B.S. Abdur Rahman Crescent Institute of Science & Technology
Deemed to be University u/s 3 of the UGC Act, 1956

SIT
Society of Information Technologists

SOCIETY OF INFORMATION TECHNOLOGISTS

DEPARTMENT OF IT MAGAZINE

Eternity CHRONICLES

TABLE CONTENTS

ABOUT THE DEPARTMENT

The department was started in 1999 and has been offering B.Tech.-Information Technology since 1999, M.Tech.-Information Technology since 2010 and Ph.D since 2009. It has highly qualified, experienced and dedicated faculty members specialized in various areas like Artificial Intelligence, Deep Learning, Machine Learning, IoT, IIoT, Data Science, Cyber Security, Cloud Computing, Mobile Computing & Networks, Computer Networks, Ad hoc Networks and Software Engineering.

The faculty members contribute their very best to the academic environment by publishing research papers in National and International Journals.The department imparts comprehensive knowledge coupled with practical exposure, which is essential for software design, development and testing in the IT industry.

To expose latest trends to the students, value-added courses, MOOC, in-house seminars, workshops, industrial visits are conducted periodically. A National level symposium 'ICON' is organized every year by the department's professional society, "Society of Information Technologists (SIT)" to enhance the technical skills of the students.

VISSION AND MISSION OF THE DEPARTMENT

The Vision of the IT department

To be a leader in providing quality education and training in the field of Information Technology at Undergraduate and Postgraduate levels and undertake Research activities thereby contributing to the progress of the country

The Mission of the IT department

- To impart quality education and inculcate professionalism to suit the needs of the industries and society.
- To involve graduates in undertaking need based Research activities and disseminate the knowledge to develop entrepreneurial skills.
- To improve the professionalism through extension activities, industrial visits and in-plant training.
- To improve communicate effectively both in documentation and presentation.
- To create awareness of social, economic responsibilities ethically.

PROGRAMME EDUCATIONAL OBJECTIVES

Programme Educational Objectives for students of B.Tech – Information Technology Programme within the first few years after graduation are that they will

• Have core competence in mathematics, science and engineering concepts essential to formulate, analyze and solve hardware / software engineering problems

• Possess good breadth of knowledge in the core areas of information technology and related engineering so as to comprehend engineering trade-offs, analyze, design and synthesize data and technical concepts to create novel products and solutions for the real time problems

• Use tools and techniques for software development in different application domains and to grow as an entrepreneur.

• Apply their knowledge and multifaceted skills to get immediate employment and excel in it professional careers or awareness of the lifelong learning needed to continue their education in it or related post graduate programmes to perform excellence, leadership and demonstrate good citizenship.

• Maintain high professionalism and ethical standards, effective oral and written communication skills, to work as part of teams on multidisciplinary projects and diverse professional environments, and relate engineering issues to the society, global economy and to emerging technologies.

PROGRAMME OUTCOMES

On successful completion of the programme, the graduates will be able to:

• Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

• Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

• Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

• Use research based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of the information to provide valid conclusions.

• Create, select, and apply appropriate techniques, resources, and modern engineering and it tools including prediction and modelling to complex engineering activities with an understanding of the limitations

PROGRAMME OUTCOMES

• Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice

• Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

• Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

• Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

• Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

• Demonstrate knowledge and understanding of the engineering and management principles and apply these to one‘s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

• Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES

- Design and conduct experiments for organizing, analysing, interpreting data to develop skills related to information retrieval.

- Identify, formulate and solve computing problems using appropriate tools & techniques to meet industrial and societal needs in different domains

MESSAGE FROM HOD / IT

Dr. N. Prakash
HOD / IT

It is a great privilege and immense honor to inform you that the Department of Information Technology is publishing its annual technical magazine “ITernity Chronicles - 2025”. It is reflection of student’s hidden talents, skills and caliber. This magazine certainly would induce the young engineers to promote their creativity in approaching things differently. This technical magazine is a platform to exhibit the literary skills and innovative ideas of students.

I would like to thank all editorial team members for providing students a platform for creative thoughts and knowledge expansion. I express my considerable appreciation to all the authors of the articles in this magazine. I express my gratitude to all for their involvement, encouragement, support and guidance.

DEPARTMENT FACULTIES

Dr. N.Prakash
Professor & Head

Dr. Latha Tamilselvan
Professor & Director (MIS)

Dr. I.Sathik Ali
Professor

Dr. G.Kavitha
Professor & Director in charge, CITL

Dr. Kabeer M
Associate Professor

Dr. P. Latchoumy
Associate Professor

DEPARTMENT FACULTIES

Dr. N. Rajendran
Associate Professor

Dr. Nabeena Ameen
Assistant Professor (Sel. Gr.)

Dr. P. Gnanasekaran
Assistant Professor (Sel. Gr.)

Dr. A.Sonya
Assistant Professor (Sr. Gr.)

Dr. Mohammed Wajid Khan
Assistant Professor

Mrs. S. Muthahara Fathima
Assistant Professor

DEPARTMENT FACULTIES

Mrs. R. Ramya
Assistant Professor

Mrs. Pavithra R
Assistant Professor

Dr. K. Nallarasu
Assistant Professor

Ms. K. Sangeetha
Assistant Professor

Ms. Sakthi P
Assistant Professor

SOCIETY OF INFORMATION TECHNOLOGISTS MEMBERS

Mr. Mohamed Basha S
General Secretary

Ms. Aafreen Marzuqa A
Joint Secretary

Mr. Mohamed Faizal S H
Joint Secretary

Ms. Rakshana T
Treasurer

SIT
Society of Information Technologists

EVENTS ORGANISED

WORKSHOP - “Developing a website using HTML, CSS and JS” on 27th August 2024

The Department of Information Technology organized a hands-on workshop on “DEVELOPING A WEBSITE USING HTML, CSS AND JS” on 27th August 2024 from 1.45 pm to 4.00 pm for the benefit of 2nd year B. Tech IT students. The Resource Person of the workshop is Mrs. K. Kalaivani, Technical Trainer, LIVEWIRE, TAMBARAM, Chennai. A total of 62 students have attended the workshop. This hands-on workshop guided the students through the process of developing interactive websites using HTML, CSS, and JavaScript, supported by Visual Studio Code.

EVENTS ORGANISED

TECHFUSION EXPO - A National level project Expo on 30 january 2025

Proudly organized by the Department of Information Technology at B. S. Abdur Rahman Crescent Institute of Science and Technology, **TechFusion'25 is a platform for students to showcase their innovative technical projects. This expo brings together the brightest minds to demonstrate their work in various fields of engineering.** Students from engineering branches, such as **IT, CSE, Cybersecurity, AI & DS, IoT, EEE, ECE, and E&I, are invited to participate!**

EVENTS ORGANISED

This is your opportunity to display your technical expertise and creativity. Whether you're passionate about Artificial Intelligence, Cybersecurity, or Software Development, this event provides a dynamic stage to present your work, exchange ideas, and inspire one another.

The event is not just about showcasing projects; it is about fostering collaboration, innovation, and the spirit of technological advancement. At this expo, students will have the chance to receive valuable feedback, gain insights into emerging trends, and explore career opportunities in the tech industry.

EVENTS ORGANISED

DEPARTMENT OF INFORMATION TECHNOLOGY

SILVER JUBILEE CELEBRATIONS

August 10th, 2024, marked a significant milestone as the Department of Information Technology, School of Computer, Information, and Mathematical Sciences at B. S. Abdur Rahman Crescent Institute of Science and Technology, celebrated its Silver Jubilee. The event was a grand occasion, filled with memories, reflections, and a sense of pride as the department commemorated 25 years of academic excellence, innovation, and growth.

EVENTS ORGANISED

The celebration began with a warm welcome address by Dr. N. Prakash, the Head of the Department, setting the tone for the day's proceedings. Our Vice Chancellor Dr. T. Murugesan, Registrar Dr. N. Raja Hussain, Advisor Alhaj V.N.A Jalal, Advisor Dr. P. S. Syed Masood Jamali, and Professor & Director MIS Dr. Latha Tamilselvan, graced the occasion with their presence and delivered heartfelt felicitation addresses, acknowledging the department's journey. The event was also attended by the faculty members and current students of the IT department, adding to the sense of accomplishment.

EVENTS ORGANISED

As a token of appreciation, mementos were presented to all attendees, including alumni who had returned to their alma mater to celebrate this special occasion. The alumni, representing various batches, shared nostalgic memories, reconnecting with old friends and teachers. The atmosphere was filled with joy and camaraderie as they reminisced about their time in the department.

EVENTS ORGANISED

The 25th-anniversary celebration was not just a reflection on the department's past achievements but also a celebration of the enduring bonds between its members. Alumni reconnected with their peers and mentors, and new memories were made, ensuring the day ended on a high note, filled with happiness and hope for the future.

EVENTS ORGANISED

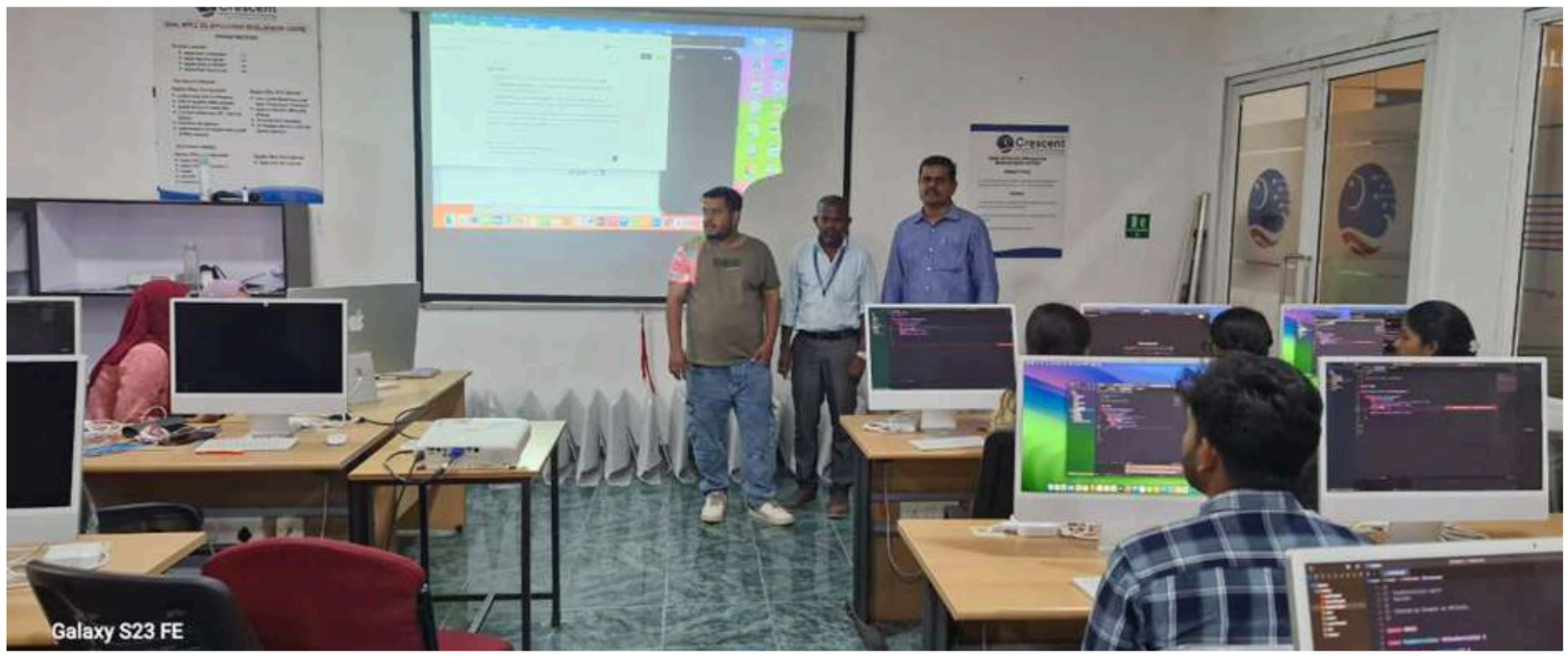
Guest Lecture - Applications of Data Structures

Guest lecture on “Applications on Data Structure” organized by Department of information technology, B.S.Adbur Rahman Crescent Institute of science and Technology, Chennai on 03.10.2024. The event took place in IT LAB 3 and was attended by students and faculty members of the department. The guest lecture aimed to provide students with an in-depth understanding of advanced data structures and their practical applications in the field of computer science and technology.

EVENTS ORGANISED

ONE DAY WORKSHOP ON SWIFT PROGRAMMING

The one day workshop on Swift Programming was held on 09-11-2024 (Saturday) by the Department of Information Technology in association with BSAU Apple iOS Application Development Centre. The conveners of the workshop were Dr. Dr. Sharmila Sankar. Dean, School of Computer Information and Mathematical Sciences, and Dr. N. Prakash, Head of the Department, Information Technology. Further, the workshop was coordinated by Dr. N. Rajendran, Associate Professor, Information Technology, and Dr. K. Nallarasu, Assistant Professor / Information Technology. As an expert in Swift language, Mr. V. Mohammed Hussain, Member Technical Staff of Zoho Corporation Pvt. Ltd was invited to be the resource person. The aim of the workshop was to give hands on experience in Swift language for Vth semester Information Technology students those opted Swift Programming (ITDX 06) as their Professional Elective Core (PEC) subject.



EVENTS ORGANISED

Twenty Three students were eagerly waiting for the session to start at the high-end BSAU Apple iOS Application Development Centre. By 09.30 AM, the workshop started with welcoming address by Dr. N. Rajendran. He extended warm welcome to both the resource person and participants. In his welcome address he formerly introduced the resource person, and briefly pointed out his milestones in arriving at the current position. Then the resource person started his valuable session by interacting with the students regarding class, object, method, and variable. To make the students actively participating in the session, he randomly picked students one by one to implement Pair Programming concept. While he dictated the codes of Swift concepts, the student he picked entered them into the system. This approach motivated the students largely to focus on his lecture and hands on demonstrations. The resource person ushered the students into the core topics like Concurrency, Xcode, Playground, Memory management of Swift Programming.

TECHNICAL ARTICLE

THREE-LEVEL SECURITY FOR DECENTRALIZED STORAGE SYSTEM USING BLOCKCHAIN

Technology has been a cornerstone of human civilization, evolving from primitive tools to sophisticated artificial intelligence systems. Over the centuries, advancements in technology have not only simplified daily tasks but also reshaped industries, economies, and lifestyles. The rapid pace of technological innovation has transformed the way people communicate, work, and interact with the world around them. From the industrial revolution to the digital age, every phase of technological development has brought about significant changes, both beneficial and challenging.

One of the most profound impacts of technology is seen in data security. Traditional centralized storage systems face challenges such as single points of failure, security vulnerabilities, and performance bottlenecks. To address these issues, blockchain-based decentralized storage systems have emerged as a promising alternative. By integrating blockchain technology with encryption mechanisms, decentralized storage ensures data integrity, security, and transparency.

The proposed three-level security architecture consists of three primary roles: User, who authenticates, uploads, and downloads files securely; Authority (Auditor), who oversees file access, approves or rejects file actions, and monitors data integrity; and Server, which handles authentication, file encryption and decryption, and metadata management. To ensure robust security, the system integrates AES-256 encryption for file security. The security module manages encryption keys, while a blockchain ledger logs immutable actions, ensuring tamper-proof activity records and transparency. The database stores encrypted files and metadata, while logs and transactions are continuously verified. By combining encryption, blockchain transparency, and a hierarchical security model, this system mitigates unauthorized access, enhances data integrity, and provides a trust-based framework for decentralized cloud storage.

