



(Established under Galgotias University Uttar Pradesh Act No. 14 of 2011)

## **SMART PARKING SYSTEM**

A Report for the Evaluation 3 of Project 2

*Submitted by*

**ASHISH SINGH**

**(1613101190 / 16SCSE101734)**

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

**Bachelor of Technology**

**IN**

**Computer Science and Engineering**

**SCHOOL OF COMPUTING SCIENCE AND ENGINEERING**

**Under the Supervision of**

**Dr. AVNEESH KUMAR  
Professor**

**APRIL / MAY- 2020**

## TABLE OF CONTENTS

CHAPTER NO.	TITLE	PAGE NO.
1.	Abstract	1
2.	Introduction	2
3.	Existing System	5
4.	Proposed system	9
5.	Implementation or architecture diagrams	12
6.	Output / Result / Screenshot	16
7.	Summary	20
8.	Conclusion	21
9.	References	22

## **Abstract**

In the current era the number of vehicles is increasing day by day. Parking vehicles in metropolitan cities has created havoc indeed that has created a major problem to park their vehicles in designated place which leads to traffic congestion during peak hours. Which leaves the user to search for their parking? This paper resolves the issue of parking system and has comes up with IOT(Internet Of Things) enabled parking space and allocation mechanism. Smart Parking involves use of Ultrasonic sensor, Arduino-Uno, ESP8266-01 Wi-Fi Module, Cloud server. IOT based new parking platform enable to especially the car parking. This indirectly leads to traffic congestion. This is because of the fact that current transportation infrastructure and car park facility are unable to cope with the arrival of large number of vehicles on the road. To alleviate the aforementioned problem, authors proposed a Smart Parking Management System that helps users to automatically find a free parking space with connect, analyze and automate data gathered from devices and execute smart parking possible. Smart parking would enable vehicle occupancy, monitoring and managing of available parking space in real-time that reducing the environmental pollution. Proposed system provides optimize usage of parking space and get considerable revenue generation.

## **Introduction to Project**

Finding a free parking lot in a congested cities is very hard. Here, if anyone wants to go outside from home with personal car first thing comes in his mind is about parking, where he will park his car. Most of the cases, people go to a parking station and find that all parking slot are full and then he have to search for another parking lot. So, it is a big hassle and many people keep in fear about parking of his car when he gets out with his car.

We realized that, to enjoy a better transport a better parking system is necessary especially in a congested city like Delhi. So, we were thinking, how the problem can be solved and finally we succeeded to make a IoT based smart parking system and we hope, implementing the system can remove the parking problem of our city. Arduino is really a nice and appropriate platform for such job. Using this system a user will able to find an available parking slot easily using mobile or web app from anywhere. we also used Wifi module with a display which may be placed several important locations of the city or road from where it will be possible to find free parking lot. The system updates parking data every 30 seconds. In this project we will show you how you can easily build such smart system. We will use arduino IDE platform, a cool IoT cloud platform.

Traffic congestion caused by vehicles is an alarming problem at a global scale and it has been growing exponentially. Car parking problem is a major contributor and has been still a major problem with confined parking spaces in urban cities. Searching for a parking space is a routine activity for many people in cities around the world. This search burns about one

million barrels of the world's oil every day. These problems will get worse as the global population continues to urbanize without a well-planned, convenience-driven retreat from the car. According to a

report Smart Parking could result in saving 2, 20,000 gallons of fuels till 2030 and approx. 3,00,000 gallons of fuels by 2050 if implemented successfully. Smart Parking systems obtain information about available parking spaces in a particular geographic area. This process is real-time to place vehicles at available slots. It involves data collection using low-cost sensors and mobile-phone-enabled wi-Fi system that allows people to see for parking slots in advance. The importance of smart parking is:

1. Accurately sense and predict spot/vehicle occupancy in real-time.
2. Guides residents and visitors to available parking spot.
3. Optimize Parking Space Usage.
4. Simplifies the parking experience and adds value for parking stakeholders, such as merchants and drivers.
5. Helps the free flow of traffic in the city leveraging IoT technology.
6. Enables intelligent decisions using data, including real– time status applications and historical analytics reports.
7. Smart Parking plays an important role in creating better urban environment by reducing the emission of CO<sup>2</sup> and other pollutants.
8. Smart Parking enables better and real time monitoring and managing of available parking space which results in significant revenue generation.
9. Provides tools to optimize workforce management.

