SMART CAR PARKING SYSTEM USING IOT

Zeeshan Sheikh [1] , Siddhesh Lakkewar [2], Saifhasan Rain [3],Akbar Nagani [4]

[123]UG Student, [4]Professor

Department Of Electronics and Telecommunication Anjuman College of Engineering & Technology, Nagpur, Maharashtra, India

ABSTRACT

In recent times the concept of smart cities have gained grate popularity. Thanks to the evolution of Internet of things the idea of smart city now seems to be achievable. Consistent efforts are being made in the field of IoT in order to maximize the productivity and reliability of urban infrastructure. Problems such as, traffic congestion, limited car parking facilities and road safety are being addressed by IoT. In this paper, we present an IoT based cloud integrated smart parking system. The proposed Smart Parking system consists of an on-site deployment of an IoT module that is used to monitor and signalize the state of availability of each single parking space. A mobile application is also provided that allows an end user to check the availability of parking space and book a parking slot accordingly. The paper also describes a high-level view of the system architecture. Towards the end, the paper discusses the working of the system in form of a use case that proves the correctness of the proposed model

Index Terms:- IOT, parking system,

1. INTRODUCTION

Now a days, main problem in malls, function halls and etc., is parking. It is due to the lack of sufficient parking space. Now a days the vehicles in a family are greater than the head count of the family members, and due to this the vehicles are also increased in the country, which leads to the parking scenario which is unhappily falling short to the current requirements in the country. Due to this parking is difficult and it also increases the time needed to park the vehicle with increase in the fuel consumption of the vehicle. And during the working days the companies and offices are facing the problem of the parking in urban areas. Now a days vehicles are most affordable to the low income group families also and the vehicles especially the cars are taking lot of space. Due to the increase in vehicles the parking space is also not sufficient in this congested cities. Whether at a shopping malls, stations and airport, problems with parking is a big issue. Most of the time people spend their time on searching parking, to park their vehicles. Thus, lot of congestion occurs in the traffic which leads to a tedious job to find the parking space to park their vehicle. The most traffic occurs only because of vehicle

congestion in the urban areas thus people are wasting time in searching the parking area abnormally to park their vehicles. And one more issue is also added to this is pollution, which effects the entire environment due to this increase in vehicles. The concept of Internet of Things (IOT) started with things and identity

communication devices. The devices could be tracked, controlled or monitored using remote computers connected through Internet. The internet of things has different definitions. In Short it is defined as the things present in the physical world or in an environment are attached with sensors or with any embedded systems and made connected to network via wired or wireless connections. These connected devices are called as smart devices or smart objects. And it consists of smart machines, which communicate, interact with other machines, environment, objects etc. And these can be processing by using some processors such as network processor, hybrid processor MCU/MPU etc.

2. LITERATURE SURVEY

Some of the recent studies shows about the parking management and the slot management. And also gives the information about reservation based parking management.

Chi-Hung Chuang, Luo-Wei Tsai [2], developed a monitoring system for parking lot management system and the result of access management is reduced human resource, through the recognition car license. The constraint of this project is the recognition process takes more time to compare.

Mingkai Chen [3] developed a parking guidance and information system based on wireless sensor system and the information is transmitted between the nodes and processing the data, and the information passes to the display drivers. In this the

constraint is, if the main node of the sensor system fails means the total block is failed.

Huang Cai-mei. [5] Presented an idea for reserving the parking slots and reversed cars look for the intelligent terminals to achieve the parked position of vehicles and get the guide route, so that user can quickly find the parking area.

Vanessa W.S. Tang [8] presented an idea on WSN-based intelligent car parking system and the sensors are deployed into a car park field, with each parking lot equipped with one sensor node, which detects and monitors the occupation of the parking lot. The constraint of the project is that they deploy only sensor node if it fails means total lot information is lose.

GiulianoBenelli [9], develops an idea that the users use their own mobile phone for allows an electronic ticket to enter and exit the parking and as an electronic wallet to pay automatically for it.

Rakesh Kumar Lenka, Rabindra K. Barik, Nihal Kumar Das, Kriti Agarwal, Debesh Mohanty, Swati Vipsita, "PSPS: An IoT based predictive smart parking system", The proposed scheme is a real-time navigation service to the parking space along with a probabilistic emptiness value based on your Estimated Time of Arrival (ETA) to the location and can be accessed from your personal devices.

Dharmini Kanteti, D V S Srikar, T K Ramesh, "Intelligent smart parking algorithm" In this paper, we will be discussing about the parking system in a city which is embedded with various features like automated, rotary parking and nearest

parking slot allotment using IoT and sensor technology. we will be using the ultrasonic sensors for vehicle detection, softwares working OCR, arduino as a microcontroller and Raspberry Pi to interface all the components.

