ABSTRACTS (2018-2019)

Project Title: DATA ACQUISITION AND DEVELOPING A COST DEPRECIATION MODEL SPECIFIC TO INDIAN CONDITIONS FOR AN ELECTRIC VEHICLE

Guide: Dr. Mrs. Pratibha Shingare

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Abstract:

Electric Vehicles is the next big thing in the automotive domain. There are a number of benefits and advantages of electric vehicles over the traditional vehicles running on ICE. To mention a few, they are easy to maintain, cheaper to run and cause less pollution. They are the solution to the scarcity of fossil fuels which is the major concern of the future. Battery and motors are the most important components of an electric vehicle. There are a few parameters like DC current, AC current, temperature that determine the performance of electric vehicles. These parameters were monitored using appropriate sensors and the values were sent to the controller. These values were further sent to the logger via CAN communication. CAN communication enables us to connect multiple controllers and send data at a speed up to the speed of 1Mbps. The data which was sent to the logger was firstly stored in the memory card. A memory card module was used to serve the purpose. The file saved was in .csv format so that it can be used for further analysis. Every time the vehicle starts, the power will be on. The RTC in the circuit will provide the real time date and time. The file name will be date and time so as to save the user profile. This data will also be uploaded on an online platform. Ubidots was the platform used. One can easily observe all the parameters in graphical and tabular form whenever required. Live monitoring is also possible as the platform comes with various attractive widgets. To monitor the parameters graphically when the vehicle is not in use, a test bench has been developed. This can be used to identify any defect or an undesirable trend in the vehicle. The performance of these parameters will show a drop or any undesirable trend which can be exploited to identify the problem. The battery is the most important component and it dominates the most of the share in the vehicle cost. The performance of the battery shows a drop in the performance due to usage and external conditions. Various agencies have conducted surveys for depreciation in the performance of batteries in different conditions. There are modelled equations for different conditions. This modelling for Indian conditions is an unprecedented task. This analysis of performance of the battery was taken into considerations and an equation is developed. As a user interface to display the final output the final output, a webpage was developed to calculate depreciation value. This data will have numerous applications in the insurance business and also second hand purchase of EV.

Project Title: IMPLEMENTATION OF THE CONCEPT OF CONNECTED MOBILITY USING VEHICLE TO VEHICLE COMMUNICATION

Guide: Dr. Mrs. Vaishali Ingale

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Abstract:

The domain of connected mobility is one of the most rapidly evolving domains today and is gaining importance due to the rising number of accidents and fatalities related to road accidents. But, most of the solutions being proposed and developed for connecting vehicles are based on a central coordinating entity or internet, which poses a threat to the security of the vehicles' data and controls and also requires a change in infrastructure. Therefore, a vehicle to vehicle (V2V) communication system has been developed which operates on peer-to-peer network and is close to dedicated short-range communication (DSRC) system due to its short range. The system developed is capable of exchanging messages among vehicles and also plot the relative positions of nearby vehicles on a screen which gives the user a birds' eye view of surrounding traffic thereby helping him/her in taking decisions. Furthermore, vehicles which are not in line of sight due to curved roads or perpendicular road intersections are also shown on screen and hence enhance safety. Therefore, such a system is capable of avoiding accidents and saving lives.

Project Title: DERMATOLOGICAL DISEASE CLASSIFICATION USING MACHINE LEARNING

Guide: Mrs. Varada Kulkarni

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Abstract:

Dermatology is one of the most unpredictable and a difficult field to diagnose due to its complexity. The high cost involved in just identifying the type of dermatological disease prevents poor people from approaching a doctor. The implication of this is that they do not undergo any form of proper or authorized treatment. This report deals with the development of an algorithm that uses machine learning capabilities which can help an

individual identify the skin disease he/she is suffering from. The ubiquitous use of smartphones in developing countries like India has opened new avenues for inexpensive diagnosis of diseases. Images of the infected area are used. Then preprocessing is done on this area in order to eliminate the noise and to make the image uniform. This is then given to the different layers of the convolutional model present in the machine learning part to classify the type of skin disease. This algorithm then can be used by anyone present in this world to develop more accurate results in the field of medicaltechnology.

