

BTECH PROJECT ABSTRACTS (2022-2023)

Project Title: Functional verification of Events Block

Guide: Mrs. A.A. Kulkarni

Swarit Nikhil Bidwalkar 111907056

Abstract:

The project is based on developing meaningful testcases for the verification of a synchronization module which will soon become an integral part of next generation neural network accelerators. Most commercially available neural network accelerators use a software-based synchronization mechanism. This software-based synchronization logic when converted to RTL (Register Transfer Logic) introduces a lot of hardware complexity. The complex architecture introduces some timing problems which leads to a delay in the timing closure of the chip. Such delays lead to an increase in the Time to Market and consequently cost the organizations large sums of money. Hence, a hardware-based synchronization logic using counters is used to achieve synchronization between hardware blocks more efficiently. This thesis explores the development of some of the testcases which can serve as a guide for testing the functionality and achieving better coverage of such hardware modules.

Project Title: SMART HELMET

Guide: Prof. Pankaj P. Tasgaonkar Sir, Dr. Deeplaxmi V. Niture, Dr. R.A. Patil

Gaurav Pande 111807042

Shreyas Madavi 111907049

Shivam Indorkar 111907048

Abstract:

Road accidents are a serious concern all around the world. They cause significant damage to life and property and can lead to disabilities, loss of income, and even death. While government authorities and traffic police are implementing rules and regulations to ensure rider safety, enforcing these rules can be a challenging task. Carelessness and negligence of riders are the major factors behind most accidents. To address this issue, we propose an intelligent system, the Smart Helmet, which automatically checks whether the rider is wearing a helmet and is not under the influence of alcohol while driving. The Smart Helmet is equipped with an alcohol sensor near the mouth of the driver to detect the presence of alcohol. If alcohol is detected, a signal is sent to the switch system to stop the spark plug ignition, preventing the rider from driving in an inebriated state. Moreover, the Smart Helmet is designed to detect the tilt of the bike and the duration of closed eyes, which could indicate sleepiness. If the system detects any of these signs, a buzzer alerts the driver to the

potential danger of driving in such a state. A vibration sensor is also used to detect accidents, and the system sends an SMS to the rider's family and emergency services, including GPS coordinates. By implementing this technology, we can significantly reduce the number of accidents caused by carelessness, drunk driving, and fatigue. The Smart Helmet ensures the rider's safety and that of others on the road, promoting responsible driving and reducing the burden on emergency services. With technology evolving rapidly, it is essential to make the most of it to ensure public safety, and the Smart Helmet is a step in the right direction.

Project Title: Design and Development of Local Events

Guide: Dr. Vanita Agarwal

Abhishek Chandrakant Salunke 111907001

Abstract:

Neural network accelerators are optimized processors designed to handle neural network workloads efficiently. These processors are designed to run quickly on low power and help make certain algorithms run faster than a traditional CPU. Such a complex design involves multiple blocks that perform processes interdependent on each other. The aim of this project is to develop a "Local Events" block RTL for a neural network accelerator under development at Cadence which would provide a flexible point-to-point synchronization mechanism between different engines in the accelerator. The block enables source engines to generate set events by checking the status of events in the block, while destination engines generate get events by checking the presence of an event in the block. In addition to providing a synchronization mechanism, the Local Events block is designed to meet specific requirements. Also, block provides a configurable point-to-point mechanism through programmable registers, and have an interface for valid and authorized read/write operations for registers and counters present in the block and match the timing requirements without any timing violations.

Project Title: Earthquake Detection and Alerting System

Guide: Dr. P. P. Shingare

Abhishek Khandekar 111907002

Umesh Dudule 142007001

Harshda Pawar 142007002

Tejas Maskare 142007007

Abstract:

The project titled "Earthquake Detection and Alerting Using ESP32 WROOM and MPU6050 with BMP388" aims to develop a system that can detect earthquakes and alert people in advance to minimize potential damage. Earthquakes are natural disasters that can cause severe property damage and endanger human lives. It is, therefore, essential to have an efficient earthquake detection and alerting system in place. Internet of Things (IoT) devices have been gaining popularity in such systems' development in recent years. In this project, we propose the development of an earthquake detection and alerting system using ESP32-WROOM and MPU6050, and BMP388 sensors. ESP WROOM is a popular IoT development board that provides built-in Wi-Fi and Bluetooth connectivity. MPU6050 is a six-axis gyroscope and accelerometer sensor that can detect motion and vibrations. The proposed system will use the MPU6050 sensor to detect seismic activity and ESP32-WROOM to process and transmit the data to a central server. The proposed system will be composed of three main components: the sensor module, the microcontroller module, and the communication module. The sensor module will be responsible for detecting seismic activity using the MPU6050 sensor and an added feature of detecting barometric pressure using the BMP388 sensor. The microcontroller module will be responsible for processing the data from the sensor module and generating alerts if necessary. Finally, the communication module will be transmitting data to a central server. The sensor module will be designed using the MPU6050 and BMP388 sensors. The sensor will be mounted on a PCB board, and a voltage regulator will be used to provide the required voltage to the sensor. The sensor module will be designed to be compact and easy to install. The microcontroller module will be designed using the ESP32-WROOM development board. The ESP32- WROOM will be programmed to process the data from the sensor module and generate alerts if necessary. The ESP32-WROOM will also connect to the Wi-Fi network and transmit the data to the central server. The communication module will be designed using the Wi-Fi module on the ESP32-WROOM. The ESP32- WROOM will be configured to connect to a central server over the internet using the Wi-Fi module. The data transmitted by the ESP32-WROOM will be stored on the server, and alerts will be generated based on the severity of the seismic activity detected. In conclusion, the "Earthquake Detection and Alerting Using ESP32 WROOM, MPU6050 and BMP388" project aims to develop a system that can accurately detect earthquakes and alert people in advance to minimize potential damages. The system will use an MPU6050 accelerometer to measure the acceleration of the ground and an ESP32 WROOM microcontroller to analyze the data and send alerts to people's smartphones. The project has the potential to save lives and reduce property damage in areas prone to earthquakes.