The workplace has also undergone dramatic transformations due to technology. In the realm of secure data storage, blockchain technology has introduced a new paradigm. Automation and decentralized encryption mechanisms have increased efficiency in file management, reducing reliance on traditional centralized systems while ensuring data security. Remote access has become a viable option, allowing users to securely store and retrieve files from anywhere with an internet connection. This flexibility has improved data security while eliminating traditional risks such as unauthorized access and data breaches.

Education has been another sector profoundly impacted by secure technology. Blockchain-integrated storage systems ensure tamper-proof academic records, providing institutions with a transparent and immutable means of record-keeping. However, challenges such as the adoption of blockchain in large-scale educational systems and interoperability with existing frameworks must be addressed to maximize the benefits of this innovation.

Healthcare has also seen remarkable advancements with the integration of blockchain and encryption technologies. Secure file storage using AES-256 encryption, combined with blockchain transparency, ensures that medical records remain confidential and immutable. Telemedicine platforms leverage this security model to enhance patient data security, ensuring that sensitive information is accessible only to authorized personnel. Nevertheless, ethical concerns regarding data privacy, regulatory compliance, and the affordability of blockchain-based healthcare solutions must be addressed.

Despite the many advantages of technological progress, there are challenges that society must navigate. Cybersecurity threats, regulatory concerns, and ethical dilemmas surrounding blockchain-based systems require careful governance and responsible innovation. Governments, businesses, and individuals must collaborate to harness the benefits of blockchain technology while mitigating its risks.

Looking ahead, the future of secure decentralized storage promises even more groundbreaking advancements. Concepts such as quantum-resistant cryptography, zero-knowledge proofs, and large-scale blockchain networks hold the potential to revolutionize secure data storage. The challenge lies in ensuring that these innovations are developed responsibly, with a focus on sustainability, inclusivity, and ethical considerations.

In conclusion, blockchain-based decentralized storage has become an indispensable force in shaping modern data security. Its impact on secure file management, data transparency, and trust-based frameworks is undeniable. While challenges persist, the potential for positive change remains vast. By embracing innovation with responsibility and foresight, society can continue to benefit from blockchain advancements while addressing the complexities they bring. The key lies in striking a balance between progress and ethical responsibility to build a future that is both technologically advanced and socially inclusive.

ABDULLAH U
Final Year - B.Tech(IT)

NEUROLEARN: AI-DRIVEN PERSONALISED LEARNING SYSTEM

Technology has revolutionized education, giving rise to smart learning systems. NeuroLearn is an AI-driven system designed to personalize and optimize online learning through adaptive learning techniques. The rapid expansion of e-learning platforms, such as MOOCs, has made it challenging for students to choose the most suitable learning paths. NeuroLearn addresses this by applying Deep Q-learning (DQL) and Multi-Agent Reinforcement Learning (MARL) to offer a dynamic and customized learning environment. With continuously monitoring student progress and engagement, NeuroLearn optimizes learning paths to suit individual needs.

NeuroLearn is an AI-powered recommendation system designed to create personalized learning experiences, structured around four key components. The first component is the learner interface, which records input, monitors progress, and offers AI-driven suggestions. The second component is the AI module, which employs reinforcement learning models to dynamically optimize learning paths. The third component is the database, which efficiently stores user profiles, learning materials, and interaction histories. The final component is the feedback mechanism, which continuously optimizes recommendations based on student responses and activity levels. By utilizing reinforcement learning techniques, NeuroLearn strikes a delicate balance between introducing new information and reinforcing existing knowledge, offering a challenging and effective learning experience.

NeuroLearn employs cutting-edge AI and machine learning technologies, utilizing programming frameworks such as Python, TensorFlow, and PyTorch. Reinforcement Learning (RL) frameworks used include OpenAI Gym, Deep Q-Learning (DQL), and Multi-Agent RL (MARL). System development incorporates the Markov Decision Process (MDP) to create adaptive learning paths. SQLite is used for structured storage of learner profiles and resources. For deployment, the user interface is built with Flask/Streamlit, while cloud deployment is supported using AWS or GCP.

One challenge we faced was scaling personalization. We addressed this by employing Multi-Agent RL (MARL) to enhance scalability and efficiency. To manage large-scale learning data, we optimized database retrieval and indexing for efficient storage and access to content. To enhance student engagement and prevent dropouts due to content difficulty misalignment, we implemented adaptive difficulty adjustment based on performance analytics. To enhance computational efficiency while training reinforcement learning models on limited resources, we utilized pre-trained models fine-tuned with real-world educational material from platforms like EdX and Coursera.

NeuroLearn has a wide range of applications, benefiting students, teachers, researchers, and corporate training programs. It enhances comprehension and retention through personalized learning paths, enables adaptive curriculum planning based on student performance, provides insights into AI-based educational methods, and facilitates customized employee skill development programs.

NeuroLearn has vast potential for further expansion, such as integration with other learning platforms by expanding compatibility with MOOCs and Learning Management Systems (LMS). Advanced AI models can improve reinforcement learning algorithms, making them more effective and precise. Gamification and peer learning can foster engagement through interactive and collaborative tools. Additionally, multilingual support can expand accessibility, reaching a diverse global audience.

In conclusion, NeuroLearn represents a groundbreaking advancement in AI-powered learning. By leveraging reinforcement learning and adaptive content recommendations, it provides a highly personalized and interactive learning experience. As technology continues to evolve, further refinements in AI models and interfaces will amplify NeuroLearn's impact. Rooted in ethics-driven innovation, NeuroLearn has the potential to transform online learning, making it more accessible, efficient, and responsive to individual needs.

Saku Muskaan Rao
Final Year B.Tech(IT)

DEEP LEARNING MECHANISM FOR SUSTAINABLE AGRICULTURE

Agriculture plays a vital role in global food security and economic stability. Among staple crops, paddy cultivation is a significant contributor to the agricultural sector, particularly in countries like India and China. However, crop diseases continue to be a major challenge, leading to reduced yield, financial losses for farmers, and increased food insecurity. Traditional disease detection methods rely on manual inspection, which is time-consuming, labor-intensive, and prone to errors. These conventional approaches often fail to detect early-stage infections due to subtle differences in disease symptoms, making timely intervention difficult.

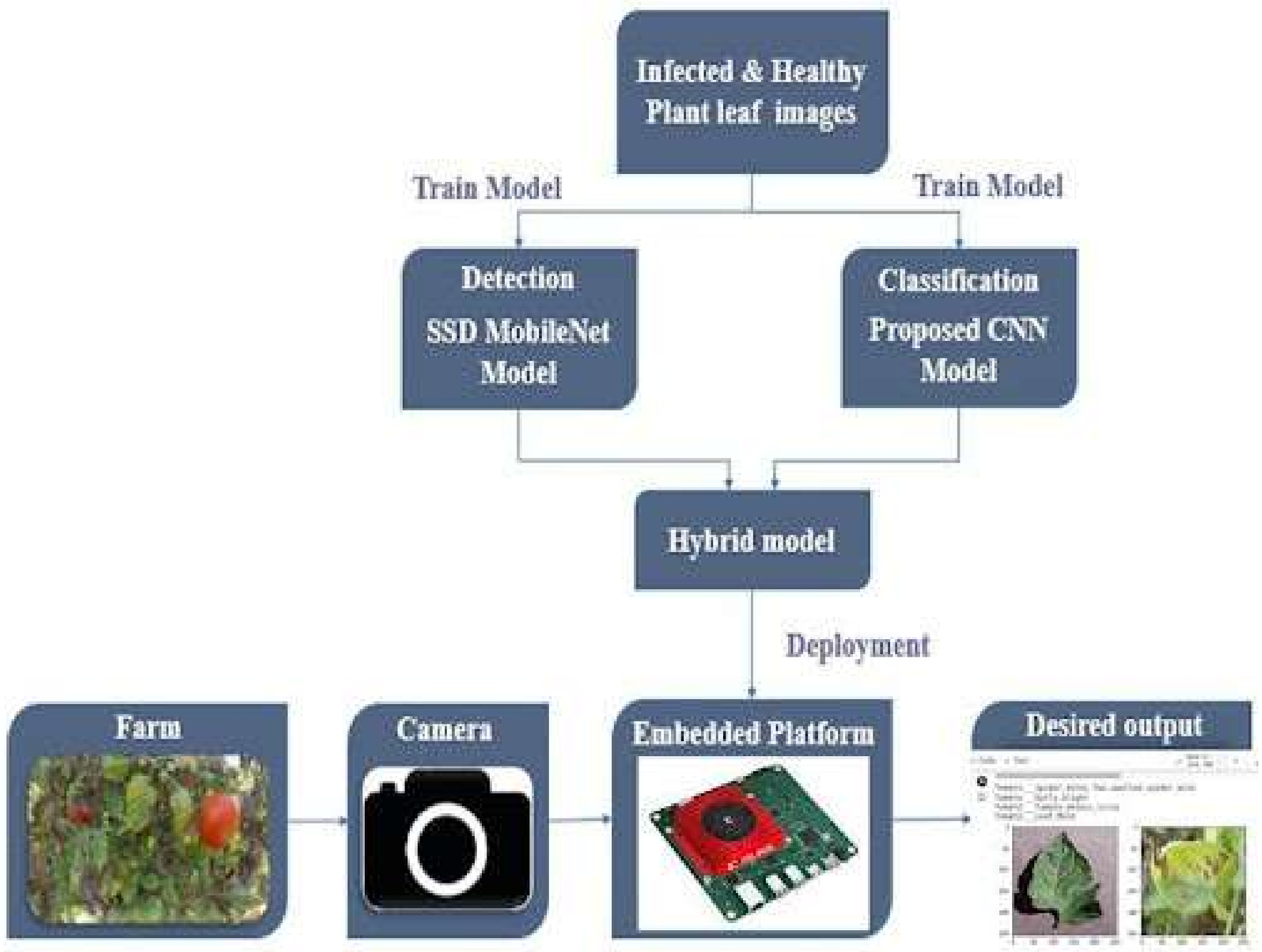
Advancements in artificial intelligence (AI) and deep learning have paved the way for automated crop disease detection systems that enhance accuracy and efficiency. By leveraging deep learning techniques, farmers can receive early disease warnings, enabling them to take preventive measures and minimize losses.

This deep learning framework integrates multiple DL techniques to improve the accuracy of paddy disease detection. Mask R-CNN is used for precise segmentation of diseased areas, enabling the model to differentiate infected regions from healthy parts of the leaf. This segmentation helps in isolating disease-affected areas, reducing false detections caused by background noise. The CNN with an attention mechanism enhances classification performance by ensuring the model focuses on disease-specific regions rather than irrelevant areas. The attention mechanism assigns higher weights to critical regions, improving the model's decision-making ability. Generative Adversarial Networks (GANs) are incorporated to augment the dataset, generating synthetic images to balance the training data and improve model generalization. This augmentation helps address the problem of limited datasets, which is a common challenge in agricultural deep learning applications. The combination of segmentation, classification, and data augmentation ensures a robust and scalable AI-based crop disease detection system.

The methodology of this system follows a structured approach, beginning with dataset collection. High-resolution images of healthy and diseased paddy crops are gathered from agricultural research centers, publicly available datasets such as Kaggle and Github. Each image is labeled based on the disease type, covering three major paddy diseases: Bacterial Blight, Blast, and Leaf Smut.

Following dataset collection, preprocessing techniques such as adaptive bilateral filtering for noise reduction, contrast enhancement to highlight disease spots.image normalization for standardizing pixel values are applied. These steps ensure high-quality input data, improving the overall performance of the model. Data augmentation is then performed using GANs, which generate synthetic images to increase dataset diversity. This step prevents overfitting and enhances the model's ability to generalize across different environmental conditions.

The segmentation process is carried out using Mask R-CNN. This method ensures precise identification of diseased regions, even in complex backgrounds. Once segmentation is complete, feature extraction is performed using a CNN, which detects key disease characteristics such as texture variations, discoloration, and lesion size. The attention mechanism further refines feature selection by focusing on disease-prone areas while ignoring irrelevant parts of the image. Finally, the classification model predicts the disease type, providing an accurate diagnosis to help farmers take preventive measures. The workflow follows a structured pipeline, beginning with image input, followed by preprocessing, segmentation, feature extraction, classification, and disease prediction. The inclusion of an attention mechanism enhances model efficiency, ensuring high precision in disease identification.



This deep learning framework offers significant benefits to the agricultural sector. Early disease detection allows farmers to implement timely interventions, reducing crop losses and improving productivity. The CNN with attention mechanism provides a higher classification accuracy compared to traditional methods, ensuring reliable predictions. The system is highly scalable and can be adapted to detect diseases in various crops beyond paddy. Furthermore, the integration of Mask R-CNN enables accurate segmentation, allowing researchers to study disease progression more effectively. The model is designed for real-time monitoring and can be integrated with drones or mobile applications, enabling farmers to receive disease alerts and recommendations instantly. By automating the disease detection process, this AI-driven system reduces dependency on manual labor and enhances precision agriculture practices.

The adoption of AI in agriculture marks a significant shift towards sustainable farming. This project introduces an efficient deep learning-based disease detection system that leverages CNNs, attention mechanisms, GANs, and Mask R-CNN for improved accuracy and scalability. Future enhancements will focus on real-time drone-based disease monitoring, expanding the dataset to include more plant species, and developing a mobile application for direct farmer assistance. AI-driven agricultural solutions contribute to food security and economic stability by enabling early disease detection and minimizing losses.