Ravi Kishore Kodali, Krishna Yogi Borra, Sharan Sai G. N., Honey Jehova Domma, "An IoT Based Smart Parking System Using LoRa"Internet of Things (IoT) plays a fundamental role in connecting the ecological things around us to a network. It helps us monitor the parameters of the things with the usage of sensors that are familiarize for remote sensing of the specific data and forward the information over the network cloud by means of Internet Connection. This paper centers around the idea of knowing the status of parking availability in a parking lot through Internet with the help of Internet of Things Technology. This uses Ultrasonic sensor to detect the vehicle in the parking

3.METHODOLOGY

Recently, with the explosive increase of automobiles in cities, parking problems are serious and even worsen in many cities. The aim of the project is to design and provide:-

☐ A simple web application for parking vehicles.

☐ Can search nearby places using web.

☐ Parking owners can see availability of parking palaces.

☐ Make easy to automate parking owners and customers.

User can search their destination parking facilities and according the availability they can choose parking spot for their vehicle.

We have designed a simple web application. Where user can search for vehicle parking.
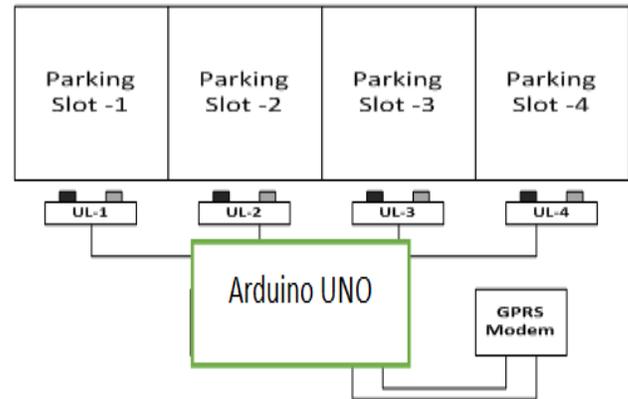

Fig.1. Block diagram of car parking

Arduino Uno is a microcontroller based on the datasheet. It has 14 digital input or output pins of which 6 can be used as Pulse Width Modulation (PWM) as output, 6 analog inputs, a 16 MHz quartz crystal, a USB connection, an ICSP header and a reset button. The Microcontroller simply connected to the computer with a USB cable or a power with an AC to DC adapter or battery to get started. Here the purpose of arduino is used to transmit the command through the signal. It can be powered using power supply or by using USB cable.The supply voltage is 6 to 20 volts either it is a AC or DC supply. The Arduino can be able to communicate with the other arduino or with other microcontroller or with other computer. It supports Inter Integrated circuit and SPI Communication. Infrared Sensor

An Infrared sensor transmits Infrared waves into the air and detects the reflected waves from an object. The IR

receiver can be a photodiode or phototransistor or any other module to decode the signal. It is a non-contact

distance measurement module needs a power supply of 3.0V to 5.0V and current consumption is 23mA to 43mA,

detection range is 2cm to 30cm. It has transmitter and the receiver module. Infrared obstacle sensor is used in smart car parking system. It has three pins one pin is connected to5V power supply, then the second pin is connected to ground, and the third pin act as an output pin. It has on board potentiometer that lets the user to adjust detection range. The sensor has very good stable response even in complete darkness or in ambient light. The Infrared sensor module automatically detects whether the signal is back and if the signal is back at high level then sending Infrared signal. TCP/IP Protocol. The GSM module is controlled by AT commands and low power consumption is 1.5mA(sleep mode) then the operating temperature is -40°C to +85°C.There are eight pins in GSM module. First pin is the Rst it is used to Reset the module. The second pin is P it is the power switch pin of SIM900 module. Then the third pin is Tx it act as a UART data output then the fourth pin is the Rx it act as a UART data in. The fifth pin is DT it is used to debug data output then the sixth pin is DR it is used to debug UART data input. Then the seventh pin is ground and the eighth pin is connected to the power supply.

Work Flow

1. Install parking application on mobile device

2. with the help of the application search for parking area around user destination.