Project Title: DISTILLATION BASED KNOWLEDGE TRANSFER AND FPGA IMPLEMENTATION OF DEEP CNNS FOR FACE RECOGNITION

Guide: Prof. M. S. Sutaone

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Abstract:

In the wake of the burgeoning amount of data and the demand of IoT based edge computing devices at the advent of 5G, the research community as well as the industry are taking an increased interest in deploying AI on the edge. AI based systems in edge computing devices provide the best of both worlds viz., the state-of-the-art accuracies of deep learning models and the portability and scalability of embedded systems. However, a major bottleneck is the prohibitively large size of deep learning models and the limited memory and computation capacities of embedded systems that work on a low power budget. With this background, our work is at the intersection of computer vision, deep learning and embedded systems. By addressing the problem of face recognition using deep Convolutional Neural Networks(CNNs), we explore optimizations at the model level and the hardware level with an aim to ease an embedded implementation. To begin with, our work extends the idea of distillation based knowledge transfer for model compression to regression based problems with an intuitive discussion for motivating the idea. We transfer the knowledge from a deep Inception CNN model with ~3.7M parameters into a MobileNet CNN architecture with ~0.8M parameters and achieve a near full recovery of the original accuracy with a 76.75% reduction in the model parameter count. In addition, we demonstrate that precluding the face alignment step and pruning away local response normalization layers along with those layers that either perform a constant product or power on their input, has negligible effects on the model accuracy. In spite of doing away with most of the parameters and pre-processing bottlenecks, the trained model achieves 80.25% accuracy on the LFW with a threshold of ~0.96. Further, the results of a myriad of experiments on knowledge transfer with hyper-parameter tuning have been performed and discussed to promote future work.

At the hardware level, we use Intel's DE10 Nano FPGA SoC in order to deploy the CNN for real time inference. The OpenCL programming model is used to map the layers in the CNN into corresponding kernels that are deployed and computed in parallel on the FPGA. The highlights of the OpenCL implementation are twofold. Firstly, the kernels and the host code help demarcate between the convolution operations and the pre-processing and also speed up CNN inference by dispatching ops onto the FPGA simultaneously. Thus, the parallelism in CNNs is exploited because a single feature map is acted upon by multiple types of filters and thus, a significant speed up is achieved. Secondly, the OpenCL program is generic in the sense that it can be deployed on a large variety of devices ranging from FPGA SoCs to distributed GPUs. Significant time and LUT based metrics are compared to demonstrate speed up in forward inference of the CNN model.

Project Title: ELEPHANT SOUND RECOGNITION

Guide: Prof. Swapnil G. Mali

Ruta Abhyankar (141607001)

Priyanka Banasode (141607002)

Rasika Diwate (141607007)

Nupura Joshi (141607010)

Abstract:

In India, we find that rail transport occupies a important position in providing the necessary transport infrastructure to sustain and satisfy the ever-increasing needs of a rapidly growing economy. Today, India possesses the fourth largest railway network within the world. In India, states like Assam there are huge wildlife sanctuaries wherever the railway tracks are deployed, however some areas are declared as " animal corridor " where animals are free to roam. In these areas due to railways, frequent accidents of animals occur. The recent incident, coming in an elephant corridor and barely two months after five pachyderms died equally in Assam, highlights again how India's railway tracks have turned into death traps for elephants. According to wildlife experts, India has the large number of train accidents which also involve elephants in the world. This project relies on to protect such animals that encounter certain accidents because of railways by recognizing their sound and to synthesize it to avoid the same. This project aims to safeguard the lives of the elephants that try to cross the railway track by detecting their sound like roar, rumble and trumpet and after detecting the elephant sound producing honeybee sound as they are afraid of the honeybee sound. The .wav audio files of the elephant sounds are recorded which are around 60 files provided by the Professor of IISC Bangalore. The sounds are captured by doing the proper setup in the grasslands , so as the herds of the elephants are passed by the sound is

captured by the desired system . So, these 60 files and around 200 files which are mixed using the other environmental noises are analyzed in this project.

