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IOT based Smart Vehicle Parking Manager

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***Abstract:** This study introduces a new approach of parking system by using Wireless Sensor Network (WSN) technology equipped with ultrasonic sensors. The system also implements shortest path algorithm to calculate the shortest distance from the parking berth to the nearest preferred entrance. The system operates by monitoring the availability of the vehicle berth and making the information collected available for patrons and car-park operator. The information gained from the detection sensor and calculation from the shortest path algorithm is used to guide patrons to parking berth. The car-park operators use the sensors' information to aid in overall management and planning. WSN is chosen since it enables reliable information gathering and measurement to be transmitted through wireless channel without having to install new cabling for network and electricity to reach each sensing device.*

I. INTRODUCTION

The concept of Internet of Things (IoT) started with things with identity communication devices. The devices could be tracked, controlled or monitored using remote computers connected through Internet. IoT extends the use of Internet providing the communication, and thus inter-network of the devices and physical objects, or 'Things'. The two prominent words in IoT are "internet" and "things". Internet means a vast global network of connected servers, computers, tablets and mobiles using the internationally used protocols and connecting systems. Internet enables sending, receiving, or communicating of information. Thing in English has number of uses and meanings. Dictionary meaning of 'Thing' is a term used to reference to a physical object, an action or idea, situation or activity, in case when we do not wish to be precise. IoT, in general consists of inter-network of the devices and physical objects, number of objects can gather the data at remote locations and communicate to units managing, acquiring, organizing and analyzing the data in the processes and services. It provides a vision where things (wearable, watch, alarm clock, home devices, surrounding objects with) become smart and behave alive through sensing, computing and communicating by embedded small devices which interact with remote objects or persons through connectivity. The scalable and robust nature of Cloud computing is allowing developer to create and host their applications on it. Cloud acts as a perfect partner for IoT as it acts as a platform where all the sensor data can be stored and accessed from remote locations. These factors gave rise to the amalgamation of both technologies thus leading to the formation of a new technology called Cloud of Things(CoT). In CoT the things(nodes) could be accessed, monitored and controlled from any remote location through the cloud. Due to high scalability in cloud any number of node could be added or removed from the IoT system on a real time basis. In simple terms IoT can be explained in form of an equation stating:

A. Physical Object + Controller, Sensor and Actuators + Internet = Internet of Things

The ideal of creating a Smart City is now becoming possible with the emergence of the Internet of Things. One of the key issues that smart cities relate to are car parking facilities and traffic management systems. In present day cities finding an available parking spot is always difficult for drivers, and it tends to become harder with ever increasing number of private car users. This situation can be seen as an opportunity for smart cities to undertake actions in order enhance the efficiency their parking resources thus leading to reduction in searching times, traffic congestion and road accidents. Problems pertaining to parking and traffic congestion can be solved if the drivers can be informed in advance about the availability of parking spaces at and around their intended destination. Recent advances in creating low-cost, low-power embedded systems are helping developers to build new applications for Internet of Things. Followed by the developments in sensor technology, many modern cities have opted for deploying various IoT based systems in and around the cities for the purpose of monitoring. A recent survey performed by the International Parking Institute reflects an increase in number of innovative ideas related to parking systems. At present there are certain parking systems that claim to citizens of delivering real time information about available parking spaces. Such systems require efficient sensors to be deployed in the parking areas for monitoring the occupancy as well as quick data processing units in order to gain practical insights from data collected over various sources.

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II. LITERATURE SURVEY

Sang-Hyuk Lee ; Jung-Hawn Kim ; Yong-Jin Lim ; Joonhong Lim "Traffic light detection and recognition based on Haar-like features" in this paper. We use Haar-like features to learn about the traffic light image and detect the candidate area based on the learning data. The detected candidate image is verified by the pre-learned SVM(Support Vector Machine) classifier, and binarization and morphology operations are performed on the verified candidate image for detection of the traffic light object. The detected traffic light is divided into respective signal areas to determine the current on/off status of traffic lights. The signal signs in the respective areas are defined by regulation and the sign of traffic lights can be recognized by recognizing on/off of the signals in the respective areas. The experimental study is performed to show that it is possible to detect and recognize traffic lights irrespective of color change Marco Schönfelder ; Valentin Protschky ; Thomas Bäck "Reconstructing fixed time traffic light cycles by camera data analytic" In this approach is based on camera data and the knowledge of the traffic light system's cycle time. It can utilize further additional traffic light properties as well as legal-or environmental-constraints, to create predictions on even fewer data. The base target of the approach is to predict parameters of traffic light programs. These can be used to predict traffic light phases and enable at later stages to reconstruct traffic light programs. Its performance is measured by achieving the required coverage and accuracy, based on as little information as possible. The provided approach is considered suitable to predict green start times and green phase duration accurately after several intersection crossings Smart traffic & parking management using IoT: The world is moving very fast and it has to keep moving this way for continuous development. But modern transport is failing to provide smooth transportation system to the citizens. Excessive traffic jams lead to delays in reaching workplace or home, wastage of fuel, wear and tear on vehicles or even a road rage by the stressed and frustrated motorists. Very often we see people standing in a long queue for toll tax collection. Parking is also an extra headache to the vehicle owners. With the help of Internet of Things we have proposed a remedy to all these problems and to make the vision of a Smart City true. We have proposed an algorithm to control traffic congestion and the smart parking system. We have also discussed smart toll tax collection using Internet of things. The implementation of our proposed method is inexpensive. Nilufar Neyestani ; Maziar Yazdani Damavandi ; Gianfranco Chicco ; João P. S. Catalão Effects of PEV Traffic Flows on the Operation of Parking Lots and Charging Stations the introduction of plug-in electric vehicles (PEVs) in the electrical system is bringing various challenges. The main issue is incorporating the PEV owner's preferences in the models. One of the main attributes representing the preference of the owners is their travel purposes, impacting on the traffic flow pattern. The PEVs' traffic pattern defines the required charging schedule of the PEVs, and consequently, characterizes the operation of the charging facilities such as PEV parking lots (PLs). The deployment of resources such as PEV PL requires a detailed modeling of the factors affecting their operation. In this regard, this paper aims to model the power flow of the PEVs based on their traffic flow. Different travel types and purposes are considered for the PEVs traffic modeling. Two types of charging infrastructure (i.e., PLs and individual charging stations) are considered. The study is performed on a distribution network categorized based on the consumption patterns of the zones.