Project Title: Potato Leaf Disease Identification with Multi-Model DL: A Comparative Study

Guide: Prof. Yogita Kapse

Aditya Patil 111907003

Aman Agrawal 111907009

Ashitosh Fating 111907010

Mihir Darvankar 111907027

Abstract:

Potatoes are a vital source of food for people worldwide and are considered a staple food. As the COVID-19 pandemic has caused significant disruptions to the global food supply chain, the demand for potatoes has increased. However, potato diseases remain a significant concern for farmers as they can drastically reduce the yield and quality of harvests. Diseases such as Early Blight which can be seen on plant leaves are caused by *Alternaria Solani* Fungi and microbes like *Phytophthora Infestans* De Bary causes disease like Late Blight and decreases total potato production. Disease identification and classification are essential for disease management, but it can be challenging for farmers to detect diseases early on due to the lack of expertise in the field. The method proposes a DL system which on the basis of leaf conditions segregate diseases present in potato plant. The proposed method uses Digital Image Processing and a CNN architecture that helps to classify the diseases in potato plant leaves. Based on the models we proposed, we were able to achieve bare minimum accuracy of 95%, which shows a promising potential of our model architecture's. This method can help farmers detect diseases more accurately and earlier in the growth cycle, allowing for prompt management of the disease and reducing the risk of crop failure, making it a promising tool for farmers to improve the sustainability of potato farming.

Project Title: Online Voting System with Face Identification

Guide: Dr. Deeplaxmi V. Niture

Divya Gaygol 111907016

Kishan Kalan 111907022

Komal Mane 111907023

Abstract:

The traditional way of voting in elections involves long queues, physical ballots, and manual counting, which can be time-consuming and error-prone. To address these issues, this project proposes an online voting system that uses face recognition technology to provide a more efficient and secure way of voting. The system allows voters to register and verify their identity using their face and a one-time password (OTP), which is sent to their registered phone number. The system captures the voter's face and verifies it against a database of registered voters. Upon successful verification, the voter can cast their vote using the system. The system also generates voting results that can be viewed by authorized personnel, ensuring transparency in the voting process. The proposed system has the potential to streamline the voting process and reduce the likelihood of errors or misconduct, making it a reliable and secure solution for modern voting systems. The system can also help in increasing the voter turnout by providing convenience to the voters and allowing them to vote from anywhere with an internet connection. Overall, the use of face recognition technology in an online voting system can bring significant improvements in the voting process, making it more efficient, secure, and transparent.

Project Title: Hindi NLU & ASR model for Rasa using spaCy, Fast Text, Jarvis

Guide: Dr. Vidya N. More

Kunal Tanpure (111907025)

Vaibhav Padmane (111907057)

Hrithik Rao (111907020)

Abstract:

The creation of Hindi-specific automated speech recognition (ASR) and natural language understanding (NLU) models has gained popularity in recent years. With more than 500 million native speakers, Hindi is one of the most extensively used languages in the world and is the national tongue of India. However, compared to other languages, Hindi has lagged behind in the development of NLU and ASR models. To address this gap, This project is working on building NLU and ASR models for Hindi using tools such as spaCy, Fast Text, and Jarvis. These tools offer capabilities for training custom language models, text classification, language identification, and speech recognition. In the context of Rasa, a popular open-source framework for building chatbots and voice assistants, NLU and ASR models play a critical role in understanding user input and generating appropriate responses. By building custom NLU and ASR models for Hindi using spaCy, Fast Text, and Jarvis, This project enables Rasa chatbots and voice assistants to effectively understand and respond to user input in Hindi. Overall, the development of NLU and ASR models for Hindi using these tools represents an exciting opportunity to bridge the communication gap for Hindi speakers and enable more seamless interactions with technology in their native language.