Noorul Hassan M U
Final Year B.Tech(IT)

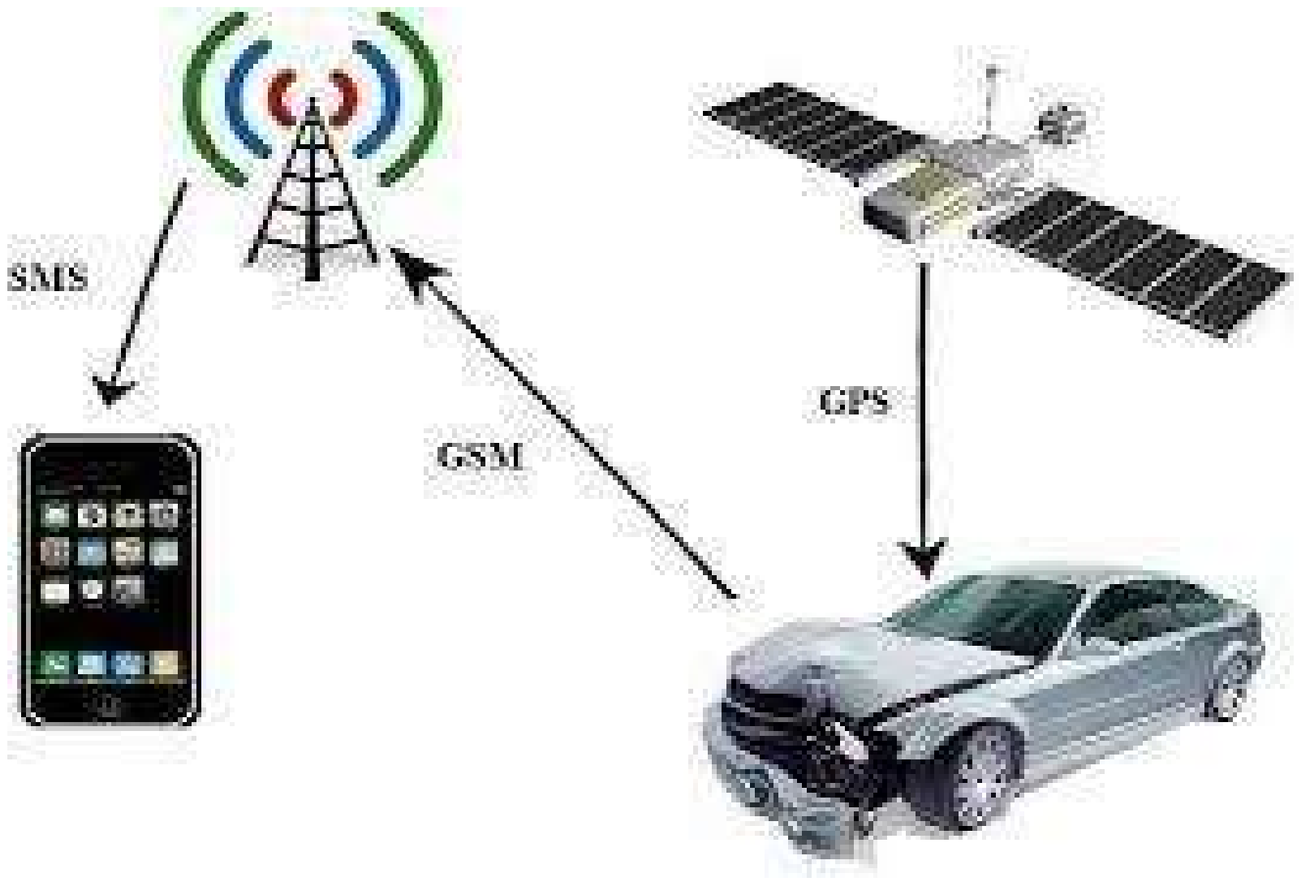
AUTONOMOUS CRASH DETECTION & SOS NOTIFICATION SYSTEM USING IOT AND EMBEDDED SENSORS

Accidents are an unfortunate reality on roads worldwide, leading to significant loss of life and property. With the advent of technology, it has become possible to leverage Internet of Things (IoT) devices to address this critical issue. The proposed IoT-based accident detection and alert system aims to improve response times and ensure accurate accident reporting by combining advanced microcontroller technology, mobile communication, and real-time location tracking. This innovative approach brings together hardware simplicity and effective communication protocols to make road safety more accessible and practical.

This system is built around the ESP32 NodeMCU microcontroller, which acts as the central processing unit. Airbag deployment detection serves as the accident detection mechanism, implemented using a thin string that snaps upon airbag deployment. This mechanism is directly connected to the ESP32 and is designed to detect significant physical impacts. When the string snaps, the ESP32 interprets this as an accident occurrence and immediately acts upon it. A SIM800L GSM module is used for sending alert messages, while the system relies on a mobile phone for GPS functionality, eliminating the need for a dedicated GPS module. The use of existing mobile technology not only minimizes hardware but also ensures a high level of accuracy in location tracking, critical for timely emergency responses.

The core functionality begins with airbag deployment detection through the thin string mechanism, which ensures reliable detection of accidents. When triggered, the ESP32 processes the input signal and interprets it as an accident, activating its programmed response. To provide accurate accident location data, the system uses a mobile phone’s GPS to send real-time latitude and longitude coordinates to the ESP32 via Bluetooth or WiFi. This significantly simplifies hardware requirements and ensures precise tracking. Upon receiving the data, the ESP32 formats this information into a Google Maps link for easy navigation to the accident site. Once detected and processed, the ESP32 communicates with the SIM800L GSM module, which sends an SMS alert to predefined emergency contacts. The SMS includes a brief message about the accident and a clickable Google Maps link. GSM ensures alerts are sent even in areas with limited internet connectivity, enhancing the system’s reliability.

The design of the power supply has been updated to improve portability and independence.



Instead of using an adapter, the system now operates on a battery, providing greater flexibility and ensuring uninterrupted operation during power outages. The SIM800L module, known for its high power requirements during transmission, is powered using a rechargeable battery setup. This configuration ensures stable operation even during peak power demands. By using a mobile phone for GPS data, the system eliminates the need for additional hardware, making the setup cost-effective and portable. Reliance on GSM-based communication ensures alerts are sent even in remote locations, while the airbag deployment detection mechanism simplifies accident detection, reducing false alarms and ensuring prompt notification of genuine incidents.

In conclusion, this IoT-based accident detection and alert system is a practical and efficient solution for improving road safety. Its combination of real-time detection, accurate location tracking, and reliable communication can significantly reduce emergency response times. By leveraging IoT principles, this system provides an intelligent response mechanism for critical situations. With potential enhancements such as cloud-based data storage, voice assistance for alerts, and integration with advanced sensors, this system can evolve into a comprehensive vehicle safety and monitoring solution, saving lives and mitigating the impact of road accidents.

Noorul Hassan M U &
Muhammad Thahir A C
Final Year B.Tech(IT)

"SOCIALMANAGER: AI-POWERED CONTENT GENERATION AND MULTIPLATFORM POSTING”

AWith the vast reach of social media today, businesses and individuals often find themselves managing multiple accounts across various platforms. This can lead to a timeconsuming and complex workflow when it comes to creating and posting content consistently. SocialManager is here to change that by offering an innovative solution that automates the content creation and posting process, helping users manage all their social media accounts effortlessly from one place.

At the core of SocialManager is AI-powered content generation, which allows users to quickly create high-quality, engaging posts tailored for different platforms. This eliminates the need to spend hours manually crafting individual posts for each social media account. Once your content is generated, you no longer need to go through the hassle of posting on each platform separately. SocialManager seamlessly integrates with your connected social media accounts and posts your content automatically across multiple platforms, all at once.

In addition, SocialManager features a powerful automatic post scheduler, enabling users to plan and schedule their posts in advance. This ensures that your content is shared at optimal times without needing to log in to each platform manually. Whether you're a business looking to streamline your social media marketing efforts or an individual managing personal accounts, SocialManager saves time, increases efficiency, and ensures a consistent online presence without the need to juggle multiple logins and manual posts.

With SocialManager, social media management becomes more efficient, allowing you to focus on what truly matters — engaging with your audience and growing your brand.

Jani Arafath A
Third Year B.Tech(IT)

DOMAIN INVARIANT FAKE AUDIO DETECTION SYSTEM

In the modern digital era, the rise of artificial intelligence and deep learning has led to significant advancements in audio synthesis. While these innovations have enabled realistic voice cloning and synthetic speech generation, they have also paved the way for the misuse of technology, leading to an increase in fake audio content. Fake audio, often generated using AI-driven text-to-speech models, deepfake technology, or voice conversion systems, poses a serious threat to security, misinformation, and privacy. To combat this growing concern, our project focuses on building a Fake Audio Detection System that can effectively differentiate between real and fake audio using machine learning and deep learning techniques.

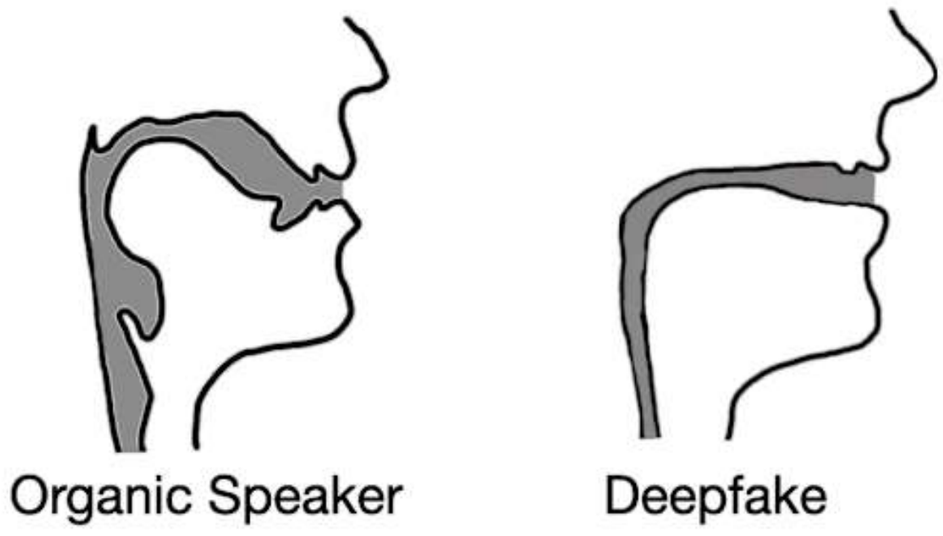
With the widespread availability of AI-generated speech tools, the challenge of identifying fake audio has become critical. Fake audio can be used for various malicious purposes, including impersonation, fraud, and misinformation. For instance, cybercriminals can manipulate voice recordings to create false evidence, leading to legal and financial consequences. Additionally, deepfake audio has the potential to disrupt political discourse by creating fabricated speeches of influential figures. To counteract these threats, it is essential to develop an automated system capable of detecting synthetic speech with high accuracy.

Our Fake Audio Detection System is built using Convolutional Recurrent Neural Networks (CRNNs), a hybrid approach combining CNNs for feature extraction and RNNs for temporal modeling. The project involves various technologies, including Python for development and machine learning model training, TensorFlow and Keras for implementing deep learning models, Librosa for audio preprocessing and feature extraction, Pydub and FFmpeg for handling different audio formats, and Flask for creating a web-based interface to interact with the system. The model is trained using Mel-Spectrogram features, which provide a visual representation of audio signals. By converting raw audio data into frequency-based spectrograms, the model learns distinct patterns that differentiate real and synthetic speech. The dataset consists of over 69,000 audio files, including both real and AI-generated fake speech, sourced from multiple datasets such as ASVspoof 2019, Fake-or-Real, and WaveFake.

The system supports multi-format audio input, allowing it to process and analyze various formats such as WAV, MP3, FLAC, and OGG. Users can upload, play, and trim audio before processing, enabling them to analyze specific portions of a file.

Additionally, the system supports live audio recording, allowing users to verify in real-time whether a recorded voice is real or fake. The CRNN model is optimized using data augmentation techniques, including pitch shifting, time-stretching, and noise addition, to enhance the model's ability to generalize across different domains. This ensures high accuracy in detecting fake audio across various speech synthesis techniques. The web-based application processes audio within seconds, providing users with immediate results, and allows them to download the processed audio for further analysis.

One of the significant challenges in detecting fake audio is the variability in synthesis methods. Since fake speech can be generated using multiple deepfake techniques, detection becomes complex. To address this, the model is trained on a diverse dataset comprising multiple synthesis methods to ensure it learns various patterns of fake speech. Another challenge is handling background noise, which can interfere with detection accuracy. By applying noise-reduction and augmentation techniques, the model remains robust to variations in background interference. Given the large dataset size, optimizing performance was necessary. Training on over 69,000 audio files required efficient batch processing and GPU acceleration, which significantly reduced computation time and ensured smooth processing.



While the Fake Audio Detection System is already efficient in distinguishing real and synthetic speech, future improvements can further enhance its capabilities. One area of interest is the integration of quantum computing, which could significantly reduce processing time for large-scale datasets and improve detection efficiency. Additionally, deepfake audio clustering using unsupervised learning techniques could be implemented to categorize different types of synthetic speech and refine detection accuracy. Another potential enhancement is the development of a mobile-based version, allowing real-time voice authentication and fraud prevention on smartphones, thereby making the system more accessible to users.

With the increasing prevalence of AI-generated speech, the need for robust fake audio detection systems is more critical than ever. The Fake Audio Detection System utilizes deep learning and advanced signal processing techniques to provide an accurate and efficient solution for detecting fake speech. By integrating real-time processing, multi-format support, and live audio verification, the project contributes to combating misinformation and ensuring audio authenticity in digital communications. The ability to quickly and accurately differentiate between real and synthetic speech makes this system an essential tool in safeguarding the integrity of digital media, protecting individuals from fraud, and preventing the spread of misinformation.

Lokesh J &
Mohamed Rilwan M
Final Year B.Tech(IT)

A SPEECH GUIDED EMAIL SYSTEM FOR BLIND INDIVIDUALS USING ASR AND TTS

In today's digital era, email communication has become an essential part of daily life, facilitating both personal and professional interactions. However, visually impaired individuals face significant challenges in accessing and utilizing conventional email systems due to their dependence on graphical user interfaces. To bridge this accessibility gap, a speech-guided email system leveraging Automatic Speech Recognition (ASR) and Text-to-Speech (TTS) technologies can provide a seamless and user-friendly communication platform for blind individuals. This system enables users to compose, send, read, and manage emails using voice commands, eliminating the need for conventional text-based input and navigation.

The core functionality of the system revolves around ASR and TTS technologies. ASR allows the conversion of spoken language into text, enabling users to dictate emails, search inboxes, and perform other necessary actions through voice commands. TTS, on the other hand, converts the received emails and system responses into audible speech, allowing users to listen to their messages and interact with the system effectively. These technologies, combined with Natural Language Processing (NLP) algorithms, enhance the system's ability to recognize diverse speech patterns, accents, and contextual cues, ensuring a smooth and accurate user experience.

To ensure an intuitive interface, the system employs a structured command-based approach, where users can initiate actions using predefined voice commands. For instance, users can dictate commands such as "compose email," followed by the recipient's name and the message content, which the system transcribes and processes accordingly. Similarly, commands like "read inbox" or "delete email" allow users to navigate through their email accounts effortlessly. The integration of AI-driven speech recognition further refines the accuracy of the system, minimizing errors and enhancing the overall efficiency of email operations.

Security and privacy are critical aspects of this speech-guided email system. Voice authentication mechanisms can be incorporated to ensure that only authorized users have access to their respective accounts. Additionally, encryption techniques can be applied to safeguard sensitive information during email transmission. The system can also be designed to support multiple languages, catering to a diverse user base and ensuring inclusivity for visually impaired individuals across different linguistic backgrounds.

The implementation of this speech-guided email system has the potential to significantly improve digital accessibility for blind individuals, empowering them with greater independence in email communication. By eliminating the barriers associated with traditional text-based interfaces, this technology enhances their ability to stay connected, access information, and participate in professional and social interactions. As advancements in ASR and TTS continue to evolve, the accuracy and efficiency of such systems will further improve, paving the way for more inclusive and accessible digital solutions in the future.

In addition to its core functionalities, the system can be enhanced with smart AI assistants that offer predictive suggestions, allowing users to complete emails more efficiently. These assistants can recognize frequent contacts, suggest subject lines, and even provide automated responses based on the context of the email. Such capabilities further streamline the user experience and ensure greater convenience for visually impaired individuals.

Another significant enhancement is the integration of cloud storage solutions to maintain email backups and allow seamless synchronization across multiple devices. This feature ensures that users do not lose important emails and can access their communications from different locations. The system could also support customizable voice commands, enabling users to personalize their interactions and improve efficiency according to their individual preferences.

Moreover, real-time feedback mechanisms can be embedded within the system, where users receive instant auditory confirmation after each command execution. This helps in reducing uncertainty and ensures that users can interact confidently without second-guessing their actions. The addition of AI-driven sentiment analysis can further enhance the system by allowing automated detection of email tone and suggesting appropriate modifications before sending messages.

Overall, this speech-guided email system represents a significant step toward digital inclusivity. By combining advanced speech recognition, text-to-speech synthesis, and AI-driven enhancements, the system offers a comprehensive solution that enables visually impaired individuals to communicate effectively. As technological advancements continue, further refinements will lead to an even more seamless and intelligent communication experience, fostering greater independence and accessibility for all users.

