EMBEDDED SYSTEMS

A Survey on Water Stagnation Detection and Prevention System in Smart Cities

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ABSTRACT

Water logging seems to be a common problem nowadays in the cities during heavy rains. The existing rainwater infrastructures in the cities are not adequate to assure the proper drainage of the water. This leads to streets in the low-lying areas get flooded causing traffic jams in the city. Moreover, it causes the spreading of waterborne diseases among the people especially who are living in the slums or squatters. Sometimes, they lose their homes due to waterlogging. In addition to that, pedestrians are actually clueless when they walk through the flooded streets. Hence, this paper intends to do a survey on waterlogging in the city, the causes of waterlogging, how to identify the waterlogging areas, what are the necessary measurements have to be followed for preventing the waterlogging. The main idea behind this paper is how to minimize the problems faced by the people that are caused to them due to water logging.

Keywords: water logging, waterborne diseases, traffic congestion

Smart Irrigation System using Zigbee Technology and Machine Learning Techniques

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ABSTRACT

Agriculture plays a massive role in India's economy with nearly 60% of its land still under cultivation. In such scenario, managing the scarce water is a critical issue in this era. Therefore, a smart irrigation mechanism is necessary to improve the crop productivity. Smart irrigation can be achieved by combining the potential of Internet of Things (IoT) with machine learning algorithm(s), which supports automation and fast forward enhancements in the agricultural field. In this paper, design and implementation of a Smart Irrigation System (SIS) that automates the irrigation process in an ideal and accurate manner using machine learning techniques (decision making) is detailed. In the first module (sensor), various parameters such as the moisture content of soil, temperature and humidity of air are obtained from the field and transmitted to a local base station through Zigbee technology (IEEE 802.15.4).Second module is the base station, where Raspberry pi is used for computation and learning. That is, a classification model is built using the training set and predicts the crop water requirement (ETcrop) for the new parameters. In addition, the sensor module is solar powered, thus reducing power consumption and enhancing the system's robustness.

Keywords: Smart Irrigation System, Internet of things, Machine learning, Classification, Zigbee, Raspberry pi.

Design and Fabrication of Mobilized Lower Extremity Powered Exoskeleton System

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ABSTRACT

Powered exoskeleton system is an external structure that supports and protects the human body. It's human wearable mobile machine that is powered by a system such as electric motor, hydraulic and pneumatic systems. Four core parameters have been tackled that includes calculation, designing analysis, machining and assemble. Initially, the dimension of the exoskeleton leg has been taken from the average human and it is designed by using solid works software as a prototype model. The mild steel material has

been chosen because of its less deformation, higher material properties and affordable cost. The solid work model is analyzed in ANSYS software by applying various weight load to checking the withstanding capacity. The pneumatic operation is non-linear system it is easy source availability & controllability in fluid power system. The pneumatic pressure works on 5 to 8 bar at constant supply through FRL unit & air compressor of pneumatic cylinder can be actuated. The direction control valve of the 5/2 solenoid is electrically operated to control the speed pressure & real time automation purpose. The arduino controller is used as a feedback system that can be diagnosis and rectify which can be acting as a close loop system to reduce the friction and wear factor using tribometer testing equipment. This project is designed and fabricated for various applications, such as for the individuals employed in military to carry heavy loads using backpacks. The fire fighters to carry heavy weapons and foot soldiers to walk for longer distances by carrying heavy loads. When the human foot ison the ground, the wearable powered exoskeleton suits will transfer forces point loads from the human backpack to the ground, so that the user will not feel any difficulties and physical fatigue. This suit will enhance the user's load bearing capacity, walking speed and efficiency and it also lessens the injuries and difficulty level. The analyzed design has been implemented and tested by lifting heavy loads, the result has been shown that the exoskeleton leg can withstand load from 100kg to 150kg. The exoskeleton leg can walk at the speed of 0.9m/s (2mph) and the Degree Of Freedom is obtained as 4, Where the exoskeleton leg consists of 4 links and 2 joints. It is demonstrated to humanbodyas a exoskeleton system to transfers load as maximum of 90%. The powered exoskeleton leg is used to withstand heavy loads, enhances the human efficiency and reduces the work. It can also be used for social needs like physically challenged people to reduce the fatigue rate and enhance the human power.

