

A Thesis/Project/Dissertation Report

On

IoT Based Car Parking Surveillance System

*Submitted in partial fulfillment of
the requirement for the award of the
degree of*

B.Tech - (CSE)



Under The Supervision of

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CANDIDATE'S DECLARATION

I/We hereby certify that the work which is being presented in the thesis/project/dissertation, entitled **"IoT Based Car Parking Surveillance System"** In partial fulfillment of the requirements for the award of the Bachelor of Technology (B. Tech) submitted in the School of Computing Science and

Engineering of Galgotias University, Greater Noida, is an original work carried out during the period of month, Year to Month and Year, under the supervision of Name... Designation, Department of Computer Science and Engineering/Computer Application and Information and Science, of School of Computing Science and Engineering , Galgotias University, Greater Noida

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Signature of Examiner(s)

Signature of Supervisor(s)

Signature of Project Coordinator

Signature of Dean

Date: December,

2022Place: Greater

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STATEMENT OF PROJECT REPORT PREPARATION

1. Thesis Title—IoT Based Car Parking Surveillance System
2. Degree for which the report is submitted-Bachelor of Technology (B.Tech–CSE).
3. Project Supervisor was referred to for preparing the report— Dr. Raju Ranjan
4. Specifications regarding the thesis / report format have been closely followed.
5. The contents of the thesis have been organised based on the guidelines provided.
6. The report has been prepared without resorting to the plagiarism.
7. All the resources used have been cited appropriately.
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I

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ABSTRACT

The concept of smart cities has gained a lot of traction in recent years. Smart cities are a concept that now looks to be feasible, thanks to the advancement of the IoT. In the realm of IoT, consistent efforts are being made to increase the efficiency of urban infrastructure. IoT is self-addressing issues such as traffic congestion, limited automotive parking spaces, and road safety. Throughout this article, we attempted to create an IoT based efficient parking system that can be applied anywhere, including malls, societies, and schools. The proposed excellent Parking system entails the deployment of an IoT module on-the-spot that will monitor and signalize the condition of accessibility of every parking place. Every automobile parked is protected thanks to a secure parking system. A high-level read of the system design is also described in the paper. The paper concludes with a discussion of the system's operation in the context of a use case that demonstrates the accuracy of the proposed model.

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Introduction

Internet of things is a giant network of interconnected devices. These devices are capable of deciding without any human intervention. IoT is a platform where we can connect everyday things embedded with electronics, software and sensor to the internet enabling them to collect and exchange data. The thought of the Internet of Things started with the idea of how devices can communicate with each other. The devices further can be controlled and monitored with the help of computers connected through the net. IoT extends the employment of the net providing the communication between the devices and therefore interconnection of the devices and server to keep a track record of each function. It provides a platform where all the things in our daily uses such as a wearable watch, alarm clock, home devices become advanced and act alive by sensing, computing, and communicating with one another other and give us the best output according to the situation. With the growth of different industrial premises and societies, the main target to automate these premises have augmented drastically. Also, the growing traffic mess within the cities has pushed everybody towards a much better and more reliable parking system.

Internet of thing is a giant network of interconnected devices. These devices are capable of making decision without any human intervention. IoT is system of related sensors, computing and digital devices spread across the globe over the internet which can communicate amongst them to share and transfer information using unique id which is assigned to each and ever device, as UIDs (Unique Identifiers). 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". 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. The smart parking system that we propose is implemented using a website that is connected to the cloud.

- • The system helps a user know the availability of parking spaces on a real time basis.

- • Website will show the client entering and leaving time, and help them in picking a parking space.
- • Data of clients are put away in the MYSQL database.

The construct of efficient parking is additionally discussed, which uses sensors and IoT to discover whether or not there is a free parking lot on the market or not. The assorted varieties of sensors, their applications, advantages, and limitations were also mentioned. The choice criteria chiefly rely upon wherever the sensing element is to be placed and also the current infrastructural condition.

MOTIVATION

- OUR MAIN MOTIVATION IS TO HAVE AUTOMATED CAR PARKING SYSTEM
- IT WILL HELP USER TO FIND THE EMPTY PARKING AREA AND PAY THE PARKING AMOUNT BEFORE HAND WHICH REDUCES THE PARKING TIME AND UNWANTED TRAFFIC IN PARKING AREA.
- TO HELP REDUCE THE UNNECESSARY PAPER WASTE CAUSED BY THE PARKING TICKETS.
- TO PROVIDE AN ADDITIONAL SECURITY TO THE PARKING AREA BY MONITORING THE CAR SPARKED.

OBJECTIVE

Our main objective to build this project is to reduce the traffic problem in parking space and to also provide a security in the parking space with a cost efficient model.

LITERATURE SURVEY

Ultrasound sensors and recorded info area units are placed away within the cloud. Humanoid contrivance map offers straightforward to use the knowledge on the spot of the gap. Every gap is having one sensor which helps the user with the finding of available spots to save a lot of time. IoT based parking system framework was compiled with Google to allow the user to discover a parking spot. The IR detector is installed which is used to find an associate empty parking spot and is fixed at the entrance and exit. A unique tag gave to permit an individual to get to the vehicle left.