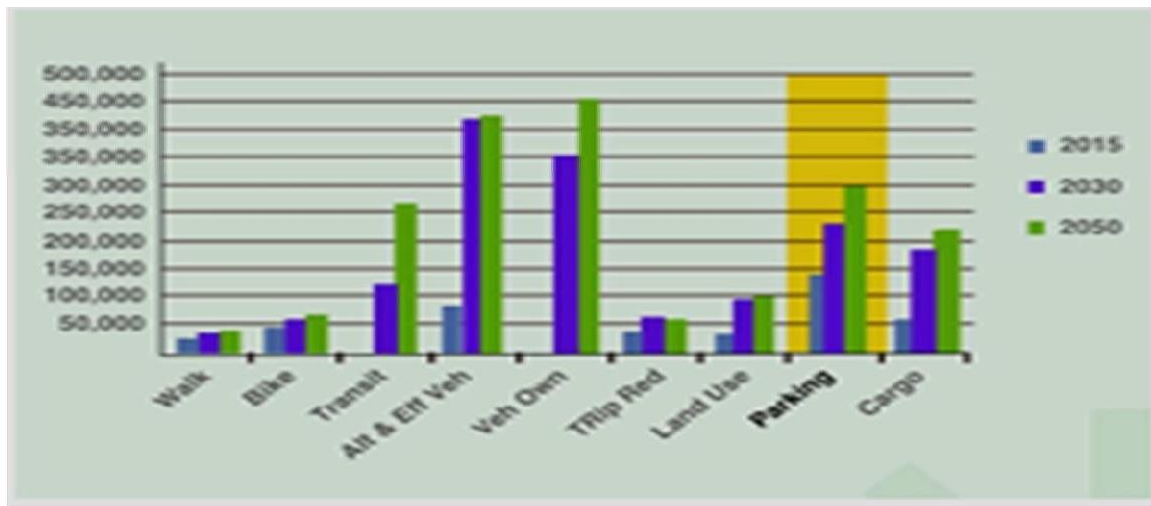


Figure:-Estimation Of Fuel Saved(in Gallon)

Conventional Parking System	Smart Parking Management System
1. No optimum use of available spaces	1. Provides optimum use of all available spaces
2. Congestion may increase due to parking traffic	2. Congestion can be decreased by diverting traffic to available spaces
3. Increase fuel consumption to search space	3. Decrease fuel consumption to search space
4. Increases time to search space	4. Decreases time to search space
5. No Real Time parking space tracking	5. Provides Real Time Parking space tracking
6. efficient revenue monitoring	6. Provides efficient revenue monitoring

## **Existing System**

A car parking system is a mechanical device that multiplies parking capacity inside a parking lot. Parking systems are generally powered by electric motors or hydraulic pumps that move vehicles into a storage position.

Car parking systems may be traditional or automated. Automatic multi-storey automated car park systems are less expensive per parking slot, since they tend to require less building volume and less ground area than a conventional facility with the same capacity. In the long term, automated car parking systems are likely to be more cost effective than traditional parking garages. Car parking systems reduce exhaust gas — cars need not drive around in search of street parking spaces.