3. Select the particular parking area.

4. Browse through various parking slot available in that parking area.

5. Select the particular parking slot.

6. When the user leaves the parking area amount will be paid by using that mobile application.

7. The payment information will be notified to the owner using the mobile application

4.CIRCUIT WORKING

Circuit diagram for this IoT based vehicle parking system is given below. It involves two IR sensor, two servo motors, one ultrasonic sensor and one 16x2 LCD.
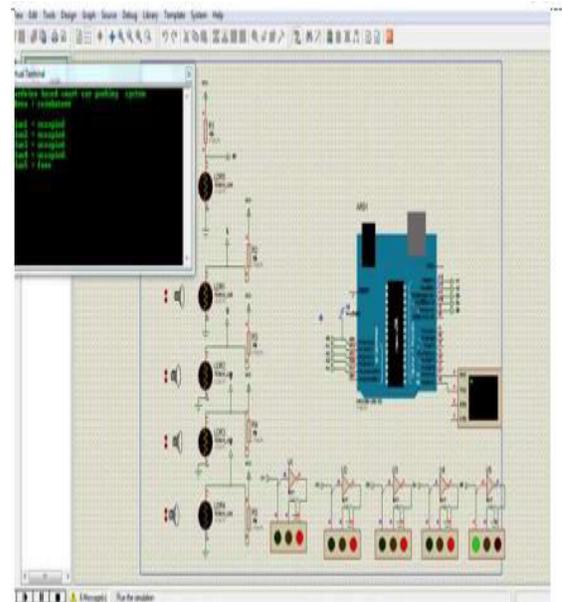

Fig.2 Simulation result of the proposed system

Here the ARDIUNO IDE will control the complete process and also send the parking availability information to Google Firebase so that it can be monitored from anywhere in

the world over the internet. Two IR sensors are used at entry and exit gate to detect the presence of car and automatically open or close the gate. IR Sensor is used to detect any object by sending and receiving the IR rays, learn more about IR sensor here. Two servos will act as entry and exit gate and they rotate to open or close the gate. Finally an Ultrasonic sensor is used to detect if the parking slot is available or occupied and send the data to ARDIUNO IDE accordingly. Check the video given at the end of this tutorial to understand the complete working of the project. Fig 2 is the simulation result the parking place is detected by adjusting the potentiometer values. The output is

viewed by using the virtual terminal.

The hardware setup Fig 4 consists of Arduino UNO, GSM Module, and the infrared sensor. The sensor detects

the vacancy in the parking place then it is updated to the user by using the GSM Module. The LED is used to
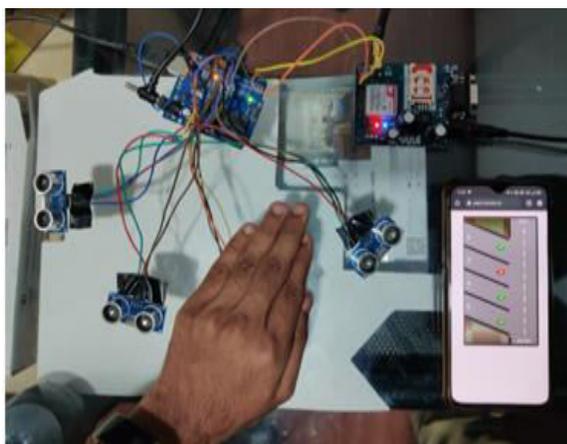
indicate the vacancy position

Fig 3 Demonstration of 2nd occupied spot

5. CONCLUSION

In this system, the implementation of the smart parking system being presented, its efficiency in alleviating the traffic problem that arises especially in the city area where traffic congestion and the insufficient parking spaces are undeniable. It does so by directing patrons and optimizing the use of parking spaces. With the study on all the sensor technologies used in detecting vehicles, which are one of the most crucial parts of the smart parking system, the pros and cons of each sensor technologies can be analysed. Although, there are certain disadvantages in the implementation of visual based system in vehicle detection as described earlier, the advantages far outweigh its disadvantages. proposes the smart parking system that combined with IoT that enables to solve the common problems faced by building managements.The implementation of SPS is expected to help customers, parking staff and shopping mall management. Customers will find easier to park the car in shopping mall with booking system, paperless ticket, cashless payments and automated guided parking. Booking system enables customers easy to find available parking slot, even before even arriving and with paperless ticket system eliminates the possibility of missing ticket. Cashless payment will ease the payment process while automated guided parking guides the customers to vacant parking slot without the need to going around. Booking system can also become alternative for valet that cost more because the service given by valet staff. For

shopping malls, SPS enables to lower traffic in and out of shopping mall and optimizing parking lot. SPS also benefit the parking staff in the form of ease monitoring and parking distribution. The author know that parking has been problem for not only in shopping mall but also another place like park, tourist attraction, traditional market, restaurant, etc and because of that the author hope that this paper can be useful for parking problem in other place or future studies

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