On the off probability that the individual is permitted to impart an indication to open the entranceway. Efficient automobile parking system to tell apart Free Slots utilize sensor and Pic Microcontroller. This project uses an online server to recruit and use GPS on Google Maps. Results area unit diagrammatically depicted within the mark. A viable vehicle exploits framework that utilizes IR sensors were conferred, verification is done using a unique tag.

Automobile Parking Device dependent on humanoid. The Android-based application gets knowledge regarding the vacant stopping house open. The humanoid application would have subtleties of the shopper as well as space, state, and several other vehicles. Programming with the shopper coming into and exploiting time, and choosing a parking space. Knowledge of purchasers area unit placed away within the MYSQL information. Driven demonstrates to indicate empty or reserved parking space. It also uses a camera for surveillance of car park which is automatically ON when a car is parked and with use of RFID can a lot unique id for its verification. Automatic ON and OFF of the camera can result in saving a lot of energy.

Parking System smitten by Embedded System utilizes and put in associated detector organize keen stopping framework that uses the Apps to humanoid and Windows. Raspberry PI is employed during this framework, and also the IR detector is employed to find an associate empty stop house. V2I correspondence to send the exploit solicitation to the driving force giving acclimatise reservation shopper knowledge standing. Contact with Infrastructures to Vehicle (I3V) is used to use for book parking spots. JSON style wants to alter the data within the middle. For security functions QR code is used, digital camera want to check the unique id and

permissible to indicate the course of the parking area. Continuous vehicle following will be discovered utilizing calculation smitten by vary or while not vary.

SYSTEM ARCHITECTURE

Individuals from various metropolitan areas choose to travel to retail malls, theatres, or hotels by taxi or vehicle since it is more convenient. It would take a long time and a lot of gas to find a parking spot in a densely crowded region. As a result, there is a demand for assistive innovations that can communicate the availability of halting places to enrolled clients[3]. They will be expected to register for the administration, and if the goal and expected timeframe are met, then the website had to find an empty parking spot to show customers around the neighborhood. To arrange the stop opening, the client makes an online payment. For each halting area, infrared sensors are delivered to determine the variety of stopping openings, some of which are free and some of which are reserved and an IoT modem is used to communicate between the website and sensors.

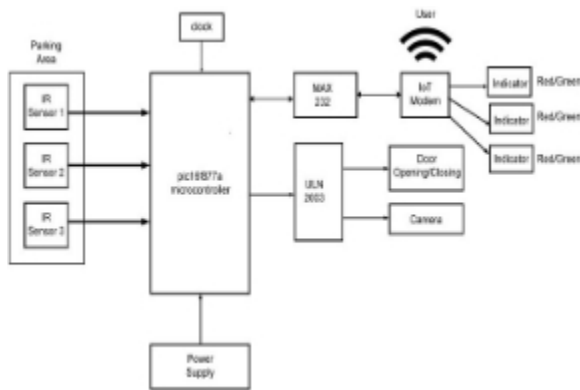


Fig.1 Block Diagram

COMPLETE WORK OF THE PROJECT

In this project we have used pic microcontroller pic16f877a, it is a powerful yet easy to program microcontroller and very cost efficient. It is the main controlling unit of the system model it provides a bridge between the IR sensor, the IoT modem and motor driver IC ULN2003 that helps them to communicate and transfer data to each other to work in coordination. The IR Sensor generates emission, then it arrives at the object & some of the emission will reflect back toward the infrared receiver. When infrared light would be reflected back from the car it will transmit the signal to the pic microcontroller which provide the information if parking area is empty or occupied.

And then max232 is used to convert the signals between pic16f877a microcontroller and IoT modem and helps them to communicate with each other making them compatible for each other. ULN2003 provides the required voltage and current load for motor and LED to work by providing the connection from pic16f877a microcontroller which works on +5V volts. IoT modems simply transfer data bytes from one format to another format. It receives the information from microcontroller if the parking area is empty or occupied and send this data to the website from where user can book a parking area according to the occupancy available.

DETAILS OF MODULE

A. PIC16F877A Microcontroller

- The PIC microcontroller PIC16f877a is one of the most well-known microcontrollers in the industry. This microcontroller is easy to operate, and programming it is even easier.



Fig.2 pic16f877a Microcontroller

- Because it uses non-volatile storage technology, one of the most advantageous features is that it can be write-erased as frequently as possible. It has a total of forty pins, including thirty-three pins for input and output.
- PIC16F877A even have a lot of application in digital-physical science circuits.
- It's used in remote sensors, security and safety equipment, home automation, and a wide range of industrial instruments.
- It also has an EEPROM, which allows it to store a variety of data for later use, such as transmitter codes and reception frequencies, as well as other related information.
- This controller is inexpensive, and it is very simple to use. It's adaptable, and it may be utilized in places where microcontrollers haven't been used before, such as silicon chip applications and timer operations.
- It has a smaller thirty-five directions set. It will operate up to 20MHz frequency. The in operation voltage is between four.2 volts to five.5 volts. The maximum current every PORT will sink or supply is around 100mA.