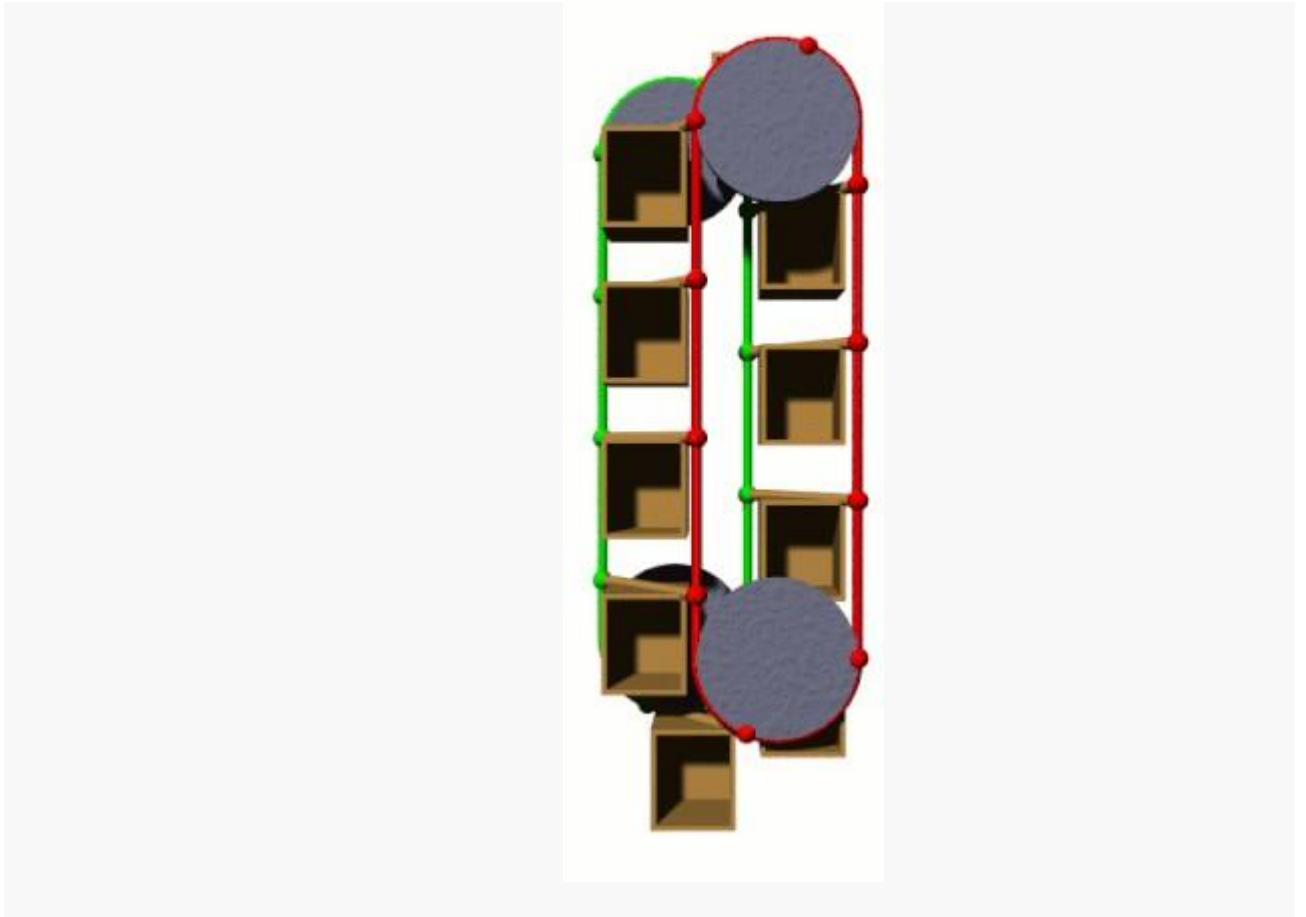


Figure:-Architecture Of Mechanical Parking System

An **automated (car) parking system** (APS) is a mechanical system designed to minimize the area and/or volume required for parking cars. Like a multi-story parking garage, an APS provides parking for cars on multiple levels stacked vertically to maximize the number of parking spaces while minimizing land usage. The APS, however, utilizes a mechanical system to transport cars to and from parking spaces (rather than the driver) in order to eliminate much of the space wasted in a multi-story parking garage. While a multi-story parking garage is similar to multiple parking lots stacked vertically, an APS is more similar to an automated storage and retrieval system for cars. The paternoster (shown animated at the right) is an example of one of the earliest and most common types of APS.



APS are also generically known by a variety of other names, including: *automated parking facility (APF)*, *automated vehicle storage and retrieval system (AVSRS)*, *car parking system*, *mechanical parking*, and *robotic parking garage*.



**Figure:-A Semi Automated Parking System**

The concept for the automated parking system was and is driven by two factors: a need for parking spaces and a scarcity of available land. The earliest use of an APS was in Paris, France in 1905 at the Garage Rue de Ponthieu. The APS consisted of a groundbreaking multi-story concrete structure with an internal elevator to transport cars to upper levels where attendants parked the cars.

In the 1920s, a Ferris wheel-like APS (for cars rather than people) called a paternoster system became popular as it could park eight cars in the ground space normally used for parking two cars. Mechanically simple with a small footprint, the paternoster was easy to use in many places, including inside buildings. At the same time, Kent Automatic Garages was installing APS with capacities exceeding 1,000 cars.

## **Problems**

There have been a number of problems with robotic parking systems, particularly in the United States. In addition to technical problems, the systems work well in situations with a relatively balanced throughput, such as shopping malls and train stations, but are unsuited to high peak volume, such as very high rush hour usage or applications such as stadiums. In addition, parkers not familiar with the system cause problems, for example by failing to push the button to alert a fully automated system to the presence of a car to be parked.

## Proposed System

Smart parking is a very good example for a common citizen of how the Internet-of-Things (IoT) can be efficiently and effectively used in our day to day life to provide different services to different users. Proposed application is user friendly and even non-technical person can use it through mobile device. Through this application user can search a free parking slot from anywhere in the world. Proposed system provides well-organized car parking management through isolated parking spot localization. Conventional reservation based car parking method has a limitation of space and time. Proposed smart parking system providing the free parking slot efficiently that saves time and fuel and reduces atmospheric pollution and congestion in cities. IOT based new Parking platform enable to connect, analyze and automate data gathered from devices, and execute efficiently that makes smart parking possible.

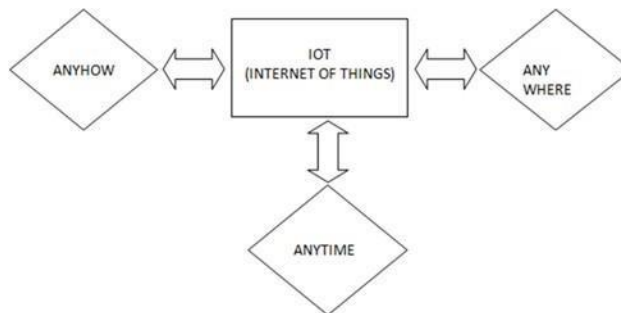


Figure:-Architecture Of IOT

## Design of Project

### END-Node

Starting from the front end, the end-node is the first node of any IoT system, without this node the ‘T’ part of IoT i.e. Things is not achieved. These end nodes are sometimes also called as objects and many times they work as sensing nodes. These nodes usually have dual nature. Examples of end-users are all types of sensors but these sensors are normally basic and a designer can convert it into active device. Proposed system has used Infrared Sensors as end node.

