**List of Projects: 2024-25**

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| SNo | Dept | Guide | USNs | Title | Status | Abstract |
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| 1 | EC | Dr. Shrikanth Rao S.K. | 4VP21EC003<br>4VP21EC015<br>4VP21EC041<br>4VP21EC030 | Yoga Asana Detection alignment of Asana | Functional | This project presents a real-time Yoga asana detection and alignment system using computer vision techniques to help users perform yoga poses correctly without the need for a physical instructor. The system utilizes Mediapipe for human pose estimation, identifying key body landmarks from a live camera feed. These coordinates are then used in a rule-based algorithm to compare the user's posture with predefined reference data for each yoga asana. If any deviation is detected, the system provides instant text-based feedback to help correct the pose. The model focuses on five commonly practiced yoga asanas: downward dog, goddess, surya namaskara, plank, tree, and warrior II. This project presents a real-time Yoga asana detection and alignment system using computer vision techniques to help users perform yoga poses correctly without the need for a physical instructor. The system utilizes Mediapipe for human pose estimation, identifying key body landmarks from a live camera feed. These coordinates are then used in a rule-based algorithm to compare the user's posture with predefined reference data for each yoga asana. If any deviation is detected, the system provides instant text-based feedback to help correct the pose. The model focuses on five commonly practiced yoga asanas: downward dog, goddess, surya namaskara, plank, tree, and warrior II |
| 2 | EC | Prof. Shivaprasad | 4VP21EC014<br>4VP21EC007<br>4VP21EC023<br>4VP21EC027 | Tarkakalpa 4-bit CPU | Functional | This paper presents the Tarkakalpa project, involving the design, simulation, and FPGA based implementation of a 4-bit educational CPU. The system was simulated using Logisim and realized on a Basys 3 FPGA using Verilog |

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| | | | | | | HDL. Emphasizing modularity, low-power design, and educational clarity, the project enables a practical understanding of fundamental CPU architecture. We discuss system design, simulation results, FPGA implementation, power analysis, resource utilization, and areas for future expansion. |
| 3 | | Dr.Mahantesh R Choudhari | 4VP21EC010<br>4VP21EC006<br>4VP21EC053 | Peddle Assisting System | Functional | The Pedal Assisting Bicycle (PAB) presents an innovative solution to urban transportation challenges by integrating manual pedaling with intelligent electric motor assistance. Designed for small business logistics and last-mile delivery, the system uses a rotary encoder to monitor pedal motion, transmitting data to an Arduino UNO microcontroller, which dynamically adjusts a BLDC motor's output to reduce rider fatigue and enhance load carrying efficiency. Powered by a rechargeable lithium-ion battery, the PAB supports payloads of up to 200 kg while offering a zero-emission, low-maintenance alternative to traditional fuel-based vehicles. The modular, scalable design enables adaptability across various industries, including food delivery, healthcare, and retail. This project demonstrates the practical implementation of embedded systems and mechatronics to promote sustainable, cost effective, and health-conscious urban mobility |
| 4 | EC | Prof. Rajani Rai B | 4VP21EC018<br>4VP21EC005<br>4VP21EC022<br>4VP21EC026 | Detection of Epilepsy using Traditional and Ensemble Machine Learning Approach | Functional | Epilepsy is a neurological disorder marked by abnormal brain activity, often monitored using electroencephalogram (EEG) signals. This study explores a structured approach to detect focal epilepsy by integrating signal preprocessing, feature extraction, and machine learning classification. EEG signals are first cleaned using filtering techniques such as Butterworth, Wavelet Transform (WT), Independent |

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| | | | | | | Component Analysis (ICA), and their combinations to remove noise and artifacts. Feature extraction includes both linear and nonlinear methods, designed to capture essential characteristics of the brain signals. Various machine learning models, including traditional and ensemble methods, are then applied to classify the processed signals. The framework emphasizes the importance of effective filtering and comprehensive feature representation for reliable detection. The proposed methodology demonstrates strong potential for clinical application and remote health monitoring in epilepsy diagnosis. |
| 5 | EC | Dr. Mahantesh R Choudhari | 4VP21EC002<br>4VP21EC050<br>4VP21EC051<br>4VP21EC056 | Quantum Computing in Healthcare Application | Functional | Quantum Machine Learning(QML) is applied to mental health prediction, and its performance is compared against Classical Machine Learning(CML) Techniques. This study introduces quantum computing concepts and implements logic circuit designs on IBM quantum lab. The core objective is to evaluate the effectiveness of a VQC with various feature maps and optimizers, against a SVC on a preprocessed mental health dataset. Experimental findings reveal that QML achieved higher classification accuracy than CML on the small-scale dataset, demonstrating the potential of quantum computation in healthcare machine learning. While acknowledgeing current quantum hardware limitations, the results highlight the promise of quantum algorithms for enhanced prediction accuracy, paving the way for future research. |
| 6 | EC | Prof. Shivaprasad | 4VP21EC025<br>4VP21EC042<br>4VP21EC058 | Braille Bridge:An Innovative System to Bridge the Gap Between Blind | Functional | Braille Bridge is an innovative, low-cost assistive device designed to facilitate one-way communication for visually impaired individuals using Braille. The system enables users to input messages through a tactile push-button interface that |