Rahimunnisha Begam M S
Final Year B.Tech(IT)

AI POWERED SMART DOOR LOCK SYSTEM

In the era of smart security, integrating face recognition with an advanced communication system like LI-FI (Light Fidelity) presents an innovative approach to access control. A face recognition-based door locking system enhances security by allowing only authorized individuals to gain access, eliminating the need for keys or passwords. When combined with LI-FI, which uses visible light for data transmission instead of traditional radio frequencies, the system becomes more efficient and secure against hacking attempts.

The primary components of this system include a camera module for facial recognition, a microcontroller for processing, an LI-FI transmitter and receiver for communication, and an electronic door lock mechanism. The face recognition process is handled using AI-based algorithms such as OpenCV's Haar cascades or deep learning models like CNNs. When a face is detected and authenticated, a signal is sent to unlock the door.

LI-FI technology plays a crucial role in this setup by ensuring fast and interference-free data transmission. Unlike Wi-Fi, which relies on radio waves, LI-FI uses LED lights to send and receive data. This enhances security as light cannot penetrate walls, preventing unauthorized access from external sources. Additionally, LI-FI offers ultra-fast data transfer speeds, ensuring seamless communication between the face recognition system and the locking mechanism.

The IoT aspect of the system enables remote monitoring and control. By connecting the system to a cloud server, users can receive real-time notifications and access logs of entries and exits. This can be further enhanced with mobile applications, allowing users to control door access from anywhere. The combination of IoT and LI-FI ensures both security and convenience, making the system highly efficient for smart home and office applications.

One of the significant advantages of this system is its resistance to cyber threats. Since LI-FI communication is confined to a limited physical space, it becomes challenging for hackers to intercept data. This makes it a preferable alternative to Wi-Fi-based door locking systems, which are more susceptible to breaches. Moreover, face recognition eliminates the risks associated with stolen or duplicated keys and passwords, further enhancing security.

However, the system also faces certain challenges. The dependency on light for data transmission means that the system might not function efficiently in complete darkness or if the light source is obstructed. Additionally, implementing LI-FI technology requires specialized hardware, which may increase the overall cost. To address these issues, hybrid systems incorporating both LI-FI and Wi-Fi can be developed for enhanced reliability.

Future advancements in LI-FI technology and facial recognition algorithms can further improve the efficiency of this security system. The integration of AI-powered deep learning models can enhance recognition accuracy, even under varying lighting conditions. Additionally, incorporating infrared-based LI-FI systems may help overcome limitations related to darkness, ensuring uninterrupted operation.

A face recognition-based door locking system using LI-FI in IoT represents a significant advancement in smart security solutions. By leveraging the high-speed and secure communication of LI-FI with AI-driven facial recognition, the system offers an innovative, efficient, and hack-proof approach to access control. While challenges such as dependency on light and cost considerations exist, continuous technological advancements will pave the way for widespread adoption in residential and commercial security applications.

SREERAM.M.V &
HARISH.S Final Year B.Tech(IT)

GEOLOCATION-BASED TWO-FACTOR AUTHENTICATION SYSTEM USING ARGON2

User authentication plays a crucial role in modern cybersecurity, yet conventional methods such as passwords and OTP-based verification often fail to provide sufficient protection. Cyber attackers exploit vulnerabilities through techniques like brute force attacks, phishing, and credential stuffi making it easier to gain unauthorized access to sensitive accounts. To counter these threats, a more advanced two-factor authentication (2FA) system has been developed, which enhances security by verifying both the user's device and network before granting access.

Many authentication systems rely on passwords as the primary layer of security, but this method alone is highly vulnerable. Attackers use automated tools to guess passwords, and in many cases, users tend to reuse credentials across multiple platforms, increasing the risk of credential-stuffing attacks. OTPs, often used in 2FA, are also prone to security breaches. Hackers can intercept OTPs through phishing attacks or SIM-swapping techniques, making them unreliable in preventing unauthorized access. Furthermore, most 2FA systems do not factor in geolocation verification, allowing attackers to bypass security layers if they manage to steal login credentials.

The enhanced authentication system strengthens security by introducing an additional layer of verification based on the user's location. When a user attempts to log in from an unregistered device, the system first checks if the new and registered devices are connected to the same location. If they are on the same network, a One-Time Password (OTP) is sent to the registered device for authentication. However, if the new login attempt is from a different network or location, an alert containing the login details is sent to the user instead of an OTP. This approach ensures that even if an attacker obtains a user's credentials, they cannot access the account from an unfamiliar location.

Additionally, strong password encryption is integrated into the system using Argon2, a powerful password-hashing algorithm known for its resistance against brute force attacks. This encryption method makes it extremely difficult for attackers to crack stored passwords, even if they manage to access the authentication database.

Moreover, to prevent repeated login attempts by attackers, the system enforces an account lock feature. If a wrong password is entered more than three times, the account is temporarily locked, reducing the risk of brute force attacks. Users also receive real-time alerts for suspicious login activities, allowing them to take immediate action if an unauthorized attempt is detected.

Beyond security enhancements, the system ensures a balance between protection and user convenience. Unlike traditional 2FA systems that may require constant authentication steps, this model streamlines the process by sending an OTP only when login conditions indicate a potential threat. This prevents unnecessary authentication requests while maintaining a high level of security. The system is designed to operate efficiently without adding excessive complexity to the user experience, ensuring accessibility for all users, including those who may not be technologically proficient.

This authentication system is applicable in various domains, including online banking, e-commerce platforms, corporate logins, and personal accounts, where security is a top priority. It significantly reduces the risk of identity theft and account takeover fraud by ensuring that access is granted only under secure conditions. The ability to track login locations helps organizations monitor and mitigate unauthorized access attempts while allowing legitimate users to verify unusual activity. Furthermore, the implementation of Argon2 encryption provides long-term security benefits by safeguarding user credentials even in cases where databases are compromised.

By incorporating geolocation-based authentication along with advanced encryption, this system ensures that only legitimate users can access their accounts, even in cases where credentials have been compromised. The combination of Argon2 password hashing, location verification, and OTP-based authentication significantly enhances security while maintaining user convenience. Traditional authentication methods are often unable to prevent unauthorized access, but this innovative approach provides a robust solution by requiring both identity verification and location consistency. The implementation of real-time alerts and account lock features further fortifies the system, making it highly resistant to modern cyber threats.

As cyber-attacks continue to evolve, strengthening authentication mechanisms is essential in safeguarding sensitive data. The geolocation-based two-factor authentication system using Argon2 provides a strong and reliable security framework that protects users against credential theft, brute force attacks, and unauthorized access. This system not only enhances security but also ensures a seamless and efficient login experience, striking a balance between robust protection and user convenience. The future of authentication must integrate multi-layered security techniques, and geolocation-based 2FA serves as a significant step forward in advancing digital security measures. As organizations and individuals continue to prioritize cybersecurity, adopting innovative authentication solutions like this will play a crucial role in ensuring data protection and minimizing cyber threats.

SRUTHILAYA K &
NIVETHA S
Final Year B.Tech(IT)

IOT BASED SUSTAINABLE ENVIRONMENT DESIGN AND CONTROL FOR UNSEASONAL CROP USING DEEP LEARNING APPROACH

The Internet of Things (IoT) has significantly impacted the agricultural sector by introducing innovative approaches to enhance productivity and ensure sustainability. In the context of agriculture, one of the most pressing challenges is unseasonal crop cultivation, which is often affected by unpredictable weather patterns, soil conditions, and pests. This project explores the potential of integrating IoT-based sustainable environment design and control systems for optimizing the growth of unseasonal crops. By leveraging the power of IoT, farmers can gather real-time data on various environmental factors such as temperature, humidity, soil moisture, and light intensity, which directly influence crop growth. These data points are critical for adjusting and fine-tuning growing conditions, ensuring that crops can thrive even when planted outside their traditional seasonal windows.

To make the system more intelligent and adaptable, this project employs advanced machine learning techniques, specifically Convolutional Neural Networks (CNNs) with VGG16 architecture, and Artificial Neural Networks (ANNs). The VGG16 model, known for its deep layers and powerful feature extraction capabilities, is utilized to process environmental data collected through IoT devices. The model is trained to recognize patterns in the data and predict the ideal conditions for crop growth. This deep learning approach can significantly enhance the ability to detect anomalies and optimize parameters in real time, ensuring the crops receive the necessary environment tailored to their needs. The use of CNNs in this context is particularly advantageous because of their ability to handle complex data, such as images or multi-dimensional inputs, which are common in agricultural monitoring systems.

The role of ANNs in this project is to model the relationships between various environmental factors and crop yield. These neural networks can learn from historical data to predict the likely outcomes of different environmental conditions. For example, the ANN can predict how changes in soil moisture or temperature might affect crop health and development. By using both CNN and ANN models, the project combines the strengths of both architectures: CNNs for robust feature extraction from sensory data and ANNs for predictive analysis.

This integrated system enables automated decision-making, where the IoT system, coupled with the machine learning models, continuously monitors the environment and adjusts factors like irrigation, temperature, and humidity to maintain optimal conditions for the crops. In addition to the technical innovations, sustainability is at the core of this project. By creating an intelligent control system that adapts to environmental changes and optimizes resource usage, this system ensures that crops receive precisely what they need, minimizing waste and reducing the carbon footprint of agricultural practices.

For instance, smart irrigation systems that only water crops when the soil moisture is below a certain threshold can reduce water consumption, a critical concern in many parts of the world. Similarly, optimizing temperature and humidity levels prevents overuse of energy in greenhouse environments, contributing to more sustainable farming practices. This project, therefore, not only aims to improve crop yield and quality but also strives to make agricultural practices more environmentally responsible. Moreover, the use of IoT and machine learning techniques opens up the potential for scaling this solution across various types of crops and regions. The flexibility of the system allows it to be customized based on local environmental conditions, making it applicable for both large-scale commercial farming and smaller, community-based agricultural initiatives. By making the system adaptable, this project contributes to ensuring food security in regions that face challenges with climate unpredictability and resource scarcity. In the long run, the integration of IoT and machine learning in agriculture could revolutionize the way crops are grown, making food production more resilient and efficient in the face of changing global conditions.

In conclusion, this project exemplifies the convergence of cutting-edge technology and sustainable agricultural practices. Through the combination of IoTbased monitoring systems, deep learning models like CNN's VGG16, and ANNs, the project offers a powerful solution to the challenges of unseasonal crop cultivation. By ensuring optimal environmental conditions for crops, minimizing resource wastage, and adapting to changing weather patterns, this system represents a significant advancement in precision agriculture. It holds the promise of not only improving agricultural productivity but also contributing to the broader goal of achieving sustainable food production in an era of climate change and global uncertainty.

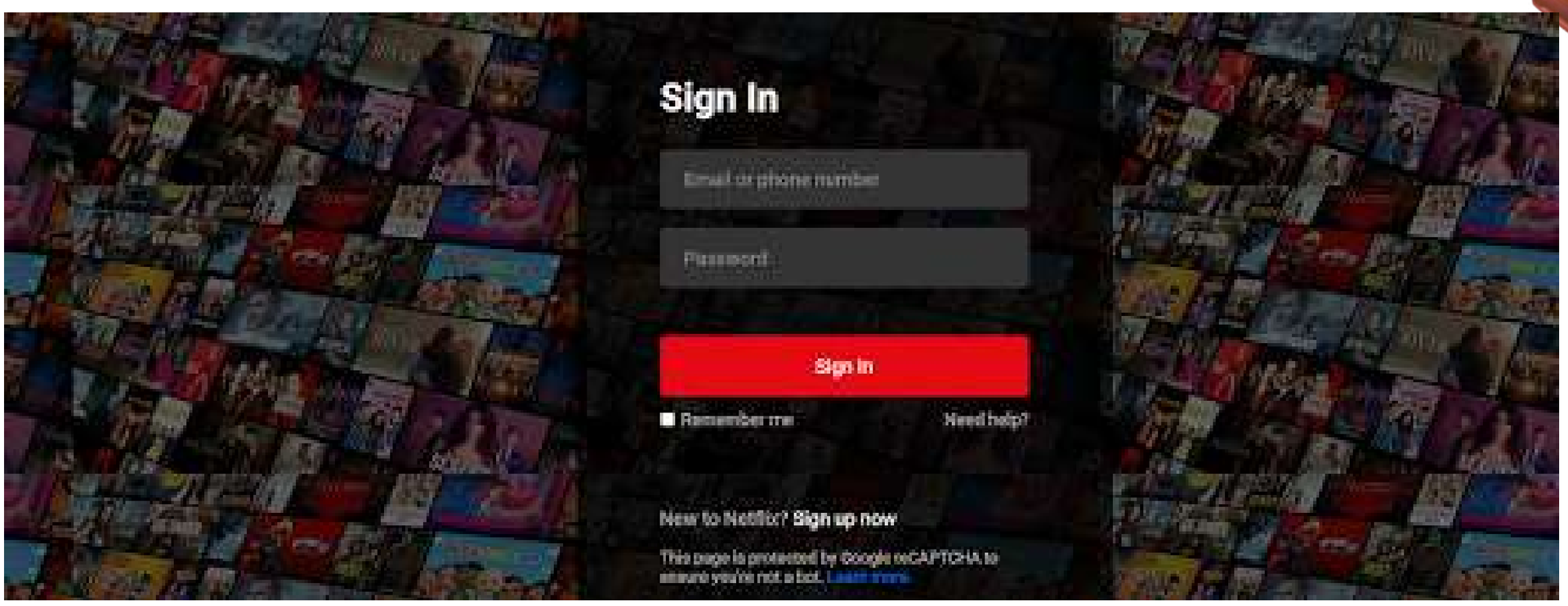
Ayesha Afrin A &
Ruwaida Fathima J
Final Year B.Tech(IT)

