of digital information storage, approximately a trillion bytes
- 13. A water body storing raw digital data
- 14. Small keyboard, typically numeric
- 16. Job/work given to an individual
- 18. Symbol used to represent a space
- 19. Red gemstone; scripting language
- 20. The bottom of a ratio

DOWN

- 1. Early internet web portal and search engine; cry of joy
- 3. Undefined or random data in programming
- 4. Dispersion of a random variable's values
- 7. Language for advanced programming tasks
- 10. OpenAI's conversational agent
- 11. Input variable in a Java function
- 12. Popular Indian payment app
- 15. Mobile phone or its receiver
- 17. Anonymous function feature in Python

TECH QUIZ 2024

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BACKEND

PYTHON

PORT

RUST

CYBERSECURITY

LINUX

NVIDIA

GRAPHICS

DEVOPS

CLOUD

FRAMEWORK

JAVASCRIPT

APPLE

COMPUTER

NETWORK

PROCESS

FLASK

SOLUTION

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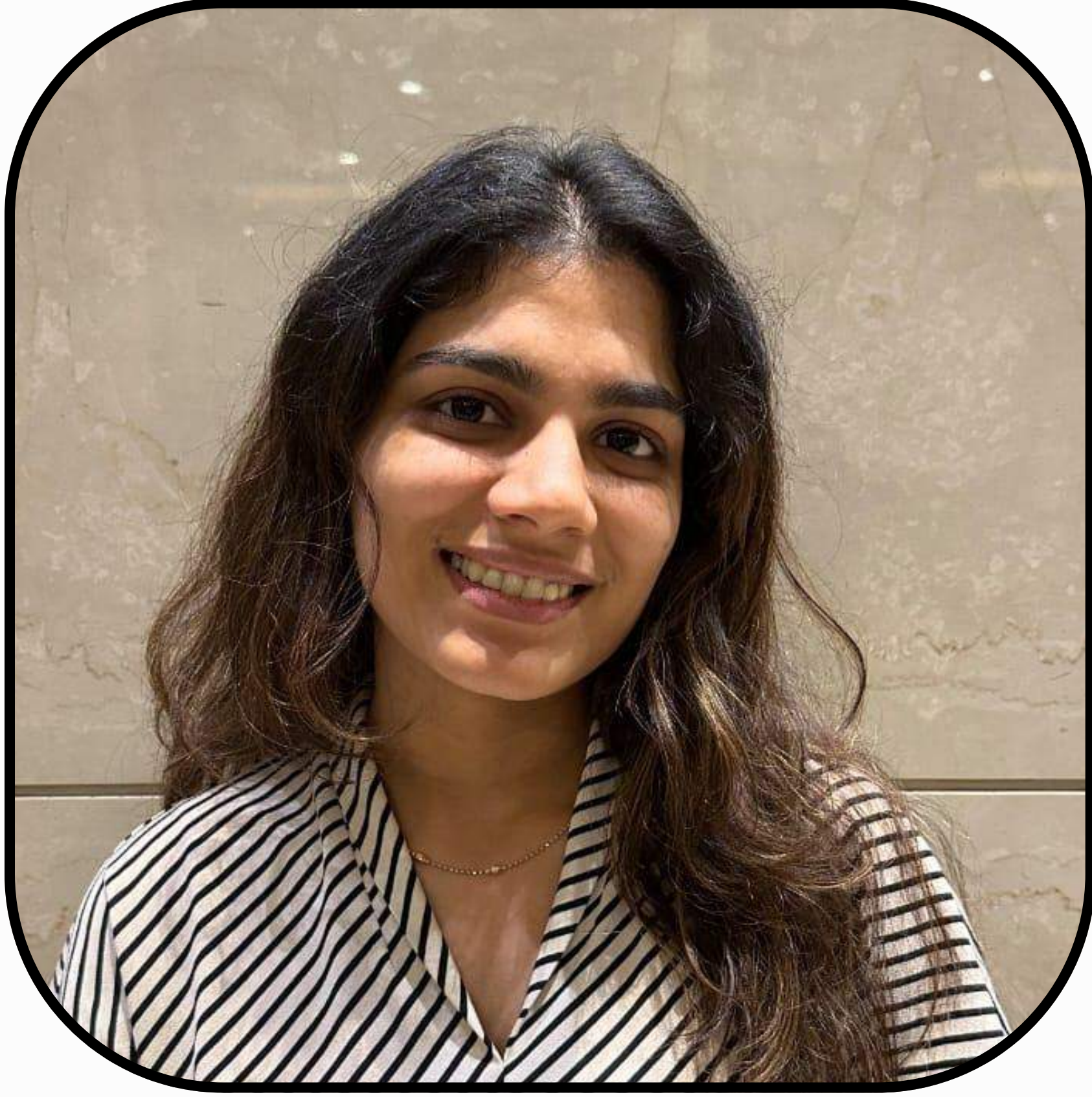
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