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| | | | | Person's. | | mimics Braille characters. These inputs are processed by a Raspberry Pi and transmitted wirelessly via Bluetooth to a receiver unit, where solenoid switches generate the corresponding Braille output for the recipient to read through touch. To enhance usability, the device also incorporates an OLED display, LED indicators, and a buzzer for feedback on message status and system operation. Designed to be compact, portable, and affordable, the Braille Bridge prototype demonstrates how embedded technology can provide accessible communication solutions and promote greater independence for the blind community. Future developments may include expanding the system to support two-way interaction, voice integration, and mobile app connectivity. |
| 7 | EC | Prof. Mahabaleshwara Bhat P | 4VP21EC001<br>4VP21EC035<br>4VP21EC037<br>4VP21EC057 | Solar Powered Seed Sprayer Robot | Functional | Agriculture plays an important role in the development of a country's economy. Using modern farming methods, known as agro technologies, helps improve crop production and reduce the hard work involved. These methods support the creation of machines that make farming faster, more affordable, and less labor-intensive. It is important that these technologies are easy to use and cost-effective. This project presents a simple solar powered seed and fertilizer spraying robot machine that can be controlled using a mobile application and internet-based technology. The aim is to help farmers save time, reduce effort, and improve accuracy in planting. With fewer people choosing farming as a career and a growing global population, such innovations are necessary for the future of agriculture. |
| 8 | EC | Prof. Akshay S P | 4VP21EC013<br>4VP21EC033 | Coin Detection and Counting using YOLO | Functional | This project presents the design and implementation of an automated coin separation system using the YOLO (You |

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| | | | 4VP21EC059<br>4VP22EC407 | algorithm with OpenCV | | Only Look Once) deep learning algorithm and ESP 32. The system detects, classifies, and sorts Indian coins of denominations ₹1, ₹2, ₹5, and ₹10 in real time. A webcam captures live images of coins, which are processed using a YOLO model pre-trained on coin datasets to identify denominations with high accuracy and low latency. Upon classification, the ESP 32 controls servo motors that physically segregate the coins into designated bins. Detection data—including denomination, timestamp, and cumulative count—are logged in a MySQL database using Python and XAMPP. A user friendly interface provides real-time updates. This system demonstrates practical applications of computer vision and embedded systems, offering a low-cost, energy-efficient solution suitable for educational use and small-scale financial automation. Future enhancements may include mobile integration, cloud storage, and support for additional currencies. |
| 9 | EC | Prof. Sowmya Anil | 4VP21EC021<br>4VP21EC046<br>4VP21EC049 | Advanced Electronic Pill Dispenser | Functional | This paper presents an Advanced Pill Dispenser system designed to automate medication schedules and improve adherence. The device uses an ESP32 microcontroller and two servo motors to dispense pills from two compartments at preset times. A mobile application built with Flutter allows users to set reminders and receive notifications. The system also integrates a local server via XAMPP to log and track dispensing data. By combining IoT and embedded systems, the dispenser offers a reliable, low-cost solution for timely medication delivery, particularly beneficial for elderly or chronically ill patients |

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| 10 | EC | Prof. Nisha G R | 4VP21EC012<br>4VP21EC028<br>4VP21EC048 | Comparative analysis of 1 bit SRAM cell using 90nm and 180nm in CMOS Technologies | Functional | Memory elements are critical components in semiconductor integrated circuits, with ongoing advancements aimed at enhancing speed, stability, and power efficiency. Among various memory types, Static Random-Access Memory (SRAM) stands out for its high speed performance and reliable data retention, making it ideal for applications such as caches and registers. This paper presents a detailed design and performance analysis of 6T 1 bit SRAM cells implemented using CMOS technology at 180nm and 90nm nodes. The study compares key performance metrics such as area, power consumption, speed (delay), and stability quantified through static noise margin (SNM) across varying temperature conditions. It aims to evaluate the impact of technology scaling on SRAM stability and performance, identify trade-offs, and understand design challenges at each technology node. The simulations, carried out using the Cadence design environment, reveal that as technology scales down, there is a noticeable trade-off between power efficiency and stability. These findings provide valuable insights into the suitability of different technology nodes for specific applications and offer guidance for optimizing nanoscale SRAM designs for enhanced stability and performance. |
| 11 | EC | Prof. Shreyas H | 4VP21EC032<br>4VP21EC031<br>4VP21EC038<br>4VP21EC055 | Sign to speech converter | Functional | Individuals with speech impairments rely heavily on sign language as their primary mode of communication. However, the lack of understanding from the general public often creates significant barriers, limiting their ability to interact and participate fully in society. The proposed system aims to bridge this communication gap by providing a technological |