III. DESIGN METHODOLOGY

A. (Parking Control)

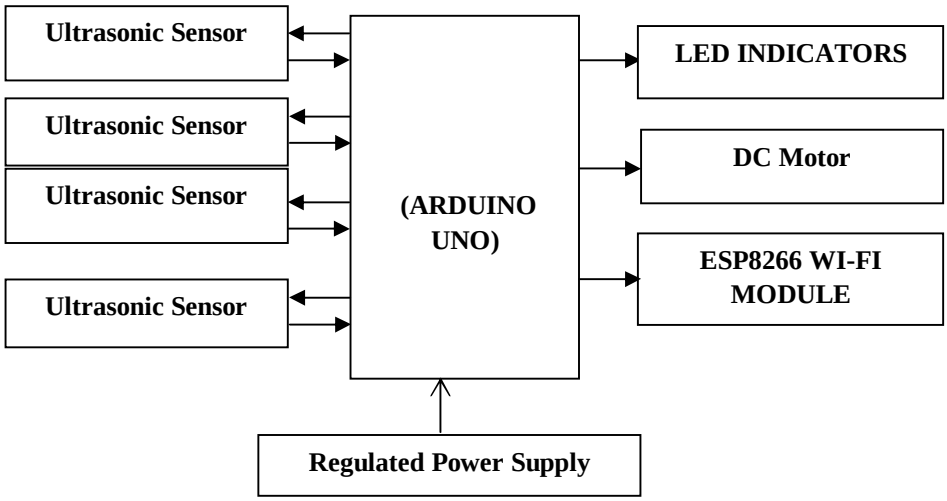
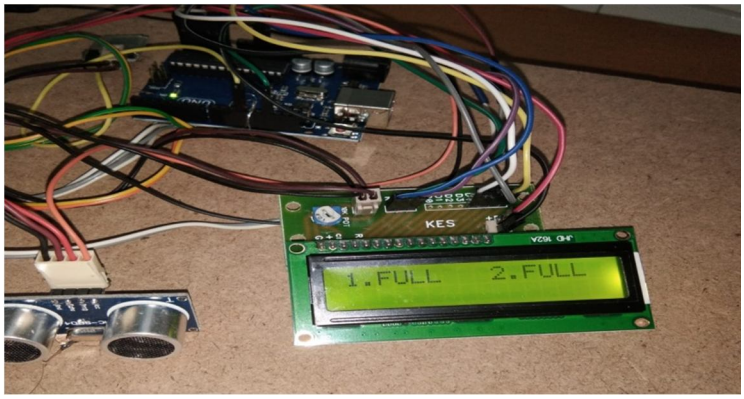


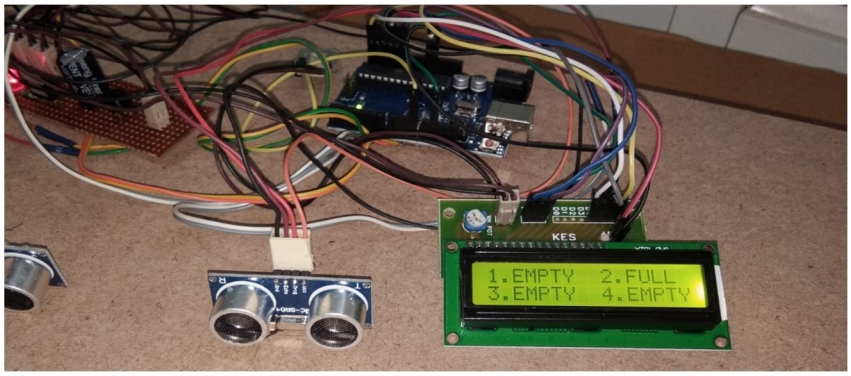
Figure 1 IOT based Smart Vehicle Parking Manger

B. Block Diagram

The System consists of two sides, the first one is the main unit, and this unit will be located in every spot in the parking lot. These units will be connected with our second, the coordinator. So every coordinator will control the information from and to the units connected with it. Every spot in the parking lot will contain the main unit. Our unit consist of: The basic block diagram of the IOT based Smart Vehicle Parking Manger shown in the above figure. Mainly this block diagram consist of the following essential blocks.