NETFLIX CLONE: A FRONTEND-BASED STREAMING PLATFORM

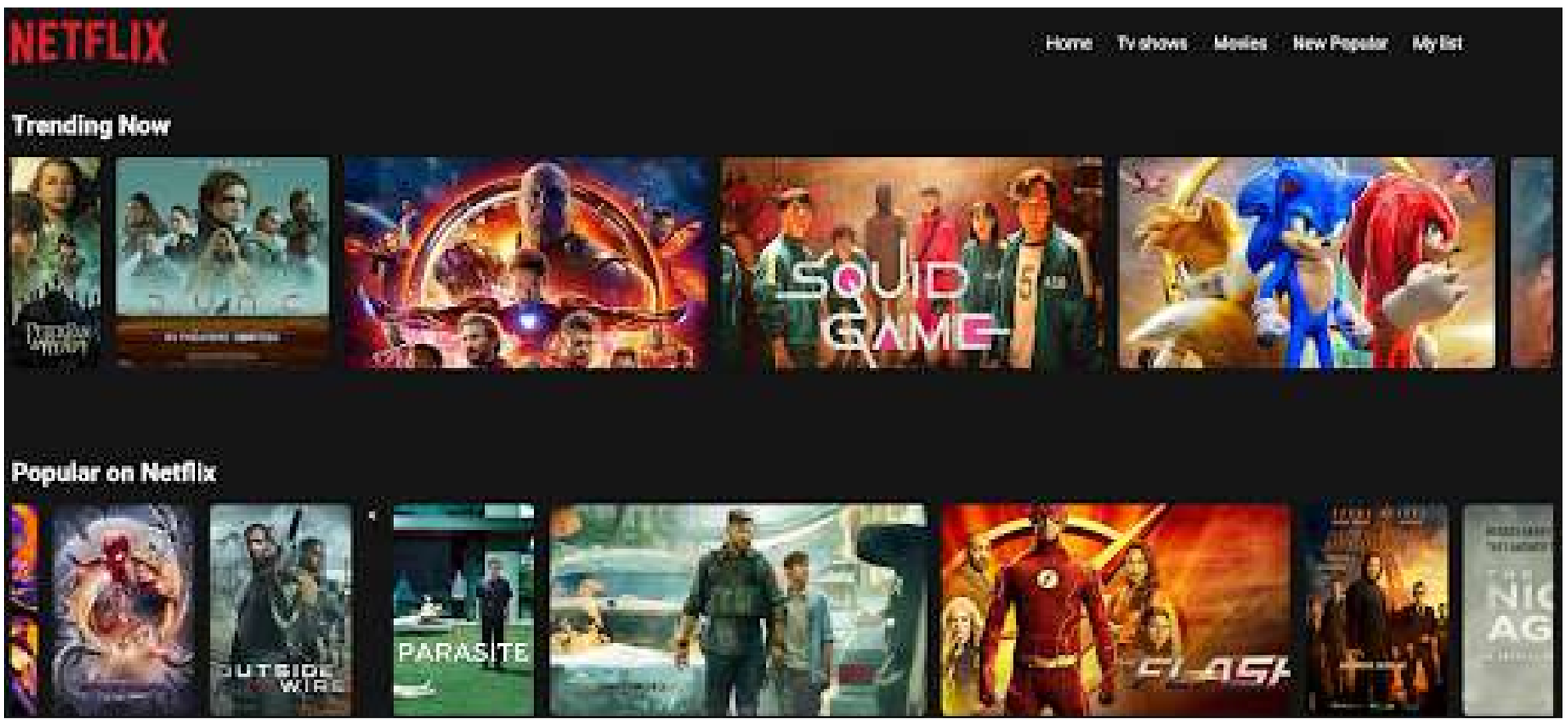
With the rise of digital streaming services, platforms like Netflix have revolutionized the way users consume entertainment. To better understand the design and functionality of such services, I developed a Netflix clone as part of my internship at Spark Solutions. This project serves as a frontend-focused replication of Netflix, showcasing a responsive, visually appealing user interface with interactive features.
At the core of this Netflix clone is an intuitive user interface built using HTML, CSS, and JavaScript. The website mimics Netflix's modern design, providing users witha dynamic browsing experience. The homepage includes a variety of categorized movie sections, a carousel slider for popular content, and an interactive navigation menu that enhances usability. Hover effects, smooth transitions, and a visually engaging dark-themed layout contribute to a professional and immersive experience.

Beyond static content display, the project integrates JavaScript functionalities to enhance interactivity. The carousel system allows users to navigate through movie collections seamlessly, while hover effects provide additional details about each title. JavaScript event listeners further improve the experience by dynamically updating the UI based on user actions. The website is fully responsive, ensuring accessibility across different devices, including desktops, tablets, and mobile phones.
This project demonstrates the effective use of frontend technologies in building engaging web applications. Although this Netflix clone does not include backend features such as user authentication or real-time streaming, it lays a solid foundation for future enhancements. A potential next step would be integrating an API to fetch real-time movie data or incorporating a backend for user account management and personalized content recommendations.

By working on this project, I gained valuable experience in frontend web development, particularly in UI design, responsive layouts, and JavaScript-based interactivity. This hands-on experience at Spark Solutions has equipped me with practical skills applicable to real-world web development challenges, helping me grow as a developer in the evolving tech landscape.



The Netflix clone website was developed using core frontend technologies, ensuring a high-quality and scalable user interface. HTML was used for structuring the website's content, defining elements such as the header, movie sections, and navigation menu. CSS played a crucial role in styling the website, implementing responsive layouts using Flexbox and Grid, as well as adding hover animations and transitions for dynamic effects. JavaScript was utilized to enhance interactivity, implementing features like the carousel slider, hover effects, and a search function for filtering movie titles. Various tools and libraries, including browser developer tools, were used for debugging and testing to ensure cross-browser compatibility. These technologies collectively enabled the development of a fully functional, responsive, and visually appealing web application. Demo link: Netflix India – Watch TV Shows Online, Watch Movies Online



Arshath Ahamed A
Second Year B.Tech(IT)

DETECTING PERSONAL PROTECTIVE EQUIPMENT IN CONSTRUCTION SITES USING DETECTRON2 WITH POSE MONITORING

Ensuring worker safety is a crucial concern in hazardous environments such as construction sites, manufacturing plants, and industrial zones. Personal Protective Equipment (PPE) plays a significant role in minimizing workplace injuries and fatalities. However, manual monitoring of PPE compliance is labor-intensive and prone to human error. To address this challenge, our project leverages Region-based Convolutional Neural Networks (RCNN) and OpenPose to develop an automated system that detects the presence and proper use of PPE such as helmets, vests, gloves, and masks in real time.

With increasing urbanization and industrialization, construction sites and manufacturing units have expanded significantly. This growth has brought about an increase in workplace hazards, making it imperative to have a robust PPE compliance system in place. Current monitoring techniques rely heavily on manual inspection, which is time-consuming and inefficient. By integrating deep learning models with real-time video feeds, our project aims to bridge the gap between safety enforcement and automation.

The primary goal of this project is to create an intelligent system capable of detecting whether individuals in a given environment are correctly wearing essential PPE. By integrating RCNN for object detection and OpenPose for human pose estimation, our system aims to achieve high accuracy in PPE compliance monitoring. The system not only detects the presence of PPE but also ensures that it is being worn correctly according to workplace safety guidelines.

Through real-time detection and alert mechanisms, organizations can proactively prevent accidents and injuries. This system can be implemented in industrial facilities, warehouses, and construction sites, ensuring a safer working environment for employees. Additionally, the use of automated monitoring reduces the dependence on human inspectors, thereby minimizing operational costs and increasing efficiency.

Our approach involves several key steps. First, we collect and annotate data using publicly available datasets and custom-labeled images of workers wearing different PPE items. Images are annotated with bounding boxes for helmets, vests, gloves, and masks, and keypoints for human posture are labeled to assess proper PPE usage.

Next, we employ Faster RCNN to detect PPE items in images. The model is trained on annotated images to classify and localize different PPE items, using transfer learning with a pre-trained model such as ResNet or VGG for enhanced performance. Additionally, OpenPose extracts keypoints from human figures to determine body orientation and PPE positioning, ensuring that PPE is correctly worn. For example, a helmet should be on the head, not being held in hand.

The integration of OpenPose adds another layer of intelligence to the system, allowing it to differentiate between PPE being worn correctly and incorrectly positioned equipment. This ensures that compliance checks are more reliable and accurate.

The system is integrated with live video feeds from CCTV cameras or mobile cameras, establishing a processing pipeline to perform real-time PPE detection and violation alerts. A dashboard is developed to visualize compliance statistics, providing an intuitive interface for safety monitoring. The dashboard will include features such as violation logs, compliance percentages, and real-time alerts, making it easier for safety officers to track and manage worker safety.

The project utilizes deep learning frameworks such as TensorFlow and PyTorch, with Faster RCNN for object detection and OpenPose for pose estimation. Python is the primary programming language, and the system is deployed on cloud platforms like AWS or GCP for cloud-based processing. For on-site inference, edge devices such as NVIDIA Jetson Nano are used to enhance efficiency and scalability.

In addition to cloud computing, edge computing solutions help reduce latency in real-time PPE detection. This ensures faster processing and decision-making, especially in environments where immediate alerts are necessary. The system also employs video preprocessing techniques such as background subtraction and motion detection to enhance the detection accuracy in complex worksite environments.

The implementation of this system will enable automated PPE detection with high accuracy, allowing real-time alerts for non-compliance. By reducing reliance on manual monitoring, workplace safety enforcement will be significantly improved. The system is designed to be scalable, making it suitable for large industrial setups and ensuring broad applicability across various sectors.

This project combines state-of-the-art deep learning techniques to improve workplace safety by ensuring proper PPE compliance. By utilizing RCNN for object detection and OpenPose for pose estimation, we enhance accuracy in detecting and verifying the correct use of protective equipment. The system can be deployed in various industries, making safety monitoring more efficient, automated, and scalable.

The future scope of this project includes expanding the system to detect additional safety violations, such as workers operating machinery without proper authorization or entering restricted areas without safety gear. Furthermore, integrating voice alerts and AI-driven recommendations can enhance the overall effectiveness of workplace safety measures. By continuously refining and updating the model with new datasets, the system can adapt to evolving safety requirements, ensuring long-term sustainability and impact.

Janani V &
Afrin A
Final Year B.Tech(IT)

DETECTION OF ATTACK IN LAN NETWORK USING CYBER SECURITY

The increasing reliance on local area networks (LANs) for critical operations has made them prime targets for cyber threats, necessitating robust security mechanisms to identify and mitigate vulnerabilities. This system is designed to perform a comprehensive vulnerability analysis of LANs by implementing a multifaceted approach involving network enumeration, automated scanning, file permissions review, network traffic capture, credential testing, and privilege escalation simulation. Each module plays a crucial role in fortifying network security and ensuring that potential attack vectors are identified and remediated before they can be exploited by malicious actors.

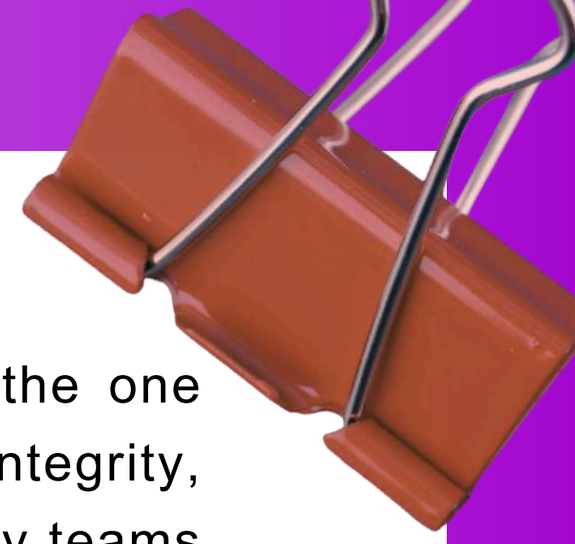
The first module, network enumeration, focuses on scanning the network to identify active devices, open ports, and running services, leveraging tools such as Nmap to generate a detailed topology of the network infrastructure. By mapping out all accessible endpoints and services, administrators can gain valuable insights into potential entry points for attackers and take appropriate measures to secure them. Automated scanning is another critical component, systematically examining systems for unpatched software, weak or outdated protocols, and known vulnerabilities using tools like Nessus. Since unpatched software remains one of the most common attack vectors for cybercriminals, automating this process ensures that all security gaps are identified in real-time. File permissions review is also integrated into the system, ensuring that access controls are correctly configured to prevent unauthorized access.

Misconfigured permissions on sensitive files and folders can inadvertently grant attackers access to critical data, making it imperative to perform thorough audits and enforce least privilege principles. Another essential aspect of vulnerability assessment is network traffic capture, which involves monitoring and analysing data packets to identify unencrypted transmissions and insecure communication protocols. The presence of unencrypted data flows, such as HTTP traffic instead of HTTPS, can expose sensitive information to attackers through man-in-the-middle (MITM) attacks. By capturing and reviewing network traffic, security teams can detect such weaknesses and implement encryption protocols to safeguard data in transit.

Credential testing is also a fundamental module within this system, focusing on identifying weak or default credentials and verifying the implementation of multi-factor authentication (MFA). Weak passwords and reused credentials continue to be a significant security risk, as they can be easily exploited through brute-force attacks. By conducting automated credential testing, organizations can ensure that all user accounts adhere to strong authentication practices, reducing the likelihood of unauthorized access. Another critical security concern is privilege escalation, which occurs when an attacker gains elevated access rights to perform unauthorized actions within a system. The privilege escalation simulation module within this system replicates attack scenarios to assess whether users have excessive privileges that could be exploited.

By simulating real-world attack methods, security professionals can identify and remediate privilege escalation vulnerabilities before they can be leveraged by malicious actors. The comprehensive nature of this vulnerability analysis system ensures that multiple attack vectors are examined, leaving no security gaps unaddressed. The integration of these modules into a cohesive framework allows for a systematic and proactive approach to LAN security, ensuring that vulnerabilities are identified and mitigated before they can be exploited. The primary advantage of such an automated system is its ability to provide continuous security assessments without the need for extensive manual intervention. By automating network enumeration, vulnerability scanning, file permission audits, traffic analysis, credential testing, and privilege escalation simulations, organizations can significantly enhance their security posture while minimizing human error. Furthermore, this system is designed to be scalable, allowing it to be deployed in small business networks as well as large enterprise environments. With the rapid evolution of cyber threats, traditional security measures are no longer sufficient to protect LANs from sophisticated attacks.

Organizations must adopt a proactive security strategy that continuously monitors, identifies, and mitigates risks before they result in data breaches or system compromises. The implementation of this comprehensive vulnerability analysis system provides organizations with a strategic advantage by enabling them to detect weaknesses early, prioritize remediation efforts, and ensure compliance with security best practices. Moreover, and improve overall network resilience. The importance of vulnerability analysis cannot be overstated, as cyberattacks are becoming increasingly sophisticated, targeting weak points in network infrastructure to gain unauthorized access.



A well-structured vulnerability assessment framework, such as the one presented in this system, is essential for maintaining network integrity, protecting sensitive information. By leveraging this system, security teams can take a proactive stance in securing LANs, implementing timely patches, enforcing strong authentication mechanisms, monitoring network traffic, and preventing privilege escalation. Additionally, the system's ability to generate detailed reports on detected vulnerabilities and recommended remediation measures enhances transparency and facilitates informed decisionmaking for IT administrators and security teams. The adoption of such a proactive security framework is essential in an era where cyber threats are constantly evolving, and organizations must remain vigilant in safeguarding their digital assets. The automated and comprehensive nature of this system reduces the burden on security teams while ensuring that critical vulnerabilities are promptly identified and addressed. The continuous assessment and monitoring of network infrastructure play a vital role in preventing cyber threats from materializing into actual security incidents. The implementation of this system not only enhances the security of LANs but also aligns with industry best practices and regulatory compliance requirements, making it an invaluable tool for organizations seeking to bolster their cybersecurity defences. As cyber threats continue to evolve, organizations must recognize the importance of implementing a structured and automated vulnerability analysis system to safeguard their networks from potential attacks. The ability to identify and mitigate security risks proactively is crucial in maintaining the confidentiality, integrity, and availability of network resources. The modular nature of this system ensures that all critical aspects of network security are addressed comprehensively, leaving no potential attack vectors overlooked. By integrating network enumeration, automated scanning, file permissions review, network traffic capture, credential testing, and privilege escalation simulation into a single framework, organizations can achieve a holistic and proactive approach to cybersecurity. The insights generated from this system empower security teams to make informed decisions, prioritize security measures, and strengthen overall network resilience against evolving threats. The significance of such an advanced vulnerability assessment system cannot be overstated, as it provides organizations with the necessary tools to stay ahead of cyber adversaries and protect their network infrastructure from potential breaches.

ABINASH K &
VAISHNAVI J
Final Year B.Tech(IT)

STARTUP SPOTLIGHT: THE JOURNEY OF SPARK WEBSERVICES

Empowering Businesses Through Innovative Technology Solutions

In the ever-evolving digital landscape, businesses need innovative solutions to stay ahead. Spark Webservices, founded in 2022, is committed to crafting cutting-edge software that drives digital transformation. Whether it's custom software development, mobile apps, or cloud solutions, Spark Webservices is your trusted technology partner.