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| | | | | | | solution that translates sign language into a more universally understandable format.<br><br>The system utilizes Flex Sensors connected to an ARDUINO board to detect and interpret dynamic hand gestures, capturing the nuances of sign language. The extracted features are then transmitted via Bluetooth to an Android mobile device, where they can be further processed and displayed. This innovative approach enables seamless communication between individuals who use sign language and those who do not understand it.<br><br>By integrating sign language recognition technology with mobile devices, the system offers a practical and effective solution for enhancing communication between speech-impaired individuals and the general public. This technology has the potential to improve the quality of life for individuals with speech impairments, enabling them to interact more freely and participate fully in various aspects of society. The system's effectiveness lies in its ability to provide a reliable and efficient means of communication. |
| 12 | EC | Prof. Sowmya Anil | 4VP21EC004<br>4VP21EC020<br>4VP21EC043<br>4VP21EC024 | Automatic Classification of Fetal Heart Rate using Machine Learning | Functional | The increasing need for accurate and objective fetal monitoring during labor has prompted research into automated diagnostic systems. This project focuses on the automatic classification of fetal heart rate (FHR) signals obtained through Cardiotocography (CTG), utilizing machine learning algorithms. The CTU-UHB Intrapartum CTG dataset from PhysioNet is used, which provides standardized and annotated recordings. Time-domain features seven in total are extracted from the decoded CTG signals. These features are used to train a Random Forest classifier to distinguish between normal and abnormal fetal |

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| | | | | | | conditions based on FIGO guidelines. Model evaluation is performed using 5-fold cross-validation, with metrics such as accuracy, precision, recall, and F1-score guiding performance comparison. The proposed method enhances diagnostic reliability by minimizing human subjectivity and inter-observer variability, aiming to serve as a decision-support tool in obstetric care. While the project restricts itself to time-domain analysis, its simplicity and interpretability make it suitable for clinical integration. The results affirm that machine learning can contribute significantly to fetal health prediction, offering a non-invasive, scalable, and efficient aid for healthcare professionals. Future work may involve extending the approach with deep learning and frequency-domain features for improved accuracy. |
| 13 | EC | Prof. Nirupama K | 4VP21EC036<br>4VP21EC039<br>4VP21EC040<br>4VP21EC052 | Semi-Automatic Wall Painting Bot | Functional | The Semi-Automatic Wall Painting Bot is an innovative electromechanical system designed to reduce human effort and improve efficiency in wall painting tasks, which are traditionally manual, time-consuming, and physically demanding. Manual wall painting often results in inconsistent finishes and requires painters to work at heights or in hazardous environments, exposing them to fumes and fatigue. To address these challenges, the bot integrates mechanical movement with a painting mechanism-typically a spray nozzle mounted on a vertical frame supported by wheels or rails that facilitate controlled vertical motion along the wall surface. This movement is powered by DC motors and regulated using a microcontroller such as an Arduino, which ensures synchronized control of motion and paint application. Paint is stored in a reservoir and fed to the painting unit through a pump or gravity-based system, allowing continuous and uniform application. The semi- |

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| | | | | | | automatic functionality means the bot requires minimal human assistance for setup and repositioning, but automates the repetitive motion and painting process itself. The bot maintains a consistent distance from the wall to ensure an even coat of paint, and its modular design allows adaptability for different wall sizes and paint types. With its ability to cover large areas uniformly, minimize human exposure to harmful conditions, and operate cost-effectively, the Semi-Automatic Wall Painting Bot represents a practical and scalable solution for residential, commercial, and industrial painting applications, bridging the gap between manual labor and fully autonomous robotic systems |
| 14 | EC | Prof. Mahabhaleshwara Bhat P | 4VP21EC011<br>4VP21EC034<br>4VP21EC044<br>4VP21EC054 | Real Time Solar Power Optimization | Functional | The increasing global demand for clean energy has underscored the need for efficient solar power systems. This project presents a real-time solar power optimization system utilizing a dual-mode Maximum Power Point Tracking (MPPT) approach—combining traditional Perturb and Observe (P&O) methods with Artificial Intelligence (AI)-based control. The system is implemented using an ESP32 microcontroller and integrates voltage and current sensors, a buck-boost converter, and Bluetooth-enabled real-time monitoring. In manual mode, the P&O algorithm adjusts operating parameters via a digital potentiometer. In AI mode, a self-learning algorithm dynamically modifies control signals based on real-time sensor data to accurately track the Maximum Power Point (MPP) under varying environmental conditions. Comparative analysis demonstrates that the AI-based MPPT significantly outperforms the manual method in power extraction efficiency, particularly during fluctuating sunlight. The low-cost, scalable design and intelligent control strategy make the system ideal for smart renewable energy |