VI. RESULT ANALYSIS





In micro-controller the data received is compared with the data stored in micro-controller, If the value reduces below certain limit a buzzer is on, the readings are shown on LCD with all four lane with status of empty and Full.

IV. CONCLUSION AND FUTURE WORK

The systems proposed by various authors help us effectively in reserving as well as eliminates the need for searching of a parking space in private parking lot. Many researchers have implemented systems which have dynamic arrangement scheme for satisfying the different needs of drivers and service providers, which is based on real-time parking information. Hence, we conclude that this paper is very useful for new researcher for innovation of new techniques to manage the problem faced by drivers on day to day basis. The above contain advantages and disadvantages of various systems implemented by researchers. In future work, we innovate this system which is not only used in a particularr parking area available, but can be extended and also be implemented on various other platforms such as railway stations, airports, mall parking spaces. This will make the management of the parking spaces efficiently, by eliminating need of manual labor work.

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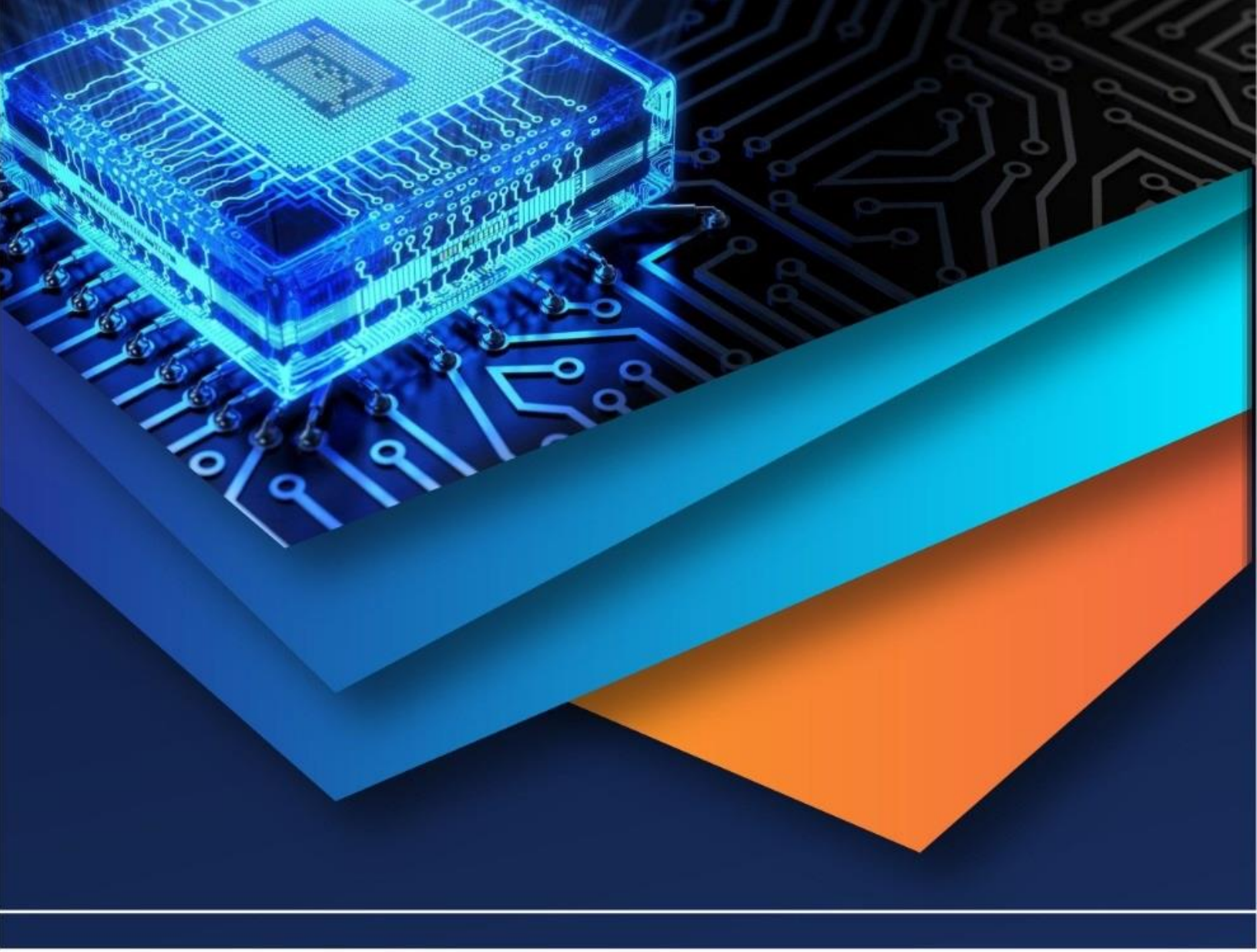

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