Our Mission

At Spark Webservices, our mission is to simplify lives, enhance productivity, and foster learning through innovative software solutions. We strive to bridge the gap between businesses and technology, making digital transformation seamless and efficient.

Our Vision

We aspire to be the leading technology partner for businesses embracing digital innovation, ensuring growth and success in the digital era.

Meet the Founders

Spark Webservices was founded by three visionary entrepreneurs:

- Syed Suhail Ahmed – A tech expert specializing in cutting-edge technology.
- Anish Kumar.S – Leading with creativity and innovation.
- Syed Mustafa – Ensuring operational excellence with strategic execution.

What started as a passion project among students has grown into a thriving startup committed to solving real-world problems. Their expertise and dedication drive Spark Webservices toward a future where technology empowers communities and revolutionizes education.

Our Services

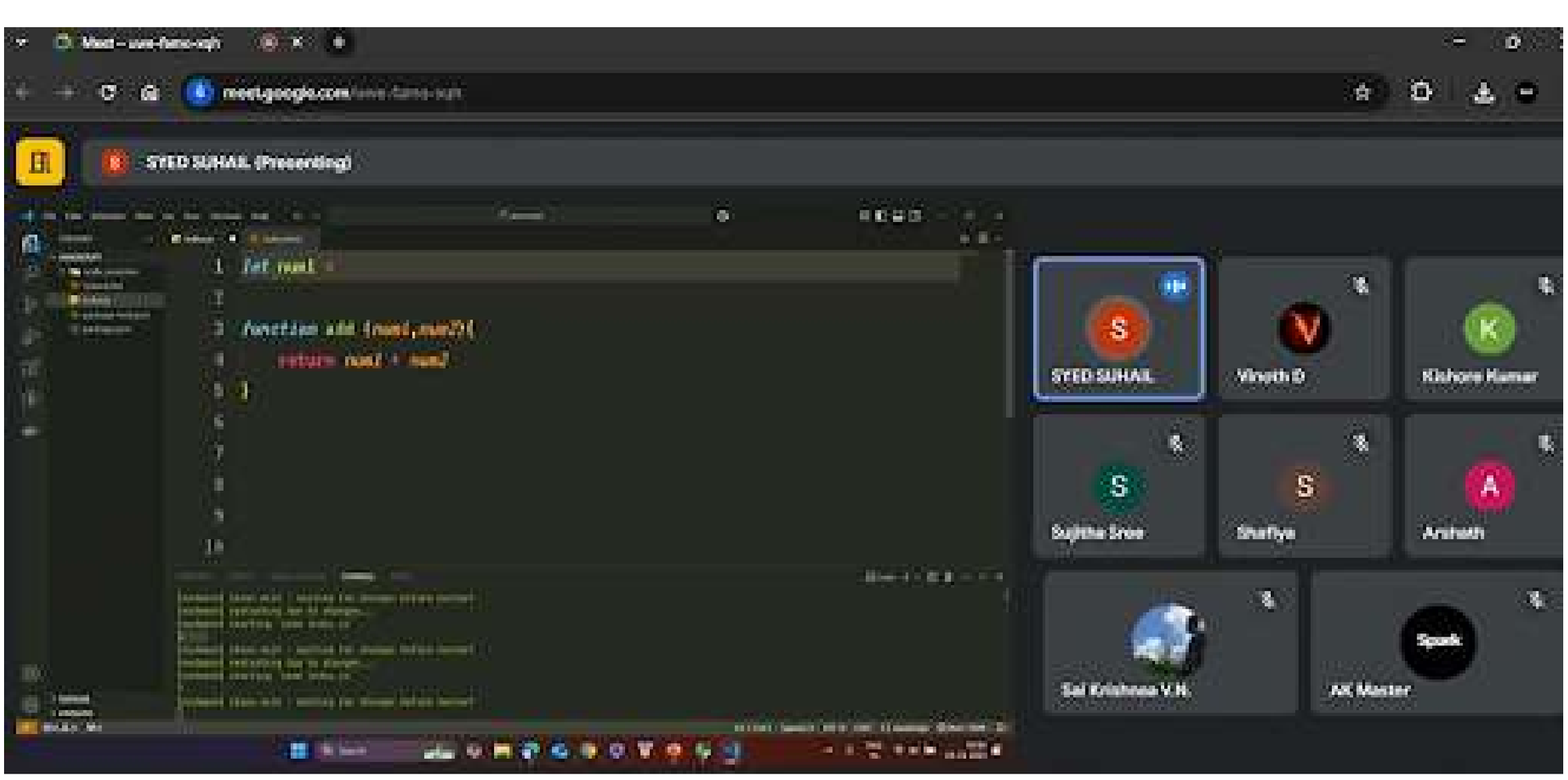
Spark Webservices offers a wide range of technology solutions, including:

✅ Custom Software Development – Tailored solutions designed for specific business needs.

✅ Web Development – Responsive and modern web applications built with the latest technologies.

✅ Mobile App Development – Creating intuitive and efficient apps for iOS and Android.

✅ Database Solutions – Optimized database management for seamless data handling.
✅ Cloud Services – Scalable cloud migration and management solutions.
✅ SFX Services – Custom sound effects that enhance projects with high-quality audio elements.



Spark education First internship

Building the Future: Education & Internships
Beyond software solutions, Spark Webservices is passionate about education. Through our venture Spark Education, we provide students with hands-on industry experience and internship programs. Our first successful internship program was conducted on January 10, 2025, equipping 35+ students with the latest industry trends and tools.
A Recognized & Registered Company
Spark Webservices is a recognized MSME-registered company (UDYAM-TN-02-0340730), ensuring credibility and trust in the industry.
Join us as we continue to innovate and inspire the next generation of tech leaders!
🌐 Visit us at www.sparksolution.org

SYED SUHAIL AHMED
Third Year B.Tech(IT)

CLIMATE-ADAPTIVE CROP CULTIVATION RECOMMENDATION SYSTEM USING RF WEIGHTED KNN

Technology has been a cornerstone of human civilization, evolving from primitive tools to sophisticated artificial intelligence systems. Over the centuries, advancements in technology have not only simplified daily tasks but also reshaped industries, economies, and lifestyles. The rapid pace of technological innovation has transformed the way people communicate, work, and interacts with the world around them. From the industrial revolution to the digital age, every phase of technological development has brought about significant changes, both beneficial and challenging.

One of the most profound impacts of technology is seen in agriculture. The agricultural sector is increasingly challenged by climate change, with unpredictable precipitation patterns, rising temperatures, and extreme weather events affecting crop yields, water availability, and the crop growth for co2 emission. These issues, compounded by erratic rainfall and poor economic conditions, have made it difficult for farmers to accurately estimate crop cultivation.

Existing solutions typically rely on the Random Forest Regression algorithm to predict crop yields under various climate scenarios. However, these methods may not fully capture the complexities of climate and agricultural data when applied as a single model. To address these limitations, we propose an enhanced prediction and recommendation system that uses RF Weighted KNN. This approach involves training Random Forest and K-Nearest Neighbors (KNN) algorithms together, leveraging their complementary strengths to reduce prediction error and improve overall performance compared to traditional models.

The proposed system provides optimal crop suggestions based on historical climate data, rainfall patterns, and current soil conditions. By analyzing past and present environmental variables, the system helps farmers make informed decisions, improve productivity, and promote sustainable agriculture by adapting to changing environmental conditions and supporting food security in the face of climate variability.

The system integrates multiple data sources, including: Agricultural Data: Crop types, yields, and environmental factors. Meteorological Data: Rainfall patterns and real-time weather information. Environmental Data: Co2 levels affecting agriculture.

Data processing follows an ELT (Extract, Load, Transform) methodology, ensuring data integrity and transformation flexibility. Exploratory data analysis (EDA) is conducted to detect anomalies and optimize feature selection.

The proposed model involves: Random Forest (RF): An ensemble learning algorithm utilizing multiple decision trees for classification and regression. K-Nearest Neighbors (KNN): A supervised learning algorithm that predicts based on the k-most similar training instances. RF Weighted KNN: A hybrid model combining RF and KNN, assigning weight-based probability distributions for final predictions.

During training, each model generates separate predictions, and the RF Weighted KNN model determines final outcomes through a probability-based approach. This integration enhances predictive accuracy and optimizes decision-making for farmers in diverse climatic conditions.

The proposed RF Weighted KNN model significantly improves crop recommendation accuracy compared to standalone RF and KNN models. The model's performance is validated through: Accuracy Computation: Comparative analysis of prediction results. Hybrid Decision-Making: Dynamic blending of RF and KNN predictions. Enhanced Productivity: Reduced prediction error and better crop recommendations.

This study presents a climate-adaptive crop cultivation recommendation system utilizing RF Weighted KNN to enhance agricultural decision-making. By integrating machine learning techniques and data-driven insights, the system empowers farmers with actionable recommendations tailored to specific environmental conditions. The results indicate a significant improvement in prediction accuracy and resilience against climate variability. Future work will focus on expanding data sources and optimizing model parameters for even greater predictive efficiency.

Thiyagarajan V
Second Year M.Tech(IT)

IPV6: THE FUTURE OF INTERNET ADDRESSING

The internet has become an essential part of our daily lives, connecting billions of devices worldwide. However, the current system that assigns unique addresses to these devices, IPv4, is running out of space. With only 4.3 billion unique addresses available, IPv4 simply can’t keep up with the growing number of connected gadgets, from smartphones and laptops to smart home devices and industrial sensors. To solve this problem, IPv6 was developed, offering an almost limitless number of unique addresses—around 340 undecillion. This means that every device can have its own dedicated IP address, eliminating the need for workarounds like Network Address Translation (NAT), which IPv4 relies on to extend its lifespan. With IPv6, devices can communicate directly, making networks more efficient and easier to manage.

But IPv6 isn’t just about more addresses—it also improves security and performance. One of its standout features is IPsec (Internet Protocol Security), which provides built-in encryption and authentication, making online communication safer. This is especially important today, as cybersecurity threats are increasing and protecting personal and business data is a top priority. IPv6 also speeds up data transfer by reducing network congestion and latency. Since IPv4 depends on NAT, which requires extra processing, connections can sometimes slow down. IPv6 eliminates this inefficiency, leading to faster and more reliable performance, particularly for things like video streaming, online gaming, and cloud computing.

Another major improvement with IPv6 is stateless address autoconfiguration (SLAAC). This allows devices to automatically assign themselves an IP address without needing a central DHCP server, making network setup much easier. IPv6 also improves the way data moves across networks by using a more efficient routing system. This reduces bottlenecks, enhances reliability, and makes large networks run more smoothly—something that’s especially useful for businesses and internet service providers.

Despite all these advantages, IPv6 adoption has been slow. Many organizations hesitate to switch because upgrading network infrastructure can be costly, and older systems may not be fully compatible. Additionally, IT teams need to be trained to work with IPv6, which requires time and resources. However, many major tech companies, including Google, Facebook, Amazon, and Microsoft, have already embraced IPv6, ensuring that their services are future-proof. Governments in countries like the United States, China, and India are also encouraging IPv6 adoption, recognizing that it's essential for digital growth, innovation, and security.

The need for IPv6 is becoming more urgent as technologies like 5G, the Internet of Things (IoT), and artificial intelligence (AI) continue to expand. With billions of new devices coming online each year, IPv6 provides the scalability needed to support them. In particular, 5G networks benefit from IPv6's ability to handle a massive number of simultaneous connections while keeping latency low, which is crucial for real-time applications like self-driving cars and smart cities.

For businesses, upgrading to IPv6 is no longer just a recommendation—it's a necessity. As more networks transition to IPv6, those that stick with IPv4 may face compatibility issues, security risks, and performance limitations. Internet service providers and cloud platforms are already prioritizing IPv6, meaning businesses that delay the switch could struggle to keep up with evolving technology.

At its core, IPv6 is about preparing the internet for the future. It provides the foundation for faster, safer, and more scalable connectivity, ensuring that we can continue to innovate without worrying about running out of IP addresses. While the transition may take time, it's clear that IPv6 is the key to a more connected and efficient digital world. The sooner businesses, governments, and individuals embrace it, the better positioned they'll be for the internet's next evolution.

A.MOHAMED FAZIL
Second year B.Tech(IT)

THE FUTURE OF QUANTUM COMPUTING IN CYBERSECURITY

Technology is advancing at an incredible pace, and with every step forward, our digital world becomes more complex. One of the most exciting yet daunting developments is quantum computing. While this cutting-edge technology has the potential to revolutionize industries, it also brings a significant challenge to cybersecurity. In the near future, the encryption methods we rely on today may no longer be secure, forcing us to rethink how we protect our data.

Quantum computing is fundamentally different from classical computing. Instead of using traditional bits, which can be either 0 or 1, quantum computers use qubits, which can exist in multiple states at once due to a phenomenon called superposition. Additionally, qubits can be entangled, meaning their states are interconnected even if they are separated by great distances. These properties enable quantum computers to solve problems much faster than even the most powerful classical supercomputers.

Most of our current security systems, including RSA encryption, rely on complex mathematical problems that would take classical computers millions of years to crack. However, quantum computers, using algorithms like Shor's Algorithm, could break these encryptions in mere seconds. This means that once quantum computers become powerful enough, sensitive information like financial transactions, medical records, and even government communications could be at risk. Confidential data stored using traditional encryption could become instantly accessible to hackers. Cryptographic keys securing blockchain networks, including cryptocurrencies, may be compromised. Countries investing in quantum computing could use it for intelligence gathering, making encrypted government communications vulnerable.

To combat these risks, researchers are working on Post-Quantum Cryptography (PQC), a new set of encryption methods designed to withstand quantum attacks. Some promising approaches include lattice-based cryptography, which uses complex geometric structures to make breaking encryption extremely difficult, and hash-based cryptography, which relies on cryptographic hash functions that remain secure even against quantum computers. Quantum Key Distribution (QKD) is another futuristic approach that uses quantum mechanics itself to create ultra-secure communication channels. If a hacker tries to intercept the data, the quantum state changes, immediately alerting both parties.

The transition to quantum-resistant encryption is already in motion, with governments and tech companies actively investing in solutions. While we are still a few years away from quantum computers reaching their full potential, it is crucial to prepare now to ensure that our digital world remains secure. Quantum computing is both an incredible opportunity and a serious challenge. While it has the power to drive innovation and solve problems that were once thought impossible, it also threatens the very foundation of our current security systems. The key to staying ahead is embracing change, investing in quantum-safe encryption, and being proactive about cybersecurity. The future is quantum—let’s make sure we’re ready for it!