Project Title: WebKart: Scan, Shop and Checkout

Guide: Dr. Mrs. D.V. Niture

Koustubh Tushar Anturkar 111907024

Mahesh Navnath Mali 111907026

Onkar Nivas Viralekar 111907033

Shreyash Shirish Bhimanwar 111907050

Abstract:

Nowadays, shopping has taken on a daily routine. In many malls, there are long lines of people waiting to be billed. Our project's goal is to solve the issue of time wastage caused by waiting in lines. In many industries, electronic devices such as smart card readers, bar-code readers, and RFID scanners are increasingly used. Supermarkets also need these kinds of gadgets. To address the aforementioned issue, we propose a smart trolley billing system that would audit the purchased products and make the payment online automatically via the payment gateway inside the application linked with a specific trolley. When a person places

any product on the trolley, it is scanned using a barcode reader, and the product's cost, name, brand, weight, and count are displayed in its application. This model is a reasonable and profitable smart shopping cart that is managed by IOT innovations. The major purpose is to deliver a technologically advanced, time-saving, and commercially driven solution for a better shopping experience. This system will also make product recommendations based on user purchasing history from a unified system. Every product in the mart will have a barcode in this system, and each cart will have a reader attached to it for scanning reasons. These features will save you time and make purchasing more convenient. Overall, we can have the best shopping experience possible. Keywords: Barcode reader; ESP8266; Internet Of Things; Smart trolley; Shopping smart; Web technology.

Project Title: e-Cockpit (Migration of components from Mediatek to QC8295)

Guide: Mr. S.G. Mali

Nilesh Patil 111907030

Abstract:

This report describes my internship at KPIT Technologies. KPIT is a leading company operating in Automotive Industry and Mobility Ecosystem for making software defined vehicles a reality. The scope of this document is to identify and describe the training undertook, technologies used , project completed and experience gained as a software engineer Intern. During my internship at KPIT , I was introduced to some new technologies and concepts like IPC, CMake , Socket Programming and different Microprocessors. We were given task of programming of powermanager used in e-Cockpit. Initially our project was on MediaTek processor .we were given the task of transferring few components from MediaTek processor to snapdragon processor.

Project Title: US Honda-Infotainment System Validation

Guide: Prof.G.K.Andurkar

Pravin Khade 111907040

Abstract:

This is a KPIT oriented Project. I am doing this project with KPIT. Honda US. Project is based on Validation of Infotainment System of Honda US. In This Project we are creating test cases for various features like Wi-Fi, Bluetooth, Smart Phone pairing and Head Unit etc. For Writing Test Cases we are using Free Mind Software in which are categorizing test cases into various category. After writing Test Cases we are doing automation of test cases using KITE Tool. Basically, KITE Tool is used to give CAN Signals. Other Companies are doing manual

testing, but KPIT have build inhouse KITE Tool for Automation. In the US Honda project, we are testing and updating the infotainment system by using CAN Commands. KITE has high accuracy and reliability.

Project Title: Implementation of Modular Design in the Firmware of Genset Controller Unit

Guide: Dr. R. D. Joshi

Ram Dilip Mude 111907041

Abstract:

In embedded systems, firmware serves an indispensable purpose. It enables system configuration and security, as well as performance optimization and system maintenance. Without firmware, embedded systems could not effectively function. Firmware code can be written in a variety of methods; however, it is crucial that the firmware be written efficiently and in accordance with the system's requirements. Due to the fact that the existing approach did not account for the possibility of cases involving the incorporation of modifications, redesigning is required. The redesign of the firmware increases the development time. Similarly, Genset Controller Unit (GCU) firmware requires a modular design. The absence of a modular design in code can result in a less efficient development process, a more difficult-to-maintain codebase, and a greater error and bug risk. In the proposed approach, the objective is to implement modular design in the firmware of Genset Controller Unit(GCU). Modular design facilitates modifications to be implemented without redesigning the entire firmware. Multiple AC System varieties are accommodated, thereby expanding the scope of potential customers. The modular approach is therefore responsible for the GCU firmware's reusability, maintainability, and scalability.

Project Title: Things SDK with Dual Stack using Ubuntu

Guide: Dr.RanjitSadakale, Prof. Nilima Kolhare

Pooja Gulhane 111907034

Prathamesh Ganorkar 111907039

Simran Manghwani 111907053

Abstract:

The Internet of Things (IoT) industry has witnessed tremendous growth in recent years. As more and more devices become connected, there is a growing need for secure and reliable communication protocols. Thread is a popular IoT protocol that enables low-power wireless communication among connected devices. Things SDK is an open-source software

development kit for building IoT applications on Nordic Semiconductor's nRF5x SoC series. The Things SDK with Dual Stack using Tizen/Ubuntu is a software development kit designed to simplify the process of building IoT applications. With this SDK, developers can easily create applications that run on both Tizen and Ubuntu operating systems, and seamlessly communicate with various IoT devices. This SDK provides a high level of abstraction, making it easy to manage resources and handle device-specific protocols. It also includes a comprehensive set of libraries and tools that enable developers to create secure, scalable, and reliable IoT applications. Overall, the Things SDK with Dual Stack using Tizen/Ubuntu makes it easier for developers to create innovative IoT solutions that meet the needs of the modern world.

Project Title: Test Time Reduction for IC Testing on Eagle Test System – 800 Tester.