Project Title: Firefighter Monitoring and Tracking System

Guide: Mr. Sushil Ronghe

Niranjan Gadre MIS NO: 111507016

Adarshkumar Patil MIS NO: 111507040

Sachin Sanap MIS NO: 111507051

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Abstract:

A fire fighter needs to get inside the fire affected building. The fire fighter always puts himself in danger and even after entering the fire affected area it is not possible to track the fire fighter. So, here we are designing a system which will track the fire fighter in the fire affected area and also transmit his health parameters. When the fire fighter enters the fire affected premises then this system is placed on his body. This system consists of various sensors like pulse rate sensor, temperature sensor, distance sensor and gas sensor. These sensors will continuously monitor the fire fighter's parameters like temperature of his body, pulse rate of fire fighter, the toxic gas around him, distance between obstacle and firefighter. These parameters will continuously be displayed on the 16x2 LCD display unit interfaced with the microcontroller and also send over webserver via Wi-Fi module. Using GPS receiver, we will track the position of the fighter inside the building and all these parameters are also transmitted to the base station via GSM modem.

Project Title: FLOOR CLEANING ROBOT

Guide: Mrs. D.V. Niture

Mayuri Naik MIS NO: 111507033

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Abstract:

Due to the effectiveness in assisting humans in floor cleaning applications at homes, restaurants, offices, hospitals, universities etc., cleaning Robots is a major area of research. It is a compact robotics system and is thus easily portable. Being a robot it removes human error and provides cleaning activity with greater efficiency. While carrying out the cleaning process manually there is a possibility that some portions of the floor may be left out. Also manual cleaning is time consuming. In case of huge offices and universities a large work force is required for cleaning job. The advantages of Floor cleaning Robot are cost-effective, time-saving, flexibility and efficiency makes the bot a better choice for cleaning. In this project, the floor cleaning robot carries out wet cleaning activity. It operated in dual mode, manual and autonomous. In manual mode the robot receives instructions through Bluetooth and acts accordingly. In autonomous mode the robot makes decisions on the basis of the outputs of the ultrasonic sensors.

Project Title: FOG REMOVAL AND OBJECT DETECTION USING IMAGE PROCESSING

Guide: Mrs. V.N. More

Pratik Dhebe 111507014

Yash Pawar 111507042

Rupal Lautre 111507048

Abstract:

Fog is one of the biggest problems in hilly and cold regions. Road fatality occurs every year in thousands because of weather, such as fog, and it is increasing each year because of pollution and smog. According to worldwide research, increased visibility between vehicles reduces the risks of crash by over 30 %. This report is a solution to this important problem. It deals with the processing of an image in order to produce a defogged image. We tried to implement this code on a raspberry pi and capture image with Pi camera starting from the Foggy picture using algorithms. This system can be extended further to higher levels, such as satellite images in the stormy or cyclone area. We can improve satellite imaging with high speed camera capture and high-speed processor.

Project Title: HEALTH MONITORING WEARABLE DEVICE FOR CARDIAC ARREST PREDICTION

Guide: Mr. Ranjit Sadakale

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Abstract:

In today's modern world, cardiovascular diseases are the most common cause of death in the developed as well as underdeveloped and developing countries. One of the most prevalent health care problems today is the poor survival rate of out-of-hospital sudden cardiac arrests. It attacks a person so quickly that it hardly gets any time for treatment. Correct diagnosis and continuous supervision of the patient is the most challenging task for the medical practitioner but it can largely reduce the mortality rate. Accurate detection of a cardiac arrest and consultation of a patient 24x7 by a doctor is not possible as it requires a good amount of time and expertise. Pulse rate monitoring wearable provides an Internet of Things (IoT) solution to healthcare. Wireless Body Area Network (WBAN) is part of this progressive technology due to the deployment of multiple sensors such as pulse and humidity and temperature to collect vital body signals for and diagnosis. The healthcare industry generates terabytes of data daily but most of it is not effectively used. In this study, a tentative design of an integrated IOT based multisensory cardiac arrest prediction system is proposed to detect impending heart disease using efficient machine-learning techniques for facilitating database support system. The microcontroller collects the sensor information and transmits it over the web, thereby providing real time monitoring for doctors. It will trigger an alarm in case the signal has been measured above or below predetermined values. Whenever the user logs in, live heart rate of the patient is displayed. This data can be accessed anytime by the doctor. At the same time, an alert message along with the location of the patient is sent to the emergency contacts stored through the android app connected to the cloud server. The system can update the recorded data at the central server every 15 seconds. The patient's exact location (GPS) will help to give medical attention within the first few important hours, therefore greatly improving patient's chances of survival. The system also solves problems in the wireless network such as delay and packet loss due to network congestion when transmitting and receiving a bulk of data. Generally, these problems in transmitting vital body signals may result in incorrect diagnosing which can cause more deaths severely impact the overall system's performance. Thus, a suitable design of congestion control mechanism is implemented. This research makes use of signal processing and data-mining techniques for sensor data analytics to predict sudden cardiac arrests with a high accuracy. Experimental results prove the proposed system is user friendly, reliable, cost-effective. In addition, the project aims to develop a common platform for communication between the prescribed doctor and patient.