Arshath Ahamed A
Second year - B.Tech (IT)

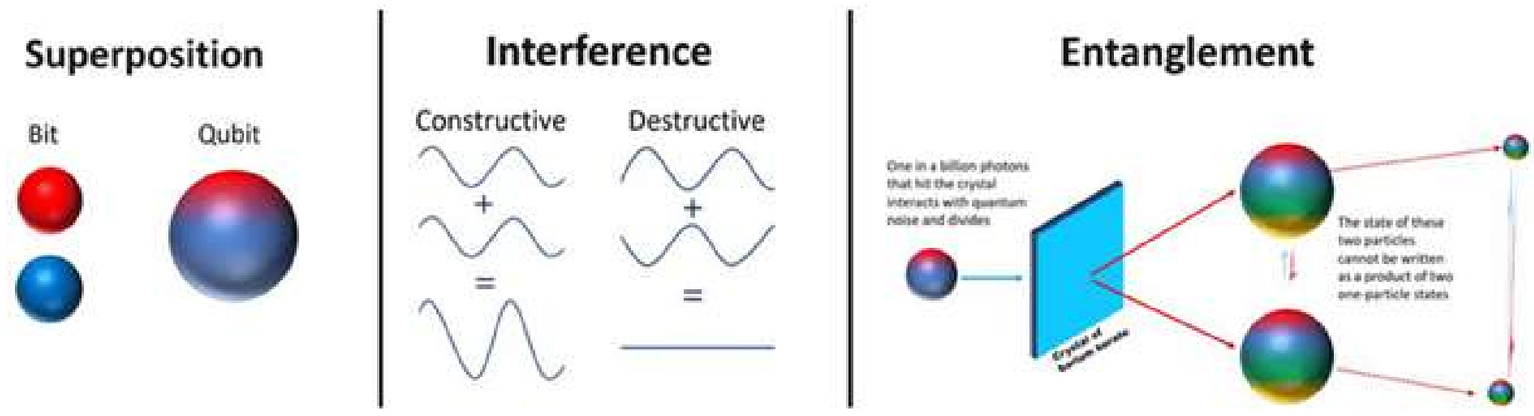
THE RISE OF QUANTUM COMPUTING: A NEW ERA OF COMPUTING POWER

Quantum computing is an emerging field that combines computer science, physics, and mathematics to solve problems far beyond the capability of classical computers. It uses quantum bits (qubits), which can exist in multiple states simultaneously, enabling faster and more efficient computations. Though still in development, quantum computing is expected to transform industries like healthcare, finance, and logistics.

Core Principles:

1. Superposition: Unlike classical bits, which are either 0 or 1, qubits can represent both 0 and 1 at the same time. This allows quantum computers to perform many calculations in parallel, offering a significant speed advantage for specific tasks.
2. Quantum Entanglement: This phenomenon allows qubits to be linked, so the state of one qubit can instantly affect another, no matter the distance. This interconnection enhances computational efficiency.
3. Quantum Interference: Quantum systems use interference to amplify correct solutions and cancel out incorrect ones, improving the accuracy of the results.

These principles enable quantum computers to solve certain problems exponentially faster than classical systems.

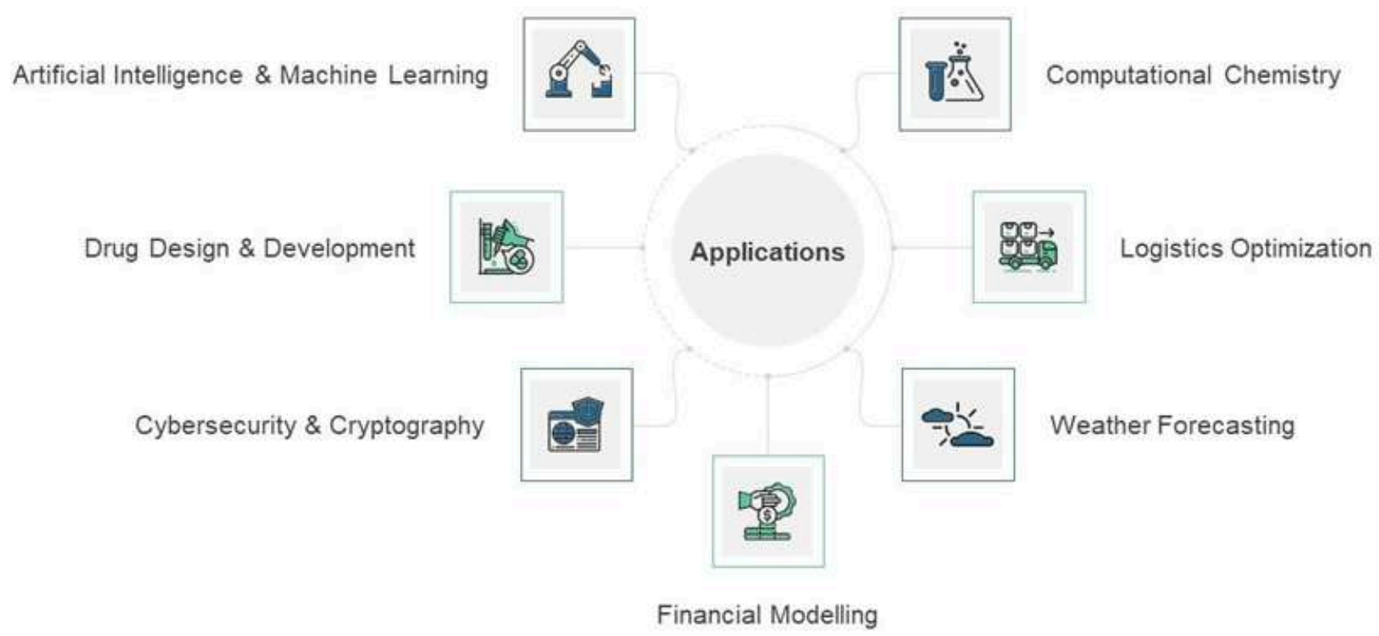


Quantum computers use quantum circuits made up of qubits, where each qubit can interact with others through quantum gates. Unlike classical computers, which process information step by step, quantum computers can handle multiple possibilities at once, making them more efficient for certain types of complex problems. However, quantum computers are probabilistic, meaning they calculate the most likely solution rather than a definite result.

Applications:

Quantum computing promises advancements in several sectors:

- Pharmaceuticals & Material Science: It can speed up drug discovery and materials development by simulating molecular interactions.
- Optimization: Quantum algorithms can optimize logistics, scheduling, and resource allocation, benefiting industries like aerospace and manufacturing.
- Cybersecurity: Quantum computers could potentially break traditional encryption methods but also pave the way for more secure quantum-based encryption systems.



Despite its potential, quantum computing faces challenges such as quantum decoherence, where qubits lose their quantum state, and the difficulty of scaling up to larger systems. Error correction and stability remain significant research areas

Quantum computing is set to usher in a new era of technological advancement. With its ability to harness the unique properties of quantum mechanics—such as superposition, entanglement, and interference—quantum computers can tackle problems that are currently beyond the capabilities of classical computers. Though there are still challenges to overcome, the ongoing advancements in quantum technology signal a future where quantum computers may solve some of the world's most pressing problems, from curing diseases to revolutionizing industries. As the field continues to evolve, it will undoubtedly change the way we understand computation and open doors to new possibilities we can only begin to imagine.

S.Mohamed Safiq &
A.Afsal Ali
Second year - B.Tech (IT)

Advancing AI & Big Data Analytics: My Journey at NUS GAIP Winter 2024

I am thrilled to share my experience of completing the GAIP Winter 2024 Program on Big Data Analytics with Deep Learning at the National University of Singapore (NUS). This immersive 21-day Global Academic Internship Program provided me with deep insights into AI, Machine Learning, and Big Data Analytics, enhancing my technical expertise and problem-solving abilities.

I worked on developing an AI-powered product recommendation system using LSTM and SARIMA models. The project aimed to predict trending resale products and identify trusted vendors, helping small businesses optimize their inventory and maximize profitability.

This project focused on enhancing storage capacity and streamlining inventory management for small businesses. Our team developed practical solutions to improve warehouse efficiency, space utilization, and inventory forecasting.

During the program, I gained hands-on experience with:
✅ Machine Learning & Deep Learning – LSTM, SARIMA, Generative AI, Reinforcement Learning
✅ Big Data Analytics – Data processing, clustering, regression analysis
✅ AWS Tools – SageMaker, S3, Lambda for AI model deployment

This internship has been an enriching experience, allowing me to work on real-world AI-driven solutions while gaining exposure to cutting-edge technologies and industry best practices. I am excited to apply these skills to future projects and contribute meaningfully to the AI and data analytics field.

Aafreen Marzuqa A
Final year - B.Tech (IT)

The Global Academic Internship Programme (GAIP)
Our International Internship Experience at NUS

The Global Academic Internship Programme (GAIP) – Winter 2024 at the National University of Singapore (NUS) was an enriching and transformative experience for us. Conducted in collaboration with Amazon Web Services (AWS) and Corporate Gurukul, this program provided a unique opportunity to explore advanced topics in Big Data Analytics and Deep Learning while immersing ourselves in Singapore's academic and cultural landscape.

Upon receiving the offer from NUS, we embarked on our journey to Singapore, eager to gain hands-on experience and collaborate with international peers. The 21-day intensive program was structured with a blend of classroom sessions, hands-on projects, and industry interactions. We delved into various aspects of Artificial Intelligence (AI), Machine Learning (ML), and Big Data Analytics, working with advanced tools such as AWS SageMaker, Lambda, and S3 for AI model deployment.

The academic curriculum covered a wide range of topics, including Long Short-Term Memory (LSTM) networks, SARIMA models, Generative AI, and Reinforcement Learning. We were allocated to different project groups, allowing us to work alongside students from various universities.

This collaboration helped us develop teamwork skills and exposed us to different perspectives in approaching data-driven solutions. As part of our assignments, we worked on two major projects: a group project for NUS and an individual project for AWS. The group project required us to apply our knowledge to real-world AI challenges, while the individual project focused on leveraging AWS technologies to develop innovative AI-driven applications. This dual-project approach deepened our technical understanding and prepared us for future industry roles.

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Apart from the technical aspects, the internship also provided a glimpse into Singapore's vibrant culture. We explored the city's diverse landmarks, engaged with professionals from NUS and AWS, and attended insightful networking sessions. These interactions not only broadened our academic knowledge but also gave us a better understanding of global work cultures and industry expectations.

The GAIP program at NUS was more than just an academic internship—it was a journey of self-improvement, cultural exchange, and professional growth. The experience of collaborating with international students, working on real-world AI projects, and receiving guidance from top professors and industry experts has strengthened our confidence and problem-solving abilities. As we reflect on our time at NUS, we can confidently say that this program has equipped us with valuable skills and knowledge that will significantly contribute to our future careers. We are grateful for this opportunity and look forward to applying our learnings in upcoming projects and research endeavors. This internship was truly a once-in-a-lifetime experience, blending academic excellence with global exposure, and we highly recommend it to future aspiring data scientists and AI enthusiasts!

Noorul Hassan M U,
Aafreen Marzuqa A &
Renukanthan K
Final year - B.Tech (IT)

NON-TECHNICAL ARTICLE

VIDEO EDITING

The process of producing videos must include video editing. The quality of your video will primarily depend on the editing methods you employ, regardless of whether you are a professional or an amateur filmmaker. In this article, we'll provide you with some tricks and approaches for producing visually stunning videos.

It's crucial to plan your video before you begin recording. Choosing the style of video you want to make, the narrative you want to present, and the images you need to take are all parts of this process. The editing procedure will be simpler and more effective if you have a clear plan in mind. Once you have finished recording, it's crucial to arrange your footage. This entails organizing your clips into folders and identifying them correctly, making it easier to find the clips you need during the editing process.

Selecting the appropriate software is essential for video editing. There are numerous choices, ranging from straightforward programs like iMovie to sophisticated programs like Adobe Premiere Pro. For mobile users, apps like Alight Motion and Kinemaster provide powerful editing features, whereas PC users can opt for DaVinci Resolve, Final Cut Pro, and Sony Vegas Pro. Select the program that best meets your needs and level of expertise. Cutting is one of the most crucial components of video editing. It's vital to cut with a purpose in mind, ensuring that every edit advances the plot and contributes to a seamless narrative. Transitions can add visual interest, but they should be used sparingly to maintain the quality of the video. Color correction is another crucial step in the video editing process. Adjusting colors can make your footage look more polished and professional. Most editing software includes built-in color correction tools, though independent programs are also available.

Sound design is an often-overlooked component of video editing. Incorporating voiceovers, music, and sound effects can significantly improve the emotional impact and engagement of your video. Once your video is fully edited, it's time to export and share it. Ensure that you optimize your video by selecting the right file format and resolution for the platform where you intend to distribute it.

With mobile apps like Alight Motion and Kinemaster, video editing has become more accessible. Alight Motion enables you to produce industry-standard motion graphics and video effects with features such as layer-based editing, keyframe animation, and visual effects. Similarly, Kinemaster offers multi-layer editing, keyframe animation, and advanced audio tools, making it one of the best mobile editing applications. For PC users, Adobe Premiere Pro remains a top choice for professionals, while DaVinci Resolve provides powerful free editing tools with advanced color correction and visual effects.

The video editing process involves several key steps. Start by importing your footage into the editing software, whether on mobile or PC. Trim your video to the desired length, removing any unnecessary sections. Add visual effects to enhance the overall look, incorporating elements such as glitch, distortion, and blur for creative appeal. Include audio by adding music, voiceovers, and sound effects, adjusting volume levels as necessary. Adding text can also help convey information effectively, with both mobile and PC software offering various fonts and text styles. Once your editing is complete, export your video in the appropriate format and resolution. Many editing tools also allow direct uploads to platforms like YouTube and Instagram.

In conclusion, mobile and PC video editing has become more accessible and user-friendly. With the help of apps like Alight Motion and Kinemaster for mobile users and software such as Adobe Premiere Pro, DaVinci Resolve, and Final Cut Pro for PC users, anyone can create high-quality videos. By following the steps outlined in this guide, you can enhance your video editing skills and produce captivating content for your audience.

Vigneshwaran G
Final Year B.Tech(IT)

DON’T MASTURBATE IT; LET’S MANIFEST IT

Turn Dreams into Reality: The Power of Action, Focus, and Consistency

As human beings, we all dream of success whether it’s a thriving career, a meaningful life, or personal achievements. These dreams often ignite a spark of excitement within us. We imagine ourselves as successful individuals, living the life we’ve always wanted. But imagining success and achieving it are two very different things. The gap between dreaming and succeeding is bridged by action, perseverance, and a focused mindset.

It’s important to acknowledge that the path to success isn’t always smooth. The first step can be the hardest. It requires courage to step out of your comfort zone and into the unknown. However, this first step is the cornerstone of all future achievements. No one starts out perfect, but each small action builds momentum, helping you move closer to your goals.

Start with Action

The first step is often met with resistance, self-doubt, fear of failure, and external distractions. But progress begins when you take action, even if it’s imperfect. Remember, it’s not about perfection but persistence. Start small and remain consistent. For instance, if your dream is to write a book, don’t focus on finishing it overnight. Commit to writing a single page every day.

Action also gives clarity. Imagine standing at the base of a mountain, wanting to reach the top but not knowing the exact route. It’s only when you take your first steps that the path becomes clearer. Similarly, when you start working on your goals, the challenges, opportunities, and solutions begin to reveal themselves.

The Impact of Technology

One of the biggest distractions in today’s world is technology. While it has made life more convenient, it also comes with the risk of overindulgence. Many of us lose precious hours scrolling through social media, binge-watching shows, or consuming endless streams of information. These activities, though entertaining, can drain our energy and divert us from our goals.

However, technology can also be a powerful tool if used wisely. For instance, instead of spending hours on social media, you could use learning platforms like Coursera or Udemy to gain new skills. Apps like Notion or Trello can help you organize tasks, and digital tools can track your progress toward your goals.

The key is balance. By controlling your screen time and being mindful of how you use technology, you can transform it into an ally rather than a distraction. Schedule periods of digital detox to reconnect with yourself, spend time with loved ones, or engage in activities that nourish your soul.

Prioritize Mental and Emotional Well-Being

Achieving success isn't just about working hard; it's also about maintaining mental and emotional balance. In the hustle of life, it's easy to neglect our well-being, but this can lead to burnout and diminished productivity.

To nurture your mind, incorporate habits that bring inner peace. Start your day with mindfulness practices such as meditation, journaling, or prayer. These practices calm your mind, help you focus, and set the tone for a productive day. Journaling, for instance, is a powerful tool to declutter your thoughts, reflect on your progress, and set clear intentions for the future.