Guide: Dr. Mrs. S. P. Metkar

Himanshu Arun Lokhande MIS: 111907073

Abstract:

Project Title: Third Eye For Blind People

Guide: A.G. Andurkar

RufosRoymon (111907078)

Surajit Ch. Sukla Das (111907082)

Dikshant Bhaisare (111907015)

Leander Raj Nongrum (111907077)

Abstract:

This paper presents an innovative solution to tackle the daunting challenges faced by visually challenged people (VCPs) in their daily lives. Our solution combines a blind walking stick with a camera-enabled device mounted on the user, providing a first-person perspective live stream of their surroundings. An object detection algorithm running on the live feed alerts the user of obstacles through vibrations and audio feedback. Moreover, the Alexa chatbot can provide information to the user regarding the weather or the time etc. By improving the environmental awareness of VCPs, our solution offers them the much-needed support to confidently navigate their surroundings, ultimately enhancing their quality of life. This portable technology empowers VCPs to embrace their independence and overcome the limitations imposed by their visual impairment. In summary, our proposed solution provides a promising avenue to address the mobility challenges faced by VCPs, fostering their confidence and independence, and improving their overall well-being.

Project Title: OptiStock: Intelligent Investment Strategies with Machine Learning and Sharp Ratio.

Guide: Swapnil Mali

Shambhavi Bhilwadikar(111907080)

Abstract:

The organization for the project stock price prediction and Optistock: Intelligent investment strategies using machine learning, reinforcement learning, and shape ratio would typically involve a structured approach to conducting research and developing the proposed models. The organization would involve identifying the research questions, conducting a literature review, selecting appropriate data sources, and developing the models using machine learning and reinforcement learning algorithms. The organization would also involve testing and validating the models using appropriate metrics and comparing the results with existing models and benchmarks. The proposed models would be organized into a coherent framework that integrates the various components of the project, such as stock price prediction, portfolio generation, and selection. The organization would also involve documenting the research process and the results in a clear and concise manner, including the methods used, the data sources, the algorithms, and the results. The organization would involve collaboration among the project team members, advisors, and mentors to ensure that the project is completed on time and meets the objectives of the project. The organization would also involve regular communication and feedback among the project team members to ensure that the project is progressing as planned. The world of investment is constantly evolving, and the need for intelligent investment strategies that can adapt to changing market conditions is becoming increasingly important. The Optistock project aims to tackle this challenge by utilizing the power of machine learning, reinforcement learning, and shape ratio analysis to develop innovative investment strategies. By leveraging cutting-edge technology, Optistock aims to provide investors with a competitive edge in the market. Machine learning algorithms will be used to identify patterns and trends in historical market data, while reinforcement learning techniques will enable the system to learn and adapt based on real-time market conditions. Shape ratio analysis will be used to identify stocks with strong fundamentals and growth potential. The Optistock project represents a significant advancement in the field of investment strategy development. By combining advanced machine learning techniques with shape ratio analysis, the system has the potential to deliver superior investment returns while minimizing risk. We believe that the Optistock project will play a key role in shaping the future of investment strategies and help investors achieve their financial goals. By providing investors with powerful and sophisticated investment tools, the Optistock project will help to make the world of investment more accessible and efficient. I am confident that the Optistock project will pave the way for a new era of intelligent and profitable investment strategies.

Project Title: IoT based Smart Campus

Guide: Dr. Mrs. R. D. Joshi

Niraj MarotiraoPadalwar 111807030

Mohini Gahininath More 111907028

Rupali BramhadevKuskar 142007004

Saba Shakeel Shaikh 142007012

Abstract:

A smart campus should be built to connect various devices and applications so that people can be connected to them which causes improved efficiencies and enhances the experience of everyone in campus. As of now students and staff spend most of their time in campus, so they should be able to access information related to the environment and the electricity should not be wasted in any form. This project describes the development of a smart campus by use of Internet of Things (IoT) technology. IoT is a platform where devices (sensors and actuators) can be connected, monitored, and controlled from any location throughout the network infrastructure. By development of smart campus, it is possible to connect campus, so that the applications based on IoT can be monitored in real-time. To develop smart campus, we are combining facilities for monitoring "Air Quality" and Drinking Water Quality" and Smart energy Management and Alert System including "Smart Garden irrigation", "Smart Dustbin" and "Smart Classroom" which have "occupancy-based light and fan control" and "Face recognition-based attendance system". The system collects real-time data and takes corrective actions and displays it on the ThingSpeak server and on Blynk android application.

Project Title: Coin & QR code Based Universal Mobile Battery Charger Using Solar Panel

Guide: Mrs. Ashwini Kulkarni

Harshada Sargar 111907017

Vyankatesh Sakhare 111907063

Shilpa Mandale 142007006

PanchshilaPathare 142007008

Abstract:

In recent years, the proliferation of mobile devices has created a need for reliable and accessible charging solutions, especially in areas without reliable access to electricity. In this project, we present a novel solution for a Coin & QR code Based Universal Mobile Battery Charger Using Solar Panels. The charging station uses a solar panel to generate renewable energy, making it an environmentally friendly solution. The charging station also incorporates a coin acceptor and a QR code reader to enable users to pay for the charging service using either coins or mobile payment platforms. The charging station is designed to

be compatible with a wide range of mobile devices, making it a universal solution. The charging station's user interface displays the battery level of the connected devices, allowing users to monitor the charging status of their mobile devices. We implemented the charging station using a Raspberry Pi computer and programmed it using the Python programming language. The charging station's software incorporates algorithms for validating coins and QR codes, monitoring the charging status of connected devices, and ensuring the efficient operation of the charging station. Our experiments show that the charging station is capable of providing reliable and efficient charging services to mobile devices in areas without reliable access to electricity. The charging station's use of solar energy makes it a sustainable solution that can contribute to reducing carbon footprint. Overall, the Coin & QR code Based Universal Mobile Battery Charger Using Solar Panels presented in this paper provides a practical and innovative solution for mobile device charging that is both universal and sustainable.