Project Title: IoT based Heart Attack Detection, Heart Rate and Temperature Monitor

Guide: Mr. Sushil Ronghe

Mayur Shinde MIS NO: 111307057

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Abstract:

The Internet of Things (IoT) is inter communication of embedded devices using networking technologies. The IoT will be one of the important trends in future, can affect the networking, business and communication. In this paper, proposing a remote sensing parameter of the human body which consists of pulse and temperature. The parameters that are used for sensing and monitoring will send the data through wireless sensors. Adding a web based observing helps to keep track of the regular health status of a patient. The sensing data will be continuously collected in a database and will be used to inform patient to any unseen problems to undergo possible diagnosis. Experimental results prove the proposed system is user friendly, reliable, economical.

Project Title: Next Generation Smart Room with Efficient Attendance System

Guide: Dr.R.D.Joshi

AchyutBodile 111507002

Santosh Gangaji 111507017

Karthi Subramanian 111507023

Koshy Thomas 111507026

Abstract:

Automation plays a crucial role in today's fast progressing era. Data has become the gold mine of this era and Internet the tool to mine it. Internet of Things has laid its foundation deep and the never-ending construction is still in progress. It has provided a platform for the things like automobile, buildings, healthcare to be connected to internet. Classroom automation can foster efficient education. The attendance system has many flaws such as proxies of student, loosing of the attendance records and inefficient storage of these attendance on papers. Similarly, students utilize all the resources such as fan, light, projector

without thinking about energy conservation and the cost incurred with it. The proposed system deals with automation of class rooms. It consists of two modules: 1. Smart attendance system 2. Actuation based on monitoring people

In the smart attendance system, attendance is marked just by switching ON the Wi-Fi button on the user's smart phone. The module developed matches the MAC address of the mobile phone and MAC address stored against the student's name in the database and marks the attendance. The attendance with the subject, date, time is stored on a cloud server and can be accessed by the faculty anytime and the students can view their respective attendance. This eases the process of taking attendance as it does not waste time and provides a paperless environment to store attendance. In the second module the appliance of the classroom such as fans, lights are turned ON/OFF based on the presence of the student inside the class. A PIR sensor is used to detect the motion of the student and automate the appliances in the classroom

Project Title: OCULUS: Deep Learning Based stand-alone module for Smart Refrigerator

Guide: Dr. Prashant P. Bartakke

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Abstract:

Automation being one of the fastest growing technologies of this era, it brings about a need for making even the most ordinary devices "smart". The refrigerator is one of the most common household items in India. It is prone to go under technological changes with each coming year. Since people now spend more time outside the kitchen, we need a fridge that will adapt to our lifestyle changes. With food detection and recognition capabilities, Oculus can automatically give us information on items present inside the fridge on our smart devices, which can be accessed when we are away from home. This can be achieved using deep learning and neural networks, where we will use convolutional neural networks to make the device learn to recognize fruits inside the refrigerator. The neural network will be trained with images, and once it is trained with sufficient number of training images it will learn to recognize fruits in images captured by the in-built camera. Along with an inventory list, Oculus will produce a nutrient list, giving the amount of calories, proteins and fibres inside the refrigerator. The model uses Faster RCNN with base network Resnet50. The images for training are labelled using LabelImg, and the model is implemented on Raspberry Pi 3 board, with Raspbian Jessie OS, Keras and OpenCV. Faster RCNN gives high accuracy with optimal speed requirements. The design for Oculus is a low budget model which can be implemented in existing refrigerators, and also come built in with the newer models. There

is no such product available in the Indian market as of now, which makes Oculus ideal for every Indian household.