B. ULN2003

- The ULN2003 is known for its ability to handle high current and voltage. For even more current output, the drivers can be paralleled. Any, electronically and physically stacking one chip on top of another, has been done.



Fig.3 ULN2003

- It's also commonly utilized to interface with a stepper motor when the motor requires high ratings that aren't available from other interfacing devices.
- Main requirements 50 V output (there may be a version that supports a 100V output), 500 mA rated collector current (single output). The ULN2003A is commonly used in relay, lamp, and semiconductor diode display driver circuits, stepper motors, logic buffers, and line drivers.

C. MAX232

The Max232 is an integrated circuit (IC) that converts TTL (Transistor-Transistor Logic) logic level signals to RS-232c level signals and rs-232c level signals to TTL level signals.



Fig.4 MAX232

This IC is critical when connecting and transferring data across devices that operate on different signal levels and waveforms (TTL, rs-232c etc.). It transforms the signals between the pic16f877a microcontroller and the IoT modem, allowing them to connect and be compatible with one another.

D. IoT Modem

The IoT modem permits vehicle to be detect and controlled distantly from the internet infrastructure. This IoT modem capable of communicate with microcontroller via UART communication. The data to be transfer to internet webpage using Wi-Fi network.



Fig.5 IoT Modem

IoT modems are devices that collect wireless data from remote sensors and pass it to another communication format, such as Bluetooth, TCP, Serial, RS-485, or another widely used communication protocol. Data bytes are simply transferred from one format to another via IoT modems. It receives information from the microcontroller about whether the parking area is

empty or occupied, and sends this information to a website where users can book a parking space based on the available occupancy.

E. IR Sensor



Fig.6 IR sensor

This sensor has an infrared LED and an infrared photodiode that can be used to create a photo-coupler or an opt-coupler. An infrared LED produces infrared light, which activates the infrared photodiode. The photodiode's resistance and the change in output voltage are proportional to the amount of infrared light received. The IR sensor's basic functioning concept is as follows. When the infrared transmitter emits light, it travels to the object, where some of the light is reflected in the infrared receiver. When infrared light is reflected from the automobile, the signal is sent to thepic microcontroller, which determines if the parking space is empty or occupied.

RESULT & DISCUSSION

The system model is successfully developed as the simulation of the system model shows the full integration of all the hardware attached to pic16f877a. Our model is cost-efficient compared to the models that have been proposed yet, our model uses a Pic microcontroller which is inexpensive compared with Raspberry pie as they are complex microcontroller and requires intermediate technical expertise, which makes them only suitable for urban or metropolitan cities. The goal is to propose a model that will not only solve the traffic and parking problems in metropolitan as well as small cities, and will also be conveniently accessible.

The Proteus design suite is an electronics simulation tool suite used for microcontroller based system design. The code of Pic16F877A has been compiled by the MPLAB IDE and its Hi-Tech Pic c compiler. The Proteus has supported Pic16F877A microcontroller simulation using embedded c code converted to .hex file by using MPLAB IDE. The Proteus has its electronic components such as LED, LCD, Resistors, Virtual terminal and Switches. The following figure shows the simulation verification of the IoT car parking.

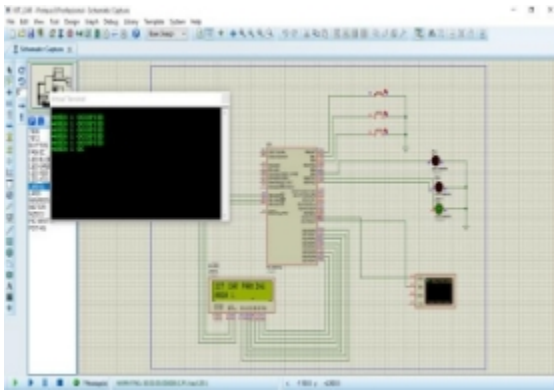


Fig.6 IoT Modem

In this simulation, the switches are used as an input instead of an infra red sensor, The IR sensor is detecting the occupied parking area and is indicated by the LED. The virtual terminal is used as output instead of UART communication. The ESP8266 is a wifi-based device is used to transfer data into a unique webpage. The parking space can be booked by the web page from anywhere.

Conclusion

The fundamental reason for parking systems is that parking spaces are scarce in metropolitan areas. Cars were once considered a luxury item owned by only the wealthy. Cars, on the other hand, have evolved from a luxury item to a need as a result of a variety of causes, and the average middle-class family has a car, which ranges from 50 to 70 per cent. As a result, traditional parking solutions are no longer viable. Humanity's ambition of smart cities has always been a pipe dream. Since past years smart cities are already a reality thanks to technological breakthroughs. The expansion of IoT has brought about new opportunities in the field of smart cities. Smart city development necessitates effective parking and traffic control systems that reduce pollution and energy consumption.

In this project, we address the problem of parking by using IoT to create a more efficient car parking system. We used a pic16f877a microcontroller to minimize the cost of our system model, and we also included an automatic automobile surveillance security camera that only operates when a car goes through the parking area, which helps to save electricity. The efforts made throughout the writing of this article are aimed at improving city parking systems and, as a result, raising everyone's level of living.

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