Project Title: Degradation Analysis and Estimating the Remaining Useful Life of Electronics Component

Guide: Prof. Nilima Kolhare

Ankita Mahajan 142007005

Abstract:

The main concern for power electronics engineer regarding the electronic component is defining the remaining useful lifetime to avoid any type of costly failure in the system and system unavailability or downtime. Capacitor being the vital of all electronics component. This research reviews the reason why the failure has caused, its modes and mechanisms are defined for electrolytic and metallized film capacitor. This paper discusses, a predictive model for estimating the remaining useful life is presented. Capacitor degradation appears in monotonic and nonlinear fashion Under accelerated stress conditions. Physics of failure and data driven are the two techniques that governs the capacitor degradation and eventually estimating the lifetime of the component. The limitation of this techniques is that they fail to reflect the physical properties of component along the degradation path which are rightly depending on the intrinsic and extrinsic properties. This research, we model the capacitor degradation by using the equation and defining the remaining useful life of component where in the model parameters are dependent on stress variables like temperature, voltage, ripple current, charge discharge rates, etc. Case studies have been used and life of capacitor has been defined for the equation. Model also ensures the satisfactory results to estimate lifetime duration according to manufacturer tests. The method presented can be helpful for predicting the capacitor reliability and alerting plant operator to execute maintenance or replacement of component. Physics-of-failure and data-driven degradation models are defined for reliability and lifetime estimation. Critical

assessment and future research directions are rightly provided based on exhaustive literature survey.

Project Title: Deep Learning Approach for ECG Arrhythmia Classification and Detection

Guide: Dr. Shilpa Metkar

Aishwarya Kadam 111907005

Chanchal Gadodia 111907011

Poorva Moharil 111907035

Abstract:

Heart health is one of the key parameters of a person's well-being. With heart diseases strengthening their hold on the human population across all ages, devising novel portable and variable devices indicative of the points that describe a heart's health is gaining much attention from researchers all over the world. This study describes such a system and its ways of implementation. An Electrocardiogram (ECG) is a signal received from the heart that describes its electrical activity and is used for diagnosis of different heart abnormalities. The P-QRS-T waves (in the order of occurrence) signify the depolarisation and repolarisation of the heart muscle cells and changes in their rhythm are then analyzed to predict irregularities in the heart. A very common type is called "Arrhythmia" and is caused by non-periodic beating of the heart. A discussion of various types is presented in this study, along with the aim of finding a dataset that can be trained for classification of different types of Arrhythmias. vii When it comes to portable or wearable devices which are not generally intended for clinical use, it becomes a tedious job for the user to get the data and get it analyzed every time by a doctor. This can also lead to patients inferring misleading results and can create confusion and panic. It is advantageous if the device is capable of performing basic diagnosis to indicate whether the situation is critical or not, which brings us to our objective of exploring and analyzing various deep learning techniques and finding out the one suitable for this job. ECG signal acquisition is an equally challenging task with various parameters such as amplification, noise removal, sampling frequency, data transmission, power management, size, cost, etc. under consideration. This study proposes an approach to developing an ECG Data Acquisition System, keeping in mind all the requirements that allow its scope to be extended to portable and wearable devices.

Project Title: POTHOLE DETECTION AND GEOLOGICAL MAPPING THROUGH AERIAL VEHICLE

Guide: Mr. Swapnil Mali

Anushka Bhimrao Kadam 142007003

Anushka Avinash Patil 142007009

Aditya Sandeep Pore 142007011

Abstract:

The construction and development of good roads is important for the economy and prosperity of today's countries. Road maintenance faced many challenges due to heavy traffic, insufficient funds, and lack of resources. These roads and highways are very dangerous for drivers due to damage such as potholes. Bad roads can lead to dangerous problems such as damaged wheels, tires, damaged vehicles, serious accidents, irregular traffic, and poor driving. To better solve this problem, this project presents a deep learning method that can identify and classify pots according to their size and severity. Infrastructure, industrialization, and population growth all affect a country's ability to develop. The key issue for infrastructure development is the state of the roads. Roads that are old and in bad condition reduce their quality and hinder development, making them more in need of inspection and proper maintenance. The Road Accident Report of India, 2020, states that there were 4986 fatalities as a result of potholes and around 4388 as a result of humps on highways. Numerous pieces of traffic system equipment, such as laser detections, smart traffic control, RADAR, ultrasonic sensors, and many others, have been developed and studied in an effort to lessen the harm and loss of life. Drones, also known as unmanned aerial vehicles (UAVs), can be utilized to modernize road safety practices and so enhance the nation's infrastructure. The image library is utilized to create a pothole detection model, which is then employed in an algorithmic approach that combines a road color model with basic image processing methods such as a Canny filter and contour detection. This method increases the degree of precision with which potholes can be found. The dataset used included over 300 photographs of various sorts of potholes from which the algorithm was able to identify and categorize them as high-risk or low-risk potholes, assisting any organization employing it in deciding where to focus their repair efforts first.