Project Title: Secure Data Transfer using ECC based Crypto-processor

Guide: Dr. Mrs. Vaishali Ingale

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Abstract:

Internet of Things is rapidly finding its way into the technological world. The large scale of applications of IoT varies from home automation to medical surveillance to warehouse management. The use of IoT for applications which require the transfer of secure data, calls for improvement in security features while transferring data within the network. Security for the safe communication of data within these networks has been neglected and the software solutions do not provide an adequate level of security for the same. There have been several breaches in the past which have led to the endangerment of human lives. Hence, we are looking to improve the security features by providing a hardware solution for data encryption and transfer in an IoT network. Implementation of cryptographic algorithms on software and deployment at the nodes is not possible due to the fact that sensor nodes do not possess the required computational power. This way the hardware encryption system will increase the security features without making any changes to the existing IoT network. Moreover, dedicated hardware for encryption relieves burden from the sensor node,so that they can perform other operations and also makes the encryption process faster. The encryption key is generated in the hardware itself making it untraceable for the software attacks as the hardware acts as a Black Box, making hardware encryption more secure than software encryption. Apart from IoT, this dedicated hardware can be used in other application areas such as Defence, Banking, Crypto-currency and any application which requires the transfer of secure data. We thus aim to design a Crypto-Processor i.e. a dedicated processor which will encrypt the data received from the sensors and transmit it securely across the network. The design of the processor is mainly divided into two parts: one which handles the key generation, which is implemented using the Elliptic Curve Cryptographic (ECC) algorithm, and the other dealing with the encryption of the data, which is implemented using the RC5 block cipher algorithm. The product (processor) is aimed to be designed such that it can be deployed at the sensor nodes in the IOT network so that the data in the network is secure and is securely transmitted across the network.

Project Title: SMART GLASSES FOR AVIATION

Guide: Prof. Mrs. V. S. Vyas

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LOKHANDE CHETAN 111507030

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Abstract:

An investigation of the most recent improvements by driving innovation organizations, for example, Microsoft, Google and Facebook, uncover that the following movement in media innovation could be what we call Augmented Reality Smart Glasses. Smart Glasses are wearable devices that meld the real and virtual information in a customer's view field. Scholars have investigated the various aspects and applications of the Smart Glasses. One such field where Smart Glasses can prove cardinal is Aviation. This report consists of a design of Smart Glasses for Aviation industry. Pilots need to take crucial decisions as quickly as possible in war like situations. This projects aims to project the measured physical parameters onto the data glass to help pilots act accordingly without deviating from the field of vision. Voice command from pilot will act as input to decide which physical parameter to project on the data glass. The project is implemented on Raspberry Pi 3Bminicomputer, one acts as a base station and other one as Client. Base station consists of sensor grid which will monitor physical parameters continuously. Client performs speech processing and display the data on data glass. The language used to program the Raspberry Pi is Python and the OS is Linux based Raspbian. Base station and Client communicate with each other wirelessly through Wi-Fi. A light weight MQTT protocol is used for communication.

Project Title: Smart Paper Tracking System

Guide: Ms. Vanita Agarwal and Dr. Jonathan Joshi (Eduvance, Mumbai)

Viraj T. Khatri 111507025

Abstract:

In this day of digital transparency, old records are being digitized to be made available for public access. This transition of records to the digital domain leaves them stored in insecure places which can cause a lot of damage for some highly sensitive information which is vulnerable due to low security. Preventing this from happening is of paramount importance. An easy to set up and portable security system needs to be implemented to provide them with a level of security that is required normally as a feasible alternative to a standard

security system. This will be better suited as the system is easier to set up than existing security systems as they require hardware which is wired in. Implementing it in modules allows the system to be extended from a few files to many with ease. This report consists the method followed for achieving this with the relevant results. The modules previously discussed are attached to the files and issue an alert when an unauthorized usage of a file is detected, also, they can lock the file remotely so that it can not be opened. Another module can be used to handle multiple files and issue commands to them with respect to what is to be done. This module will act like a central server to all the modules attached to the files, and these modules act like clients to facilitate transmission of data. The central server module is fitted with cloud and GSM connectivity so that it can transmit alerts anywhere and can be issued commands remotely. Technology implemented here will be Accelerometers to keep track of the files and alert whenever it senses movement, BLE to advertise alerts on unauthorised access and alert a central server. Central server module must be equipped with BLE to be able to communicate with the client modules, IoT and GSM compatibility to completely make the system easy to access and control so that the same level of transparency is maintained as security.