Keywords: Exoskeleton, Lower extremity, Solid works, Ansys, Actuation, Robotics, Wearable and DOF.

Industrial Wrapping Machine

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ABSTRACT

Wrapping is the process of casing a finished product from the industry which is enclosed inside the boxes. It is the final step process in the production industries when the finished product from the industry has to be transported to various sites of the product requirement. Conventional wrapping machine cases the boxes only on one direction and remaining sides of the box are not wrapped. The efficient wrapping process to cover all the sides cannot be done manually or by using the existing systems. Effective method for box wrapping can be achieved by additional fabrication of two pneumatic cylinders to either side of turn table of existing machine. Hence, our objective is to provide a low cost automatic machine to completely wrap the boxes on all the sides to prevent damages to the products and to reduce the human intervention and work.

Keywords: Wrapping, Product enclosed box, human intervention, turn table.

Enhancement of Routing Protocol for Low Power Lossy Network for Internet of Things

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ABSTRACT

Internet of Things (IoT) is a keyword which coins various challenges to be addressed in the area of networking and security. 6LoWPAN act as bridge between wireless sensor networks (WSN) and Internet. IoT Operating system is one of the major area, where we can able to change the behavior of the WSN nodes which is to be deployed. The main challenge in WSN is power consumption, as most of the devices used are battery powered. Medium Access Layer (MAC) and Network Layer protocols plays major role in effective utilization of power consumption. Routing Protocol for Low Power and Lossy Networks (RPL) is universally accepted routing protocol for IOT which is designed for static environment. This

paper deals with conversion of static environment to mobile environment where the nodes be dynamic in its position for mobility based application and modifying the parameters in existing trickle timer algorithm for mobile environment. Cooja Simulator from Contiki Operating System is used to implement the simulation experiments. Comparison was done between Static trickle timer algorithm with modified trickle timer algorithm based on power consumption for different number of nodes in a common environment.

Keywords: RPL, Trickle timer, Power consumption.

Multi-factor based user authentication scheme for lightweight IoT devices

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ABSTRACT

Authentication of legitimate user plays a prominent role in security of the Internet of Things (IoT) applications like smart home, smart cities, wearable devices etc. The services offered by IoT devices must be attainable from anyplace and anytime, only by the legitimate users. The existing authentication schemes for IoT applications are not secure, vulnerable to many attacks and also any illegal user may access the data of smart devices. This paper presents an authentication scheme which uses only simple algebraic operations like hash and XOR, and this makes the proposed authentication scheme more suitable for the lightweight environment of IoT. It uses multiple factors like user identity, password, and biometrics for authenticating the legal users. Also, the proposed scheme establishes mutual authentication and key establishment between the users and smart devices involved in the communication. The protocol is modeled using the Security Protocol Description Language and the verification is done using one of the formal verification tools–Scyther. The result from the Scyther tool confirms the security of the protocol and clarifies that it is robust against various known attacks and are more affordable for practical applications.

Keywords: Internet of Things, authentication, lightweight, multi-factor authentication, Security Protocol Description Language, Scyther.

Design and Implementation of Biometric based Smart Antitheft Bike Protection System

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ABSTRACT

A lot of research is going on in the field of biometrics. The proposed idea in the paper concentrates on the application of biometric for two wheelers especially, motor bikes and scooters. In our day to day life, a lot of motor bikes are missed and it is very difficult to find the location. This paper provides an effective solution in order to ensure more security and avoid unauthorized use of motorbikes. In this project, a finger print based simple and efficient electric engine starter is proposed. Simple and effective hardware has been designed, implemented and tested with motorbikes. Test results show that the developed system identify the correct person and allows the right person to start the bike

Keywords: Biometrics, Fingerprint scanner, Arduino

Analysis on Behavioural Changes in the Intellectual Disability of the Individuals

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ABSTRACT

The Intellectual disability (ID) is the major problem of many individuals in this century. The Intellectual disability will be determined as per the individuals Intelligent Quotient (IQ). The subjects with ID may not able to lead their life own. They are in need to have the dependence of the surrogate till the end of their life. In this project, the recommending of some activities will help to identify the likes and dislikes of the subject and also it helps to improve the activity of brain. By using MATrix LABoratory (MATLAB), with the recommending activities the EEG signals of the subject are taken non-invasively with the help of the headband and monitored. By the Hardware setup of ATMEGA 8 controller, the activities which the peak values of the likes obtained will be displayed in the

monitor. So, the repeating of this process will helps the subjects to identify their basic needs and also helps them to have an independent life.