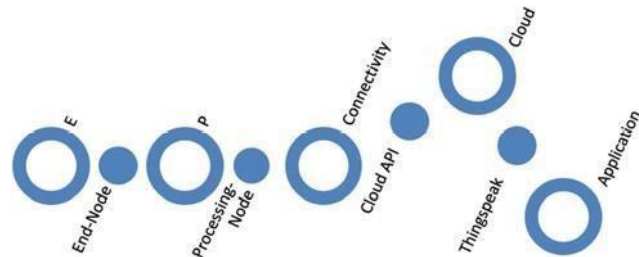


Figure:-Node Based Architecture Of IOT

### Processing Node

Processing node is the central important block. It is used to provide an artificial intelligence to the whole circuitry. It processes the data and information received from end-nodes and transfers it to further link for next action which in this case is a cloud platform. In our system we have used Arduino Uno as the processing node.

## Flow of Proposed System

In any system, wired or wireless Connectivity is important to establish a connection. Proposed system used ESP8266-01 WiFi Module to send data over the cloud. It consists of many network layers to establish a connection between software and hardware. Protocols used in each layer have a specific task as shown in Figure below. Physical layer deals with the mechanical and electrical support to the system. Every system has a unique MAC address. This system dynamically assigns IP address to each node and users. So a DHCP enabled connection can be used. A secure and fast connection MQTT.

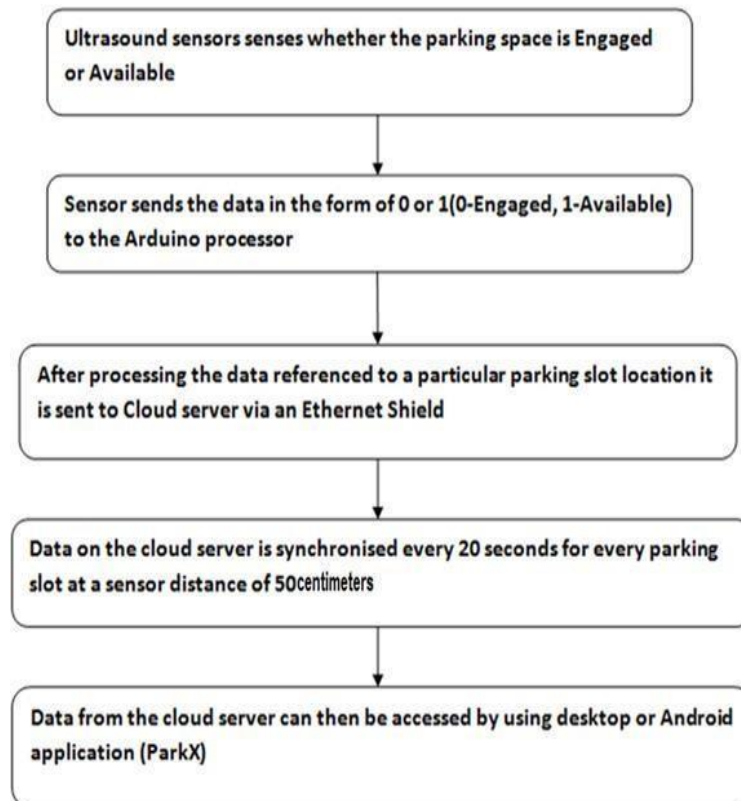


Figure:-Flow Of Proposed System

## Implementation And Architecture

### Hardware Requirements

MICRO-CONTROLLER	:-	Arduino
WIFI MODULE	:-	ESP8266(Networking)
SENSORS	:-	IR SENSORS
DISPLAY	:-	16*2 LCD
MOTORS	:-	SERVO MOTOR

### Software Requirements

IDE	:-	Arduino IDE
RAM	:-	128 MB(Minimum)
OS	:-	WINDOWS XP/7/8/10
HARD DRIVE	:-	256 MB
Language	:-	C-based