Project Title: SOLAR-DC POWERED HOME (An Inverter-less System)

Guide: Prof. Mrs. Yogita Vaidya

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Mayuri Gulalkari (141607009)

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Rutuja Nalawade (141607012)

Abstract:

It is well established that access to energy is closely linked with socioeconomic development. India houses the largest share of the world's population deprived of electricity with about 237 million people lacking access. At the same time, in India, many households that do have access to electricity lack an uninterrupted and quality power supply. This indicates that there is an immediate need to address the quality, affordability, and reliability of the power supply. The problem of energy access in India is quite unique and requires a new approach that leverages modern technological innovations. This project presents an efficient and affordable Solar DC solution for powering such homes. Though several solutions have emerged in the past for powering these homes, those have been expensive and energy inefficient. These solutions rely on several DC to AC and AC to DC conversions, to feed the widely used AC home loads, thus, wasting a large chunk of the expensive power. The proposed system will charge the batteries efficiently with clean solar power using optimized

charging algorithms and will also focus on extracting maximum power from solar panel at any point of time using Maximum Power Point Tracking (MPPT) algorithm. The output power is directly fed to the DC loads which far more energy efficient as compared to the conventional AC loads is cutting the energy costs substantially. The system will also minimize the losses due to conversions. Further remote monitoring feature can be added on to the system for increased performance.

Project Title: WIRELESS CHARGING FOR PACEMAKER BATTERY

Guide: Mr. Ranjit Sadakale

PRITEE CHAVAN (111507011)

ROCKY VALLEAMKULATH (111507059)

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Abstract:

Today in many medical applications bio-sensors and bio-implants are placed inside a patient's body. As these bio devices are placed inside the body for longer periods hence their power supply issue needs to be considered. One such device is cardiac pacemaker. The pacemaker is a small device used to sense heart beat of a person and it sends electrical signals to the heart to keep the heart beat rate at correct pace. Pacemaker can be implanted under patients skin on chest and its tiny leads are hooked up to heart .Conventional artificial cardiac pacemaker makes use of embedded battery .This battery has limited life and needs to be replaced after its expiry and for this patient has to go through surgery. This report suggests a wireless power supply approach for a rechargeable battery of pacemaker based on inductive resonance coupling. As pacemaker is a battery operated device as soon as the battery runs down surgery must be done to remove the old battery in order to keep the pacemaker working smoothly. To eliminate the risks of surgery wireless power transfer approach is suggested to charge the pacemaker Li-ion battery. This system consists of two major parts . The transmitter section and receiver section . The transmitter section to generate AC signals of high frequency and transmit them through the transmitting coil. The receiver section which receives this AC signal through receiving coil then converts it to DC signal and charges the battery of artificial cardiac pacemaker. The approach starts with generating a high frequency signal about 3Mhz frequency . To generate this signal an oscillator circuit was designed which gives sinusoidal wave of 3Mhz range. A coil was made for transmitting purpose. This high frequency wave is then transmitted through copper coil(AWG 18) of 15 turns. These two parts together works as a transmitting circuit. Receiver circuit also has a coil for receiving these high frequency signals . This is also copper coil (AWG

18) of 15 turns. Upon receiving these signals are first rectified using bridge rectifier circuit. To charge cardiac pacemaker battery uninterrupted constant voltage is needed. To provide this the rectified signal voltage needs to be regulated to 5V. This report consists of implementation results, timing results and information about each entities basic information and their working. Thus the design is fully efficient and implantable.