Keywords: Behavioural Change, EEG, Intellectual Disability (ID), Non- invasive

Low Cost Raspberry Pi Oscilloscope

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ABSTRACT

Oscilloscope is an electronic test instrument which helps in monitoring the constantly varying voltage signal, that is represented in a two dimensional plot as a function of time. Oscilloscope can be called as CRO or DSO. It also display any other form of signal by converting it into voltages. These types of oscilloscopes are costly and they are difficult to carry to different places. Cost of maintenance and repair is very high in these kind of oscilloscope. Hence, in this project portable and cost effective Oscilloscope has been developed with the help of Raspberry Pi boards. Raspberry Pi is a tiny and an affordable computer whichgives best Graphical User Interface and Graphical Programming can be done with the help of Matplotlib. Matplotlib is a plotting library for the Python programming language and it is built upon Numpy. MCP3008 (ADC), a 10 bit analog to digital converter, sampling at the rate of 200ksps is also used. This helps in converting the external signals to digital signals. With the help of Raspberry Pi, the captured signals are plotted and can be viewed in the output screen. Wi-Fi module is interfaced with RaspberryPi and by installing a RDP (remote desktop connection) android application in the mobile phone, output can be viewed on mobile phone using Wi-Fi. With the help of remote desktop connection, portability is achieved.

Keywords: Raspberry Pi, Oscilloscope, CRO, DSO

Real Time Location Tracking and Health Monitoring of Police Force

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ABSTRACT

Nations internal security greatly rests on the shoulders of the police force. Many a times during encounter operations, police personnel are exposed to be injured or even be lost. Health and well being of the police force is essential as they safeguard our country from terrorist attacks and internal security lapses. This places the onus on engineers to equip our force with the advanced technologies. The main motive of this project is to determine the exact location and the health status parameters of the police force and then transmit the information to the control room in real time so that the appropriate actions can be taken in case of crisis. the developed technology greatly supports the search operations of the rescue teams and also drastically reduces the rescue time. The proposed design uses GPS module and sensor network to record all parameters in real time. In addition to this the policemen are provided with an alert switch to call out for help during emergency condition and a camera module to capture some evidences and transmit the information to the base station.

Keywords : GPS, Critical safety, GSM, Heart beat Sensor

Driver Warning System in Hill Bends

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ABSTRACT

Hill stations are always favourite vacation spots for all age groups. The often used mode of transportation by many people to reach a destination is roadways. Road accidents are undoubtedly more frequent and are responsible for many deaths worldwide. The roads in these hilly regions are always filled with many hectic and endless curves such as hair-pin curves, salient curves and re-entrant curves. The curves provide either partial or no-visibility of the incoming traffic to the drivers. In this regard to address this problem a system is developed to warn drivers about the approaching traffic in hill curves.This system has ultrasonic sensors placed on both the sides of the road. The output of the ultrasonic sensor is interfaced to the Raspberry Pi 3 Board. When a vehicle is detected by ultrasonic sensor, Raspberry Pi triggers the camera to capture the image of the vehicle. The image of the vehicle is then compared with the images already uploaded in the database. The match is found and the data is send to the receiver side through Bluetooth. The output is displayed as "Two wheeler" or "Four wheeler" in the Liquid Crystal Display(LCD). An upgrade is done to the project in identifying the specific vehicle type as car, bike, lorry, jeep, etc. Instead of using solar panels which are costly, piezoelectric sensors are used for the generation of current and supplied to the components. Voice module is interfaced with Arduino to play the audio in the speaker as "car is arriving" or for respective vehicles.

Keyword : Raspberry Pi 3, Liquid Crystal Display

Autonomous Room Mapping Vehicle

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ABSTRACT

With the world moving to an automated platform, robots are finding application in almost all domains to reduce the human effort. One such domain is to find a path in an unknown environment. The objective of this paper is to develop a room mapping robot that is able to map its surrounding environment.This allows the user to map areas that are not suitable for humans to traverse in. The developed model will be integrated with a computer using Bluetooth modules which enables the data exchange between the computer and the robot. The data gathering or scanning of the environment is done using a Sharp IR sensor. The sensor will be mounted on a servo motor to control the speed and direction of the scanning. The data obtained is transmitted to the computer where the data received will be further processed to obtain a map of the scanned environment.