Project Title: PiTune: An Embedded Glove for People with Auditory, Visual and Speech Impairments

Guide: Prof. Dr. Vibha Vyas

Ishita Rathor 111807046

Deepakshi Singh 111907068

Esha Dorle 111907070

Kushagra Shrivastava 111907074

Abstract:

This report explores the possibilities of a sign language translation system using Raspberry pi and MEMS sensor. With tremendous developments in this day and age, it is integral to be inclusive to everyone's needs and enable the people's growth. Hence for the aforementioned purpose, we have made use of various components to upgrade the pre-existing devices which enable these real time translations. Using an approach of machine learning, we built a sensor based device to facilitate the translation of sign language into

audio. It includes MEMS sensors to detect the movements, and multiple datasets to effectively detect the sign and translate it.

Project Title: DEMONSTRATING THE PROSPECTIVE COMPONENT OF SENSE OF AGENCY USING MACHINE LEARNING

Guide: Dr. Rashmika Patole

Anway Pimpalkar 111907066

Abstract:

A normal human exhibits fluent control over the events in the outside world through their actions. This control is linked with an innate and subjective experience, referred to as Sense of Agency. Though the exact neural mechanisms leading to the experience remain unknown, the source of this experience can be attributed to two components - retrospective and prospective Sense of Agency. The retrospective component banks on the inference that the brain creates a Sense of Agency based on inferences of its own actions after the completion of it. The prospective component, on the other hand, suggests that the brain's Sense of Agency is also associated with the prediction of outcomes, and not only the retrospective inferences. This project aims to strengthen the literature supporting the prospective component of Sense of Agency, and use a machine learning approach to show differences in neural activity before the onset of movement. Using various feature extraction and machine learning techniques, the research conducted for this project leads to the conclusion that the prospective component plays a fundamental role in generating a Sense of Agency.

Project Title: Smart Battery and Thermal Management System for Electric Vehicles using IoT

Guide: Prof. Nilima Kolhare

Sahil Salame 111907043

Yash Jogdand 111907065

Gokal Bhat 111907071

StanzinGurmed 111907072

Project Title: Product Prototype for Early, Non-invasive Thyroid Disorder Detection using Embedded Intelligence

Guide: Dr. Vaishali Ingale

Samruddhi Umesh Purohit MIS: 111907044

Abstract:

Thyroid malfunctioning and diseases have become very common in the individuals of almost all age groups. Thyroid gland is an endocrine gland in the human body mainly responsible for metabolism, growth and development of the body. This small, butterfly shaped gland is responsible for body metabolism rate, with its secretion, thyroxine. Thus, thyroid malfunctioning causes a serious impact on the rate of metabolism and eventually the smooth functioning of the entire body. Thyroid diseases are one of the most common endocrine disorders globally. According to a recent study, 300 million individuals worldwide suffer from thyroid diseases, with India accounting for 42 million of them. There are several invasive tests to detect thyroid dysfunction involving blood tests, or having incisions. This is not suitable for all the age groups, as it can be riskier for smaller children and elderly patients. We propose the system implementation of a novel, non invasive approach to thyroid nodule detection. Embedded System implemented on Raspberry PI 4B and web application integrated to the model gives a complete tool for early diagnosis of thyroid diseases. The trained model was also emulated on Xilinx ZCU102 Evaluation board as an attempt of hardware acceleration for Image processing and Artificial Neural Networks.

Project Title: Development of a Predictive Maintenance Application to Predict the failure point for a Squeegee in a Solder Paste Printer and Determine its Remaining Useful Life

Guide: Dr. S. P. Mahajan

Manasi Diwate (MIS: 111913035)

Arjun Kalamkar (MIS: 111907067)

Abstract:

The second law of thermodynamics states that in a closed system, the entropy (that state of disorder) will tend to increase over time and can never decrease spontaneously. The law is seen in effect when we see friction, corrosion, and fatigue leading to the wear and tear of machines. This wear and tear causes reduced productivity, increased downtime, higher costs, and safety issues for workers and consumers. Hence, machine maintenance becomes crucial in ensuring high-quality products and high efficiency in manufacturing. The PCB manufacturing industry does not get an exemption from this law and is bound to monitor the health of its machines to ensure high-quality PCBs. Hence, investing in highly efficient and effective maintenance strategies can pay phenomenal dividends. Maintenance strategies have improved over time, and predictive maintenance using artificial intelligence and machine learning is the future of smart manufacturing alongside Industry 4.0. The project offers a predictive maintenance solution to the problems caused by a worn-out screen printer squeegee in an SMT line. This application uses Cloud computing to run a machine learning algorithm to predict the remaining useful life of the squeegee. The project establishes a user-friendly mechanism to obtain alerts automatically before the squeegee goes bad. This ensures that the PCBs are not smeared with excess solder paste creating short circuits, or that the stencil is not damaged. It also ensures that sufficient solder paste is applied on each, avoiding open circuits. The project successfully reduces unscheduled

downtime in the screen printing process and enables the smooth functioning of the SMT line.