# Block Diagram

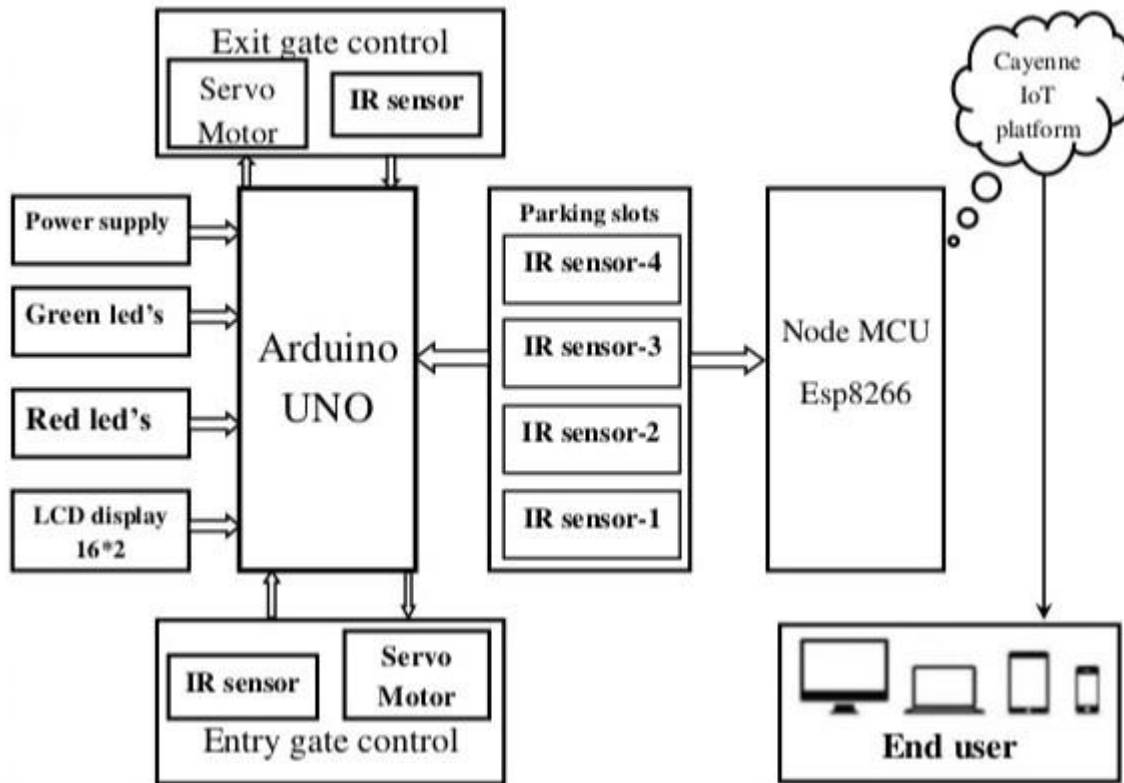


Figure 1:-Internal working of Arduino chip

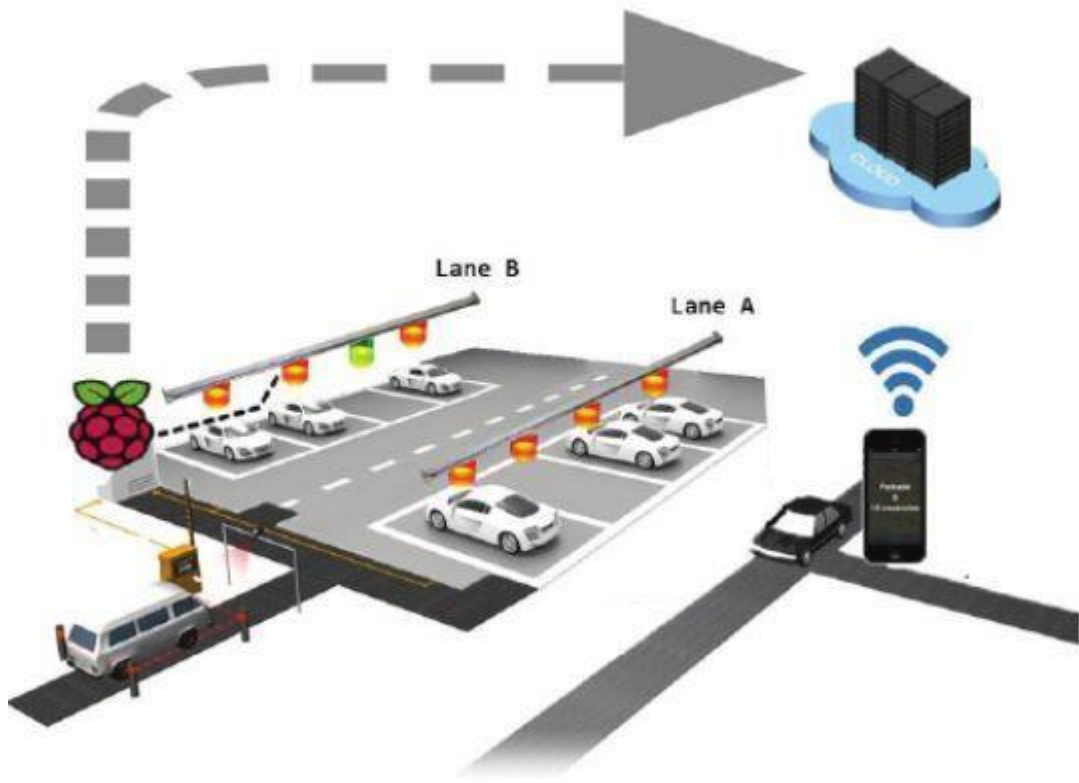


Figure:-Actual Working With Wifi Module

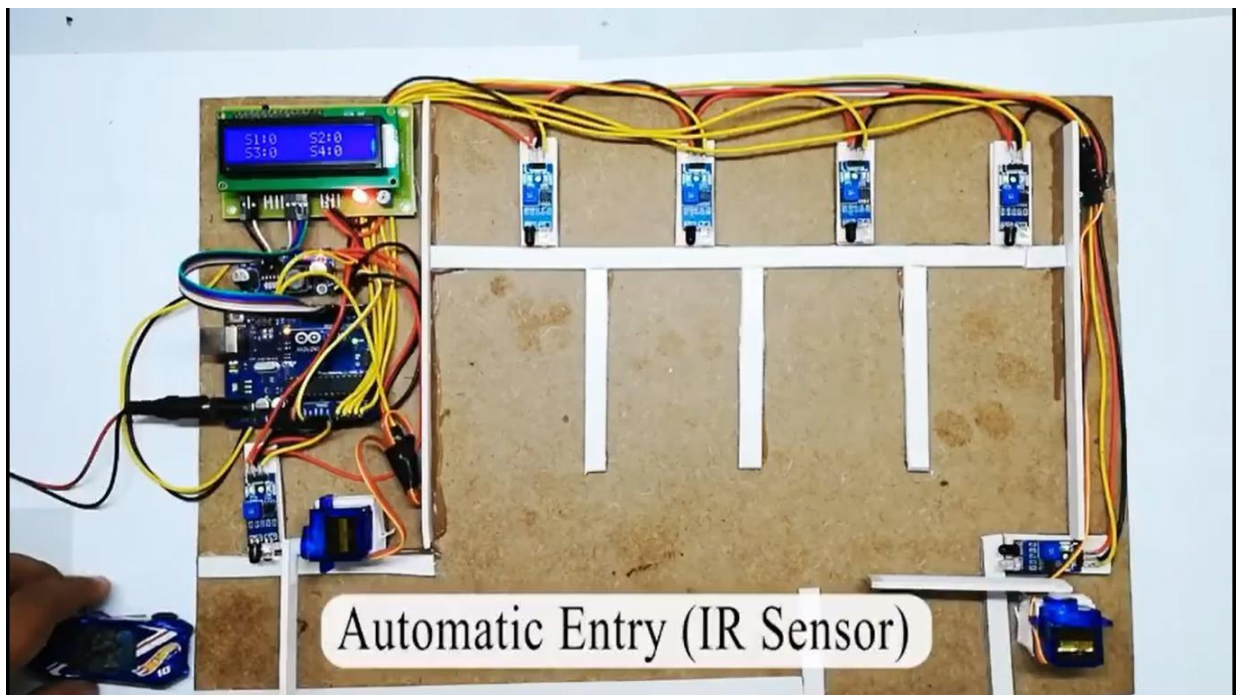




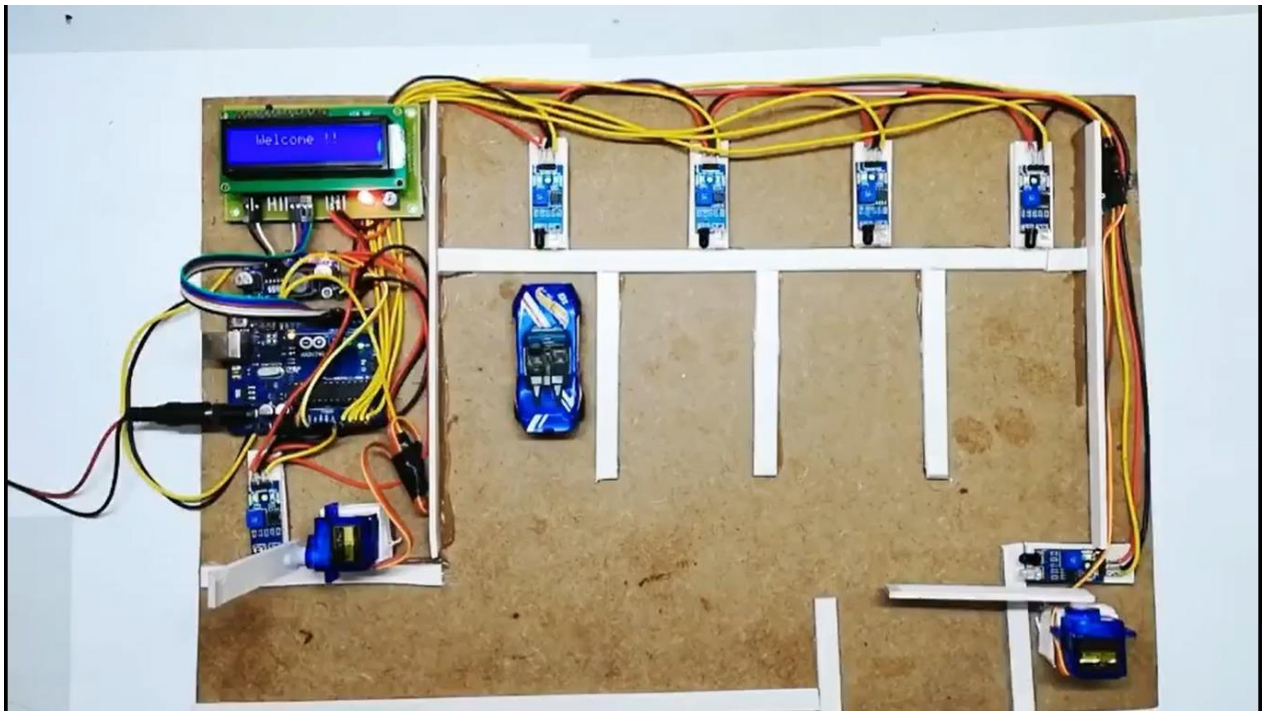
Figure:-Circuit Diagram

## Result/Output

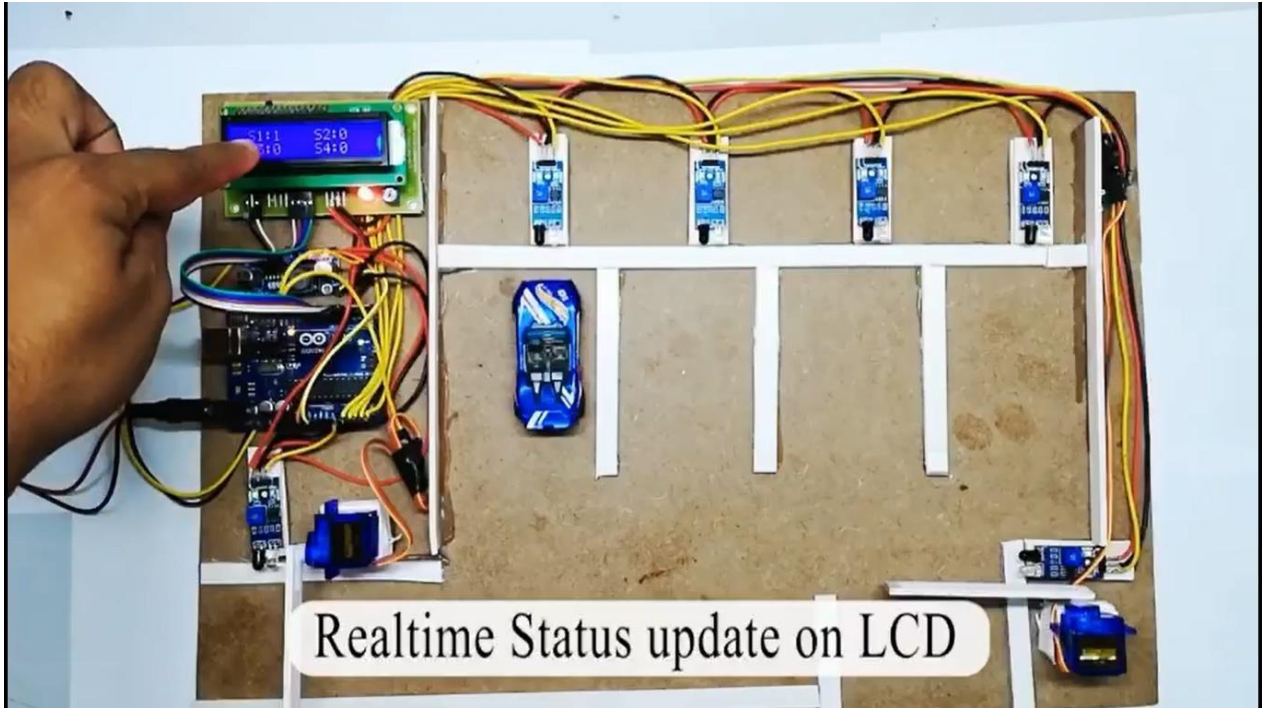
### Overview Of the Model



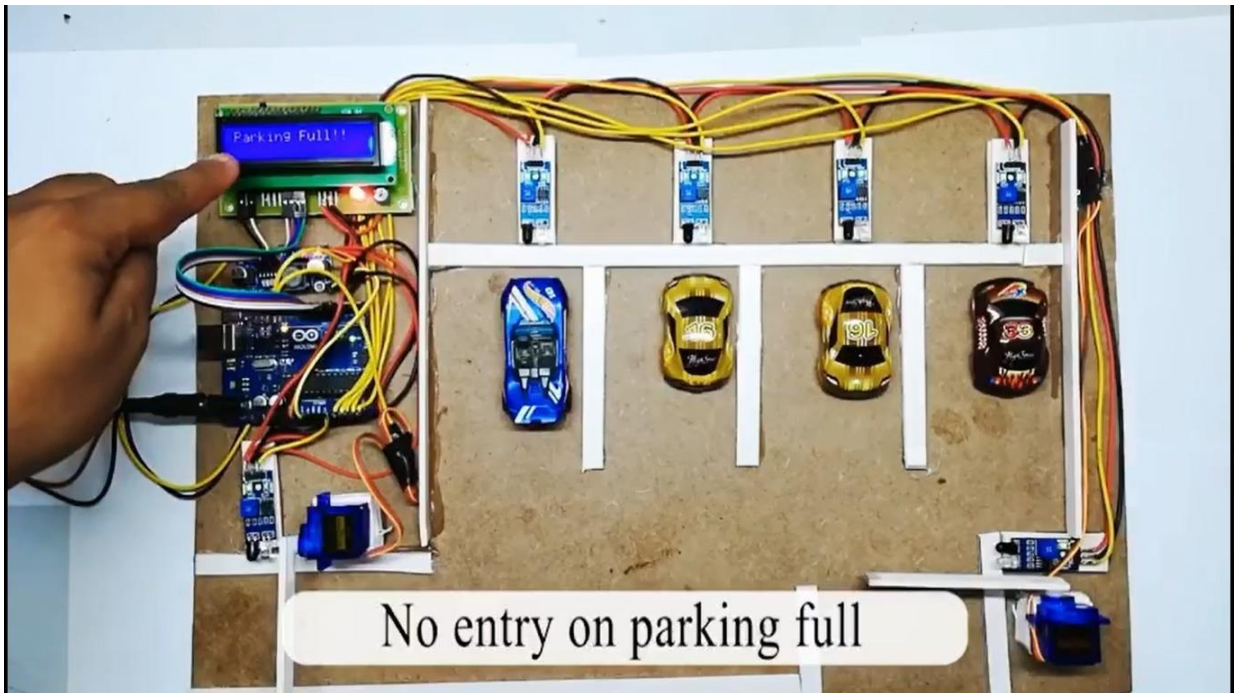
## Entry using IR Sensor



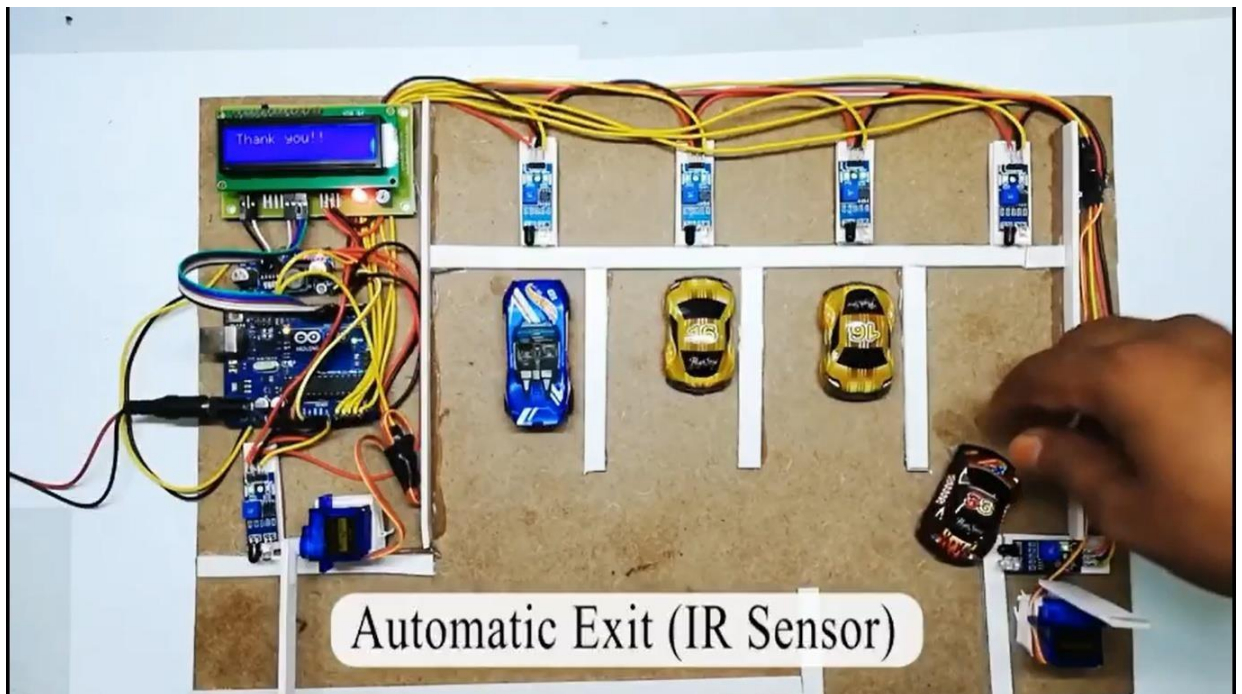
## Real time Status update



**Parking full Status**



## Automatic Exit



## **Analysis or Summary of the Project**

Summary of the project is that the project entitled Automated Car Parking system using IoT is to manage