Keywords : Arduino, Sharp IR, Room Mapping, Map Generation.

Portable Communication Aid For Specially Challenged : Conversion of Hand Gestures into Voice and Vice Versa

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ABSTRACT

Communications between a normal person and with the person having hearing loss and dumb have constantly been a tough assignment. The work is to develop a portable device for the disabled people those who are not able to communicate with the normal persons properly. The technology development presents a solution to build up a sign language conversion system to support the individual with hearing loss and mute people. The core idea is to build up a real time embedded product for the disabled persons without handheld gloves to assist their announcement in efficient way . Similarly the speech communication by normal persons will be converted into gestures for the disabled persons for their better understanding. This device will act as a two way communication device between normal and disabled persons.

Keywords : Communication aid, Sign language, Hand Gesture

Design and Fabrication of LPG Drain Gesture

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ABSTRACT

Nowadays there is a shortage of gas cylinders, so we have to book the cylinders before it gets emptied. Many times it happens that because of rush or due to the inadequacy of cylinder, there happens to be a delay in providing the gas cylinder to the customers. The main reason for this delay is that the information is passed to the service provider only after the cylinder gets empty. Most of us face many difficulties when the gas cylinder get emptied during the peak cooking hours. Our project intends to create awareness about the decreasing weight due to consumption of gas. Continuous measurement of weight can be done using a load cell as a measuring device. To monitor the liquefied petroleum gas continuously and effectively a fast working micro-controller is needed. Hence PIC controller is used to controlling the working of the load cell and its output. If the sensor sense threshold weight then the micro-controller it will make an immediate action by alerting the user. In this system, the load cell sensor is used to measure the weight of gas and its output is provided to the PIC controller and the weight will be displayed in the LCD Display, which is connected to the output port of the controller. A threshold weight is set in the controller and once the weight gets decreased below the threshold weight is reached, the micro-controller gives the signal to the buzzer which intimate's the user. To add up a safety in this we are using a leakage sensor at the outlet of the cylinder which is connected to an Arduino system. If the safety system detects leakage it shuts OFF the electrical supply of the house and alarms the user by means of an alarm. This can help in a large-scale prevention of LPG burst accidents and can save human life.

A Study of ACO/PSO Approaches in Agriculture and Social Network Fields - A Generic Review

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ABSTRACT

In recent years, evolutionary optimization algorithms are used in different domains like medical, business analysis, engineering, agriculture, social network etc. Due to scarcity of resources in agriculture, the farmers need an optimized framework to make proper decisions. Similarly in social networks, there is a need to mine meaningful insight of data among massive dataset and also needs an effective solution for security and privacy of data. In order to provide solutions for the above issues in those fields, many researchers have widely used evolutionary algorithms. This paper provides a generic review of Ant Colony Optimization (ACO), Particle Swarm Optimization (PSO) and its practice in the field of agriculture and social network. For that, this work integrates various author's findings for the benefit of new researchers to get a state-of-the-art in ACO and PSO techniques and their applications.

Keywords: Ant Colony Optimization, Particle Swarm Optimization, Social Network and Agriculture.

A Novel Architecture to Improve Performance of Photovoltaic Cells using Lens Let Arrays

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ABSTRACT

The Green revolution as ushered in by the photovoltaic cells is all pervasive. Power production through photovoltaic cells is gaining momentum as it reduces the Green House Effect. But the photovoltaic cells are plagued by severe efficiency deficiencies. It is at only 40% to 50%. In this novel approach the author proposes a new technique of using lens let arrays in combination with a resonance cavity to improve the efficiency of the photovoltaic cells. The lens in a lens let array brings the Sun's radiation in the form of light energy to a focus on the photovoltaic cell. Since this increases the Intensity of the radiation at the PV cell surface the effective conversion rate of Photon to Electron increases. Consequently the output current increases thereby improving the performance of the photovoltaic cell.

Keywords : Optics, Photovoltaic Cells.