Project Title: COMPARATIVE ANALYSIS OF DIFFERENT TRANSFER LEARNING MODELS FOR MULTI-CLASS OCULAR DISEASE DETECTION

Guide: Mrs. Yogita Vaidya

Akshay Taras 111907007

Isha Jagarwal 111907021

Sejal Bhingare 111907046

Shubham Dalvi 111907052

Abstract:

Nowadays there are millions of people all over the world who are suffering from various types of ocular diseases which may lead to incomplete functioning of the eye and blindness in severe cases. Ophthalmologists confirm the disorder by just looking at the eye and in its surrounding part. Also, study shows that Different types of CNN have achieved great success in the field of image processing due to its powerful feature extraction and learning ability. In this project we have worked on 4 different transfer learning models ResNet50, VGG19, Inception V3 and DenseNet201 to determine the likelihood of an individual having ocular diseases. using multi class model trained on Kaggle dataset which contains the retinal images which are gathered from various sources like IDRID, HRF, ODIR, DRIVE and we have compared their performance and results with evaluation metrics used such as, Cohen's kappa score, area under curve and F1 score.

Project Title: Marathi NLU and ASR Model for RASA using spaCy, FastText and RIVA

Guide: Dr. R. K. Patole, Dr. S. P. Metkar

Chinmay Chandrashekhar Patil 111907012

Pranav Chandrakant Dabre 111907038

Mrunalini Vijay Garud 111907029

Abstract:

The applications of chatbots in business and education has significantly increased in recent years. Traditional methods for creating chatbot systems are less efficient than those that use machine learning (ML) techniques. Before chatbots relied on finite states, rule bases, knowledge bases, etc., but there were still limitations with these approaches. Conversational AI systems have advanced significantly in many tasks recently, including intent classification, entity extraction, sentiment analysis, etc., thanks to advances in natural language processing

(NLP) and neural networks (NN). In this report, we propose a Marathi language chatbot that can comprehend natural language. It can provide responses, give the user tailored actions, and recall the conversation's context. We built chatbots on the RASA platform and used the spaCy model to modify the RASA pipeline for the Natural Language Understanding (NLU) model. Additionally, speech-to-text for RASA was aided by Automatic Speech Recognition (ASR) using RIVA services. Further, these tools can facilitate effective communication and encourage language and culture preservation.

Project Title: TWO-WAY COMMUNICATION: AN INTEGRATED SYSTEM FOR AMERICAN SIGN LANGUAGE RECOGNITION AND SPEECH-TO-TEXT TRANSLATION

Guide: Dr. Vanita Agarwal

Chinmay Bhat 111907013

Rutuja Rajeshirke 111907042

Sanskriti Chude 111907045

Vaibhavi Mhaiskar 111907059

Abstract:

Sign language is used by deaf and hard-of-hearing people to exchange information between their own community and with other people. It is a visual language that communicates ideas using body language, hand gestures, and facial emotions to convey meaning. There are over 300 different sign languages used throughout the world, each with its own distinct characteristics and regional variations. American Sign Language (ASL) has been used in this project. Many individuals do not know sign language. Hence, real-time sign language detection is one of the potential applications for overcoming the communication barrier between such people and the deaf community. Computer vision-based detection of sign language ranges from sign gesture recognition and continues till text/speech generation. In this paper, we attempt to create a system that establishes two-way communication between someone who signs using ASL, a deaf or hard-of-hearing individual (the signer) and someone who cannot sign (the non-signer) using computer vision. The system consists of gesture recognition using computer vision, text-to-speech conversion, and speech-to-text conversion.

Project Title: To Develop Efficient method for enabling Python code Support for HiFi DSPs.

Guide: Dr. Mrs. V. V. Ingale

Nitin Sanjay Thorat 111907031

Project Title: Design and Development of Secure and Low-cost Free Space Optical Communication System

Guide: Prof. R. A. Patil

Yadnesh Gujar 111907064

Mohammad Aman 111907008

Subhojit Halder 111907054

Hrishikesh Kembhavi 111907019

Abstract:

This Research demonstrates the implementation of FSOC with the establishment of a secure and simplex free space optics communication link for ethernet data at a rate of 10 Mbps. It comprises software section with implementation of encryption algorithm and packet data transmission over ethernet, as well as hardware simulation , design and testing methods of transmitter and receiver with the results presented by both circuits. Along with choosing laser diodes, photo diodes, and lenses for both the transmitter and receiver sides, the hardware part also includes extensive mathematical analysis.