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| | | | | | | applications, especially in off-grid and remote scenarios. This project highlights the practical benefits of AI integration in enhancing solar energy harvesting performance. |
| 15 | EC | Prof. Nisha G R | 4VP22EC400<br>4VP22EC401<br>4VP22EC402<br>4VP22EC403 | IoT based smart Multi Application surveillance robot | Functional | The increasing demand for intelligent surveillance systems in defense operations has led to the development of unmanned, IoT-enabled robotic solutions. This project presents an IoT-Based Military Surveillance Robot equipped with real-time video streaming, remote control, GPS tracking, motion detection, and mine detection capabilities. The system uses an ESP32-CAM module for live video feed, accessible via an IP-based web interface that also provides control options for robot navigation and camera orientation through a pan-tilt servo mechanism.<br><br>An ESP32 module acts as the central controller, interfacing with various peripherals including a GPS module for live location tracking, a PIR sensor for enemy detection during standby mode, and a metal detector for identifying underground mines. When motion is detected by the PIR sensor, the camera captures and stores the image for security verification. The GPS module continuously updates the robot's location (latitude, longitude, and date) on the same web interface. A motor driver controls four DC motors, enabling movement based on commands from the web interface.<br><br>This multifunctional robot can significantly aid in remote surveillance, reduce human involvement in dangerous areas, and enhance situational awareness in military applications. The system is cost-effective, scalable, and demonstrates a practical implementation of IoT in modern defense systems |

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| 16 | EC | Prof. Nithin | 4VP21EC016<br>4VP21EC017<br>4VP21EC029<br>4VP21EC060 | Traffic Sign Recognition and Autonomous Vehicle Control | Functional | This report details the design and implementation of a traffic sign detection and rudimentary vehicle control system utilizing a Raspberry Pi 5, a camera module, and a DRV8833 motor driver. The core of the system is based on computer vision techniques, specifically Haar Cascade and Local Binary Patterns (LBP) Cascade classifiers, for identifying various traffic signs such as stop, left turn, and right turn. The detected signs are intended to trigger corresponding control commands, which, in a fully integrated system, would be translated into motor actions. The project aims to demonstrate a cost- effective and open-source solution for an essential component of autonomous driving or intelligent robotics. This report covers the hardware and software architecture, implementation details, and potential avenues for future enhancements. |
| 17 | EC | Prof. Prabha G S | 4VP22EC404<br>4VP22EC405<br>4VP22EC406<br>4VP21EC045 | Web Controlled Smart Infrastructure Automation | Functional | The integration of smart infrastructure systems has become essential for achieving efficiency, automation, and remote management in both urban and building environments. This project introduces a comprehensive and scalable framework for a Web-Controlled Smart Infrastructure System designed to facilitate real-time monitoring, remote access, and improved user interaction. The system provides centralized control via web interfaces and mobile applications, enabling users to manage infrastructure components remotely and seamlessly. A core strength of the proposed system is its modular architecture, allowing multiple independent subsystems to be managed under a unified platform. This design promotes scalability and adaptability, making it suitable for a wide range of applications. The framework supports real-time status tracking, command execution, and live system feedback, ensuring effective infrastructure |

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| | | | | | | oversight and control. Additionally, the system interface has been developed to prioritize user-friendliness, ensuring that users with minimal technical knowledge can operate and manage the system efficiently. To safeguard user data and system operations, robust authentication mechanisms and access control features are integrated into the framework. Communication protocols have been optimized to ensure minimal latency and high reliability during data transmission and command delivery. These enhancements contribute to the overall responsiveness and stability of the system. Testing and validation through simulation and real-world deployment have confirmed the reliability, flexibility, and robustness of the proposed solution. The project offers a significant step toward the modernization of infrastructure management by bridging traditional control methods with advanced, web-enabled automation. Its versatility positions it as a strong candidate for implementation in smart buildings and scalable smart city applications. |