Project Title: WIRELESS FACTORY MANAGEMENT SYSTEM WITH PREDICTIVE ANALYTICS

Guide: V. N. More

Sanil Raut 111507052

Abstract:

An organized factory requires a smart management system which can perform surveillance of the premises and to report abnormal conditions for effective and efficient working of the facility. The idea is to build a wireless factory management system which can sense parametric deviations in temperature, pressure, humidity, wind speed and visibility using microcontroller and sensors based Remote Terminal Unit (RTU). Based on the constructed constraint functions, which evaluate the conditional status of the site in terms of abnormality. To predict this outcome, the data set (N=96453) is divided into 60 percent for training and rest for testing, which is used by machine-learning algorithms like Logistic Regression, Neural Network, Naive Bayes', Random Forest and Gradient Boosting with hyperparameter tuning, which predict the conditional outcome with a 95 percent accuracy. Also, The two constraint functions are compared by various statistically and graphically parameters such as Variable Selection, Models' Accuracy, Kolmogorov-Smirnov (KS), Receiver Operating Characteristic (ROC) Curve and AUC, Gain, Lift and Actual v/s Predicted Charts. The results indicate an optimization of 2 percent in the accuracy of the model by using the Weighted Percent method for Classification and data optimization.

Project Title: AI BASED APPLICATIONS FOR PHYSICALLY IMPAIRED PEOPLE

Guide: Dr. Mrs. P.P Rege

Omkar Prabhune 111508057

Abhidiptta Dey 111507071

Sunil Dhimar 141607006

Abstract:

The project consists of 3 parts: SpeakingEyes (a desktop application), Tap-On (a mobile application) and Now-You-See-Me (a mobile application). SpeakingEyes is a Human-Computer Interaction (HCI) based desktop application. It enables people with paralysis, locked-in syndrome, communication disorders, Lou Gehrig's disease, spinal cord injuries, neurological disorders and related disabilities who are left with minimal ability to perform the voluntary movement of muscles to express themselves and perform essential activities independently. These include communicating with people, requesting various services such as food, water, natural calls, phone calls, asking for assistance, raising alarm during an emergency, turning on/off switches for lights, fan and other home appliances. Web-camera/external camera is used to acquire user's images. Image processing and machine learning using convolutional neural network are used to determine eye gaze and subsequent action is performed by the computer. Tap-On is a mobile application for IoT (Internet of Things) based Smart Home. Built on the Android Operating System, this mobile application can be used to control lighting and other electrical appliances wirelessly using a mobile phone. Bluetooth is used as a means of communication between the mobile phone and electrical device. This app can be used by any person in general, though it is specifically designed for people with illness and disabilities such as lower limb loss or impairment, disability in mobility, people confined to bed due to illness or old age, etc. Now-You-See-Me is a real-time object detection mobile application designed for people with disabilities related to eyes such as blindness, low vision, color blindness, cataract, etc. The app uses the camera to capture image/video. Captured image/video is processed to label various objects present in the image such as person, car, bus, chair, table, etc. in real-time. This information is given to the user via earphone so that the user comes to know about his/her surroundings. YOLO (You Only Look Once) algorithm is used for object detection.

Project Title: Assistive Head Motion Capture Mimicking Targeting System

Guide: Mr. Sushil Ronghe

Ashish Gawali 111507019

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Siddhant Kukade 111507027

Abstract:

Today in the era of robotics there are new robots being visualized and brought to reality daily. The applications of robotics are not limited to factory automation only but also have made a huge impact in other applications such as defense, surveillance, bomb detection and

diffusion, maintenance, etc. A considerable number of the unmanned robots are manually operated remotely. For the operator to control the robot effectively the robot must in line of sight of the operator this limits the operating range of the robot. For various applications such as bomb diffusion, maintenance robots, wall climbing robots it is imperative that the operating range the robots must sufficiently large. If the range is not good enough it may endanger the safety of the operator. To increase the operating range of the unmanned robots they are being mounted with sensors that can detect the surrounding environment of the robot such as a camera. The camera more often than not is fixed on the chassis of the robot limiting the operators view of the surrounding. The system we are proposing will give a more complete view of the surrounding to the operator. This report discusses the design, manufacturing, sensors and the embedded system design required this system.