Project Title: Smart Parking System for Smart City

Guide: Prof. Dr. Ranjit Sadakale

Shubham Kshirsagar 111907051

Mandar Vategavkar 111907075

Prasad Chavan 111907076

Aniket Nikhade 111807082

Abstract:

The increasing number of vehicles in urban areas has resulted in a parking crisis, causing inconvenience to commuters and contributing to traffic congestion. To address this problem, we developed a smart parking system that leverages IoT technology to provide real-time information about parking availability and help users locate the nearest available parking spot. Our system uses ultrasonic sensors to detect the presence of vehicles in parking spots, and communicates this information to a cloud-based backend service using microcontrollers. The backend service processes this data and presents it to users through a web application, which allows them to search for available parking spots and navigate to them. In this report, we describe the design and implementation of our smart parking system, and evaluate its performance using real-world data. Our results demonstrate the effectiveness of the system in reducing search time for parking spots and providing a more efficient and convenient

parking experience for users. Our smart parking system has the potential to reduce traffic congestion, promote sustainable transportation, and enhance the quality of life in urban areas.

Project Title: A Comparative Study of Federated Learning and Privacy-Preserving Techniques for Credit Fraud Detection.

Guide: Dr. RASHMIKA PATOLE

SHREYASH MUTYALWAR 111905045

OMKAR GHADGE 111907032

SHANTANU GAIKWAD 111907047

Abstract:

Credit fraud is a significant and growing problem that can result in financial losses for individuals and institutions alike. Fraudulent activity can take many forms, from the unauthorized use of credit cards to the creation of fake identities for the purpose of obtaining loans. Traditional methods of detecting fraud can be time-consuming and error-prone, leading to both missed fraud and false alarms. Furthermore, privacy concerns have arisen due to the use of personal data to train fraud detection models. Additionally, the problem is compounded by the fact that multiple banks may need to collaborate to build a fraud detection model, while protecting the privacy of their sensitive data. In this project, we address these issues by exploring privacy-preserving ML techniques for fraud detection. Our goal is to identify the most effective technique for detecting fraudulent activity while protecting the privacy of individuals involved in credit transactions. Specifically, we will consider the problem of detecting fraud through transaction history data, while using privacy-preserving techniques such as federated learning, differential privacy and homomorphic encryption. Additionally, we will investigate how multiple banks can collaborate to build a model that helps all banks detect credit fraud more accurately, without sharing sensitive data.

Project Title: AN IOT BASED INTELLIGENT PARKING SYSTEM IN SMART CITIES

Guide: Prof. Pankaj Tasgaonkar

Supriya Kore 111907055

Vaishnavi Ballal 111907061

Sachin Kalyanpad 111507022

Abstract:

As it is in today's world, when the number of vehicles on the road is continually rising. Thus traffic issues are inevitable as the number of vehicles rises. An automatic IoT-based smart

car parking system is shown in the project titled "An IoT based Intelligent Parking System In Smart Cities". This project has the potential to address the road-related issues in major cities. The amount withdrawn is traceable, but it changes over time and across different slots, which is the fundamental drawback of the current approach. The custodians can quickly locate open parking spaces using this system. Here, when a car leaves the park, the exit gate, which is identical to the entrance gate for this project, counts the cars in reverse order. This project tries to connect the Internet of Things and the RFID idea (IoT). Smart parking systems aid in lowering fuel consumption and reducing urban pollution, both of which contribute to the growth of the nation's economy. Our proposed model uses IR sensors, RFID, IoT application, and website application for RFID.

Project Title: Implementation of MQTT Protocol for Messung XMP10 PLC (STM32F4xx based CPU)

Guide: Dr. Vibha Vyas (HoD, E&TC), Ashok Patil (General Manager, Industrial Automation, Messung) Sagar Gupta (Assistant Manager- R&D, Messung)

Sayali Vinay Gadre (111907079)

Abstract:

Nowadays, rapid technological development is taking place everywhere. PLCs have come into play, leading to the automation of systems, offices, and homes. MQTT Protocol is one such protocol used in the automation domain. The low bandwidth and the fact that clients do not have to know each other makes it a suitable protocol for IoT applications. The implementation of this MQTT Protocol in a PLC coupled with a mobile app can make it more powerful to be well suited for its IoT applications such as home automation.

Project Title: Option Pricing Using Volatility

Guide: Dr. Prashant Bartakke

111907004 Adwait Patil

111907014 Dhruv Joshi

111907058 Vaibhav Somani

111907069 Durgesh Kolhe

Abstract:

The objective of this research endeavor is to investigate a technique for valuing options through the utilization of volatility, with the aid of neural networks. Despite the dynamic and unpredictable nature of volatility, conventional options pricing models operate under the assumption of its constancy. By employing a neural network, our model is capable of capturing the intricate dynamics of volatility with greater precision and making more

accurate predictions of option prices. By utilizing a blend of technical indicators and market data as inputs, our initial step involves training the neural network through historical data to approximate volatility. Subsequently, the Black-Scholes model is employed to ascertain the prices of options by utilizing the estimated volatility. The methodology employed in our study exhibits superior performance compared to previously established models for pricing options, particularly in markets characterized by high volatility. Furthermore, it yields option prices that are more precise and reliable across the board. Furthermore, the model's robustness is assessed through the utilization of out-of-sample data, revealing its efficacy even when confronted with unfamiliar market conditions. The model we have developed takes into account the dynamic nature of volatility by utilizing neural networks, resulting in a more precise and adaptable method for pricing options.