Physical activity is equally important. A simple walk, yoga session, or workout can improve your mood and boost your energy. When your mind and body are aligned, you're better equipped to tackle challenges and stay committed to your goals.

The Role of Consistency

Consistency is the secret ingredient to success. It's not about making grand gestures once in a while but about showing up every single day. Even small, consistent efforts compound over time to create significant results. Think about a dripping faucet, it may seem insignificant at first, but over time, those tiny drops can fill an entire bucket.

Maintaining consistency can be challenging, especially when motivation fades. That's why it's essential to build habits and routines. Start by creating a daily to-do list. Break your tasks into manageable chunks and prioritize them. Celebrate small wins along the way, as they keep you motivated and reinforce positive behavior.

A great example of consistency is Thomas Edison. It's said that he failed over a thousand times before successfully inventing the light bulb. When asked about his failures, he famously remarked, "I have not failed. I've just found 10,000 ways that won't work." Edison's unwavering consistency and determination led to one of the most significant inventions in history.

The Power of Visualization

While action is crucial, visualization also plays a key role in achieving success. When you visualize your goals, you create a mental blueprint of what you want to achieve. Visualization helps you stay focused, motivated, and aligned with your aspirations.

For example, athletes often use visualization techniques to improve their performance. Before a race, a sprinter might mentally rehearse running the track, feeling the adrenaline, and crossing the finish line. This mental practice enhances their confidence and prepares them for success.

You can apply the same principle in your own life. Spend a few minutes each day visualizing your goals. Imagine the joy of achieving them and the steps you need to take. Pair this practice with action, and you'll find yourself moving closer to your dreams.

Learn from Failures

Failure is an inevitable part of the journey toward success. Instead of fearing it, embrace it as an opportunity to learn and grow. Every setback teaches you something valuable and strengthens your resilience.

Take the example of J.K. Rowling, the author of the Harry Potter series. Before achieving worldwide success, Rowling faced numerous rejections from publishers. Despite the setbacks, she persisted, believing in her story and her abilities. Today, her books are among the best-selling of all time.

The key is to view failure not as an endpoint but as a stepping stone. Analyze what went wrong, make adjustments, and keep moving forward. Each failure brings you one step closer to success.

Surround Yourself with Positivity

Your environment plays a significant role in shaping your mindset and influencing your actions. Surround yourself with people who inspire, motivate, and support you. Avoid toxic relationships that drain your energy or discourage you from pursuing your dreams.

Additionally, consume content that uplifts you, read motivational books, listen to inspiring podcasts, or watch educational videos. The more positivity you absorb, the more empowered you'll feel to take action.

From Dreams to Reality

Success is not a result of wishful thinking it's the outcome of deliberate action, focus, and consistency. While dreaming sets the foundation, it's your efforts that bring those dreams to life.

Take control of your habits, use technology wisely, and prioritize your mental and emotional well-being. Be consistent in your actions and embrace failure as part of the process. Remember, the journey may be challenging, but the rewards are worth it.

As you embark on this journey, let go of distractions, stay committed, and believe in yourself. Your dreams are within reach all it takes is the courage to take the first step and the determination to keep going. So, start today. Your future self will thank you for it.

Shameem Fathima M.J
Final Year B.Tech(IT)

ART

MUHAMMAD SALMAN S
Final Year B.Tech(IT)

ART OF DEFENSE – SILAMBAM

Silambam – An ancient Indian martial art that shaped Southeast Asian combat traditions. The word 'Silambam' comes from Tamil, where 'Silam' means hill and 'Bam' refers to bamboo, symbolizing its origins as a martial art practiced with bamboo sticks in the hilly regions of Tamil Nadu. It also deeply rooted in Tamil history, finds its earliest mentions in Sangam literature (c. 2nd century BCE – 2nd century CE), where it is praised as the martial art of ancient Tamil warriors and kings. The epic Silappatikaram describes how warriors trained in Silambam to protect their land. The mighty Chera, Chola, and Pandya dynasties patronized this art, incorporating it into their military training.

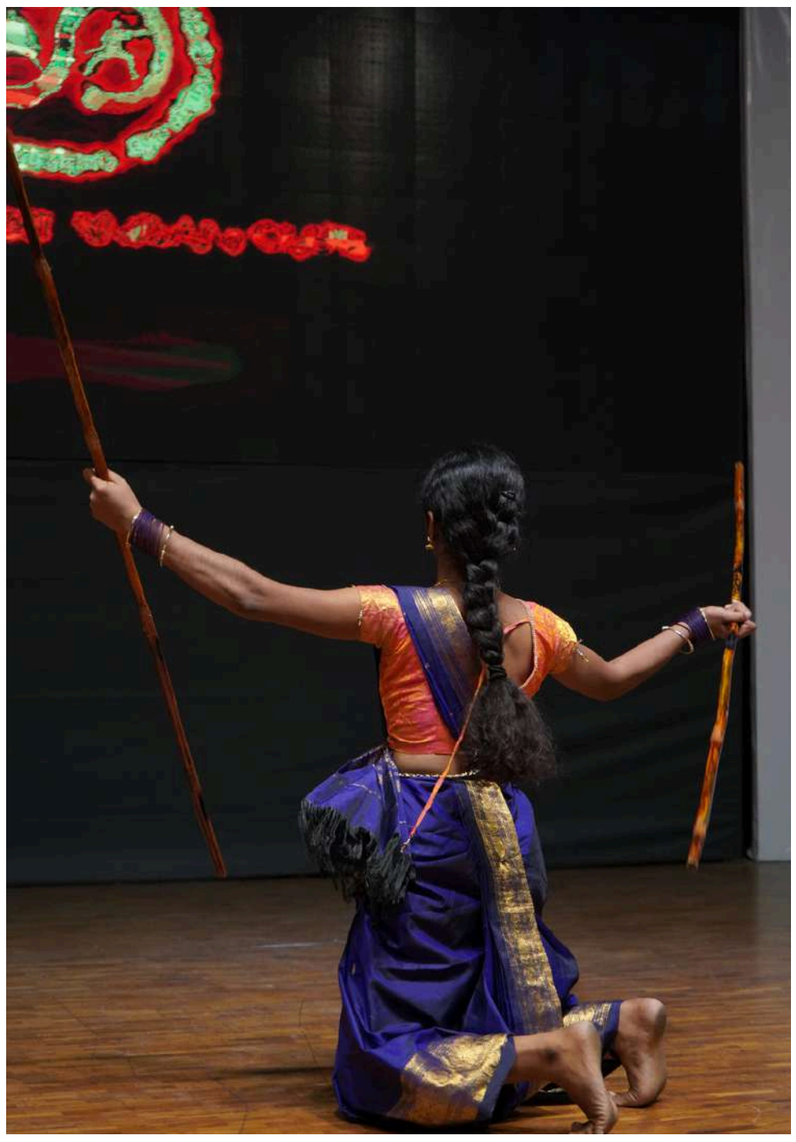
Notably, Veerapandiya Kattabomman, a freedom fighter, and his army were skilled in Silambam, using it against British colonial forces. Even Bodhidharma, the legendary monk credited with influencing Chinese martial arts, is believed to have been trained in Silambam before spreading his knowledge to the East.

A legacy of kings and warriors, Silambam remains a symbol of Tamil heritage, blending history, combat, and cultural pride.
Silambam is a dynamic Indian martial art that sharpens combat skills using sticks, swords, knives, and more. Training follows a systematic progression, with each weapon taking three months to learn with one hand and six months to master with both. Full mastery demands five years of dedicated practice.

Every move begins with unarmed techniques, laying the foundation for weapon-based combat. Training flows from simple to advanced techniques, refining both skill and agility. After mastering solo movements, warriors engage in synchronized sparring, turning practice into a rhythmic dance of precision and power.

Techniques in Silambam

- Kuttu Varisai – The unarmed movements in
- Silambam (footwork and the use of hands and fingers as weapons).
- Kambu Veechu – The rotation of a single long staff/stick to block and deflect attacks.
- Alangara Veechu – The decorative rotation of a long staff/stick.
- Velkambu Veechu – The rotation of Vel (spear), a wooden stick that is long, flat, and sharp on one end.
- Vaal Veechu – Sword techniques.
- Surul Vaal Veechu – The techniques with a flexible whip-like sword.
- Erattai Kambu Veechu – The rotation of two staff/sticks using both hands.
- Erattai Vaal Veechu – The simultaneous rotation of two swords with both hands.
- Erattai Surul Vaal Veechu – The rotation of two flexible whip-like swords.
- Maan Kombu Veechu – Movements using the horn of a deer.



Silambam is not just about combat—it's a holistic discipline that enhances physical fitness, mental agility, and self-defense skills. The rigorous footwork and weapon techniques improve coordination, reflexes, and balance, making practitioners faster and more adaptable.

Beyond physical strength, Silambam instills discipline, focus, and self-confidence, shaping both the body and mind. It serves as an excellent workout, boosting stamina, flexibility, and cardiovascular health. Additionally, mastering Silambam connects learners to a rich cultural heritage, preserving an ancient legacy while empowering individuals with modern-day self-defense skills.

Gunalini R
Third Year B.Tech(IT)

INDUSTRIAL VISIT

The final-year students of B.Tech IT (2021-2025 batch) and M.Tech IT went on an industrial visit to the U.R. Rao Satellite Centre (URSC) in Bangalore on April 29, 2024. URSC, a key establishment under the Indian Space Research Organisation (ISRO), is at the forefront of satellite development in India. The visit provided us with an opportunity to gain insights into the advancements in space technology and satellite engineering.

During the visit, the experts at URSC explained the success of Chandrayaan-3 and how they overcame the challenges faced in Chandrayaan-2. They shared valuable knowledge on mission planning, techniques, and the rigorous testing processes involved in satellite launches. We also got a brief exploration of their facilities. The visit was an enriching experience, enhancing our understanding of space technology and inspiring us about India's progress in space exploration

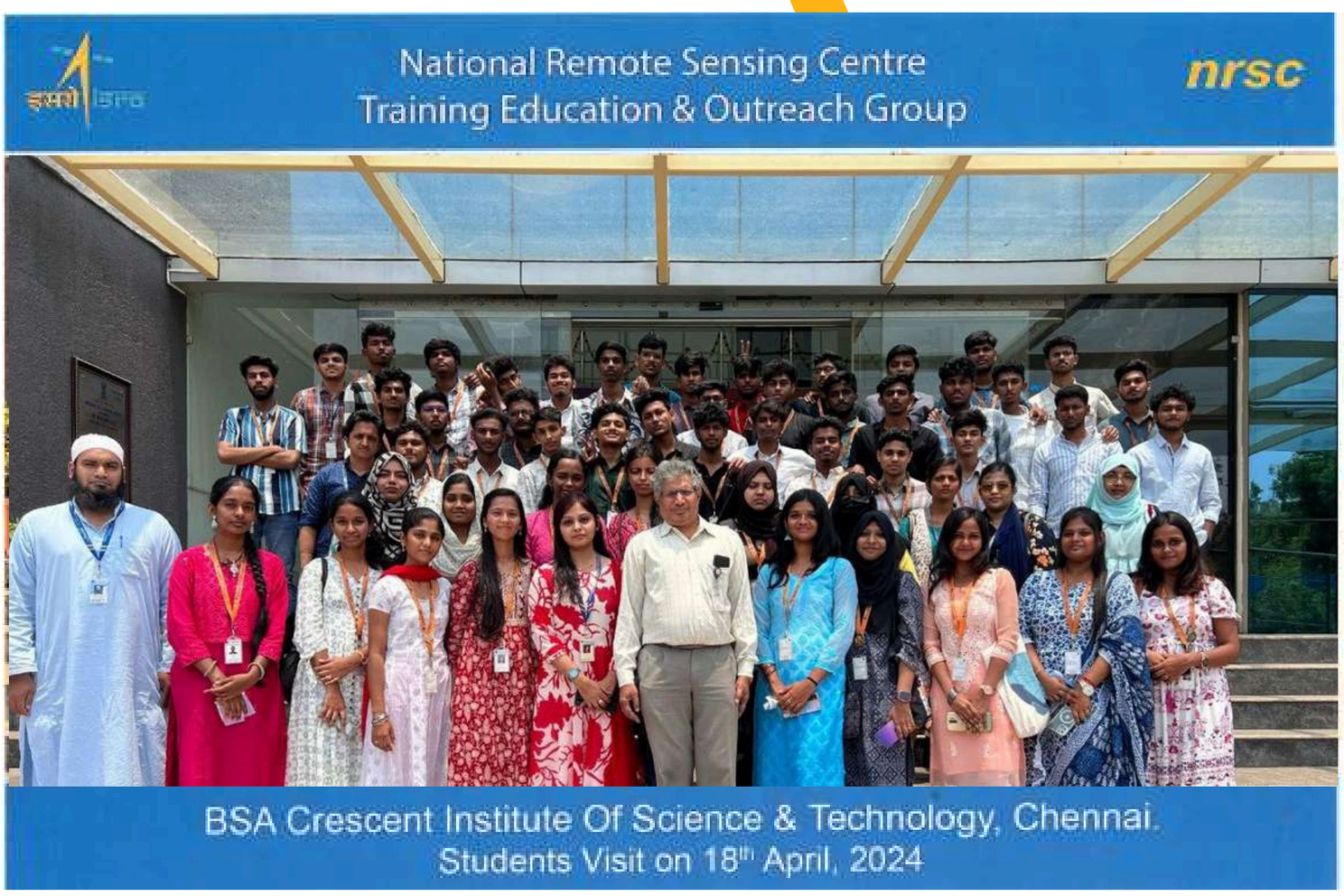
INDUSTRIAL VISIT

The 3rd-year and 2nd-year students of B.Tech IT visited the Council of Scientific & Industrial Research (CSIR) in Bangalore on September 26, 2025, as part of an industrial visit. CSIR, a premier research organization in India, is known for its contributions to various fields of science and technology.

During the visit, experts at CSIR provided valuable insights into cutting-edge research and innovations across multiple domains, including biotechnology, artificial intelligence, and materials science. They shared knowledge on recent advancements, research methodologies, and the impact of their work on real-world applications. Additionally, we explored some of their state-of-the-art laboratories and facilities, gaining a deeper understanding of ongoing projects.

The visit was a highly enlightening experience that provided us with valuable insights into the world of scientific research. It expanded our understanding of cutting-edge innovations, methodologies, and technological advancements, allowing us to appreciate the immense impact of research in various fields. Witnessing firsthand the dedication and expertise of researchers deepened our curiosity and motivated us to actively engage in scientific exploration. This experience has not only broadened our perspective but has also inspired us to contribute meaningfully to future technological advancements by applying the knowledge and skills we have gained.

INDUSTRIAL VISIT



The 2nd-year (4th semester) B.Tech IT students and final-year M.Tech IT students visited the National Remote Sensing Centre (NRSC), ISRO, in Hyderabad on April 18, 2024, as part of an industrial visit. NRSC plays a crucial role in remote sensing, satellite data analysis, and geospatial applications in India.

During the visit, experts at NRSC provided an in-depth understanding of satellite-based remote sensing, data acquisition, and its applications in fields like disaster management, environmental monitoring, and urban planning. They explained how advanced satellite imagery is processed and utilized for various scientific and industrial purposes. Students also had the opportunity to explore NRSC's high-tech facilities and observe real-time data analysis operations.

The visit was an informative and inspiring experience, giving us valuable exposure to the applications of space technology and its impact on society

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