Project Title: ARTIFICIALLY INTELLIGENT ROBOTIC ARM

Guide: Prof. Dr. S.P. Metkar

Deep Vyas 111507062

Shreeyash Pawar 111407044

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Abstract:

The advancements in computer vision, from traditional techniques to deep learning methods have been monumental, achieving human level accuracies in image classification. The use of such advancements hasn't reached the potential in aiding the people in process and manual industries. In our project, we aim to bridge this gap by assisting the people in warehouse industry . We aim to target picker to packaging work flow within a typical e-commerce warehouse, where a picker still manually sorts an item to respective collection bins, resulting in high inefficiencies, more human resource, and more pressure to deliver in tight e-commerce deadlines. To sort a product in real time conveyor belt operations, we can't use central cloud interfaces for computation as they introduce latency, require large bandwidth, and have high subscription costs to be realizable. If not for cloud, the system should be small enough to fit in dynamic closed spaces of warehouse processes. Hence, we deployed our AI model on the edge using a powerful single board computer with our optimized custom OS layer in middle. Our methodology has been to create a system in embedded Linux with installed libraries to support our application. On application side, we

have contributed datasets, configured and trained models for our use case. Our results show the best practices in training of model using conveniences of transfer learning, and we conclude the best trade-off between accuracy and speed, to run on resource constrained embedded device. Future work is concerned with making the robotics more collaborative with humans, and integrating IOT protocols to interact with other devices to create a deploy able and scalable warehouse system.

Project Title: ASL Recognition & Conversion

Guide: Ms. Vanita Agarwal

Omkar Lonkar : 111507031

Gautam Munot : 111507036

Simran Kharpude : 111507057

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Abstract:

The deaf & dumb (or the Mute community) find it a tedious task to converse with ordinary people. This stands as a hindrance in even the most basic of their activities. It affects their personal development, interpersonal relations and limits the contributions they could otherwise make to society. A bare minimum proportion of the non-mute community knows how to "sign" fluently while the others need to depend on translators. We have attempted to design a noninvasive product with definite potential for portability. The prime motive of this project is to provide an simple and easy to use platform for the hard of hearing people to express themselves despite the language barrier. We aim to achieve this motive through gesture recognition. Using gesture recognition, we compute the mathematical interpretation of human hand gestures to recognize the signs conveyed by American Sign Language. This is done by training the machine with a moderately huge dataset of sign gestures. In order to reduce processing data as well as complexity of the system, the gestures are converted to binary form. Other forms of pre-processing are also applied. The dataset consists of 24 alphabets, 10 numbers and 13 words of the English language with provision for extension. With the aim of developing a simple and robust solution, basic image processing with background subtraction has been used to create and recognize hand gestures. The machine is trained using convolutional neural network (CNN) as the learning algorithm. CNN is known to give accurate results for object detection and recognition and thus we chose this neural network for our project. The system enables realtime hand gesture and speech recognition and provides an innovative and simpler mode of communication for the mute people.

Project Title: CONGESTION CONTROL IN 802.11 WIRELESS NETWORK

Guide: Mrs. Varada Kulkarni

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Aditi Gadkari MIS NO: 111507015

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Abstract:

The growing popularity of wireless networks has led to a sharp increase in data traffic. In order to keep up with the needs of the ever-increasing use of wireless mediums, we need to upgrade current protocols. The IEEE 802.11, more widely known as Wi-Fi is the world's most widely used wireless computer networking standard, and hence will have a larger impact if improved. Due to limited resources, Quality of Service (QoS) becomes a huge challenge in wireless networks, of which one prominent issue is Congestion Control. In this project, we have focused on reducing collisions in an IEEE 802.11 network, which in turn will reduce congestion. We present an asynchronous multi-channel access protocol for Ad Hoc networks using a single transceiver. This protocol is implemented in the Media Access Control (MAC) layer of a IEEE 802.11 network and has a novel collision avoidance mechanism as well as an improved back off strategy. This has been achieved with the help of a unique handshake mechanism between the two communicating nodes. The back off strategy involves a multiplicative increase and a linear decrease in contention window, as opposed to an abrupt reset in the original MAC protocol. This new strategy results in better network throughput, lesser delay and efficient channel utilization. The distinguishing factors of our protocol are low cost and low power deployment, no need for temporal synchronization among nodes and simplicity. We have compared performance of this proposed algorithm with that of the original based on parameters like number of collisions, packet delay and aggregate throughput. These are calculated and plotted for different network conditions by increasing number of nodes in the network, data rate, number of packets sent, etc. The software used in our project are Network Simulator 2 (NS2) for simulating various network conditions with changed MAC protocols, AWK script for extracting data from NS2 logs and analyzing it, and MATLAB for plotting graphs of the processed data.