the car parking bay. This project help the company to track all the cars, car location, car in and car out details, apart from this it also help in accounting. Using this software we can track total amount collected for each day.

Automatic car parking system helps to minimize the car parking area. In the modern world, where parking-space has become a very big problem, it has become very important to avoid the wastage of space in modern big companies and apartments etc. In places where more than 100 cars need to be parked, this system proves to be useful in reducing wastage of space. This Automatic Car Parking System enables the parking of vehicles, floor after floor and thus reducing the space used.

## **Conclusion**

Smart parking facilitates the problems of urban livability, transportation mobility and environment sustainability. Smart Parking technology is used for enhancing the productivity levels and the service levels in operations. It also benefits in terms of lowering operating costs and increases revenues and facility value. Proposed system has developed from traditional servicing channels like toll-booth and parking attendants. It involves the use of Ultrasonic sensor, Arduino Uno, ESP8266-01 WiFi Module, Cloud server. The Internet of Things integrates the hardware, software and network connectivity that enable objects to be sensed and remotely controlled across existing network. Such integration allows users to monitor available and unavailable parking spots that lead to improved efficiency, accuracy and economic benefit.

## References

- Benenson, K. Martens and S. Birr., “Parkagent: An agent-based model of parking in the city”, *Comput. Environ. Urban Syst.* Vol. 32, no. 6, pp.431– 439, November 2008.
- Y. Geng and C. G. Cassandras, “New “smart parking” system based on Resource allocation and Reservations”, in *Proc. IEEE Transactions on Intelligent Transportation Systems.* Vol. 14, No.3, September 2013
- H. A. B. Sulaiman, M. F. B. M. Afif, M. A. B. Othman, M. H.B. Misran, and M. A. B. M. Said, “Wireless based Smart Parking System using ZigBee”, *IJET*, Vol. 5, 2013.
- P. Dharma Reddy, A. Rajeshwar Rao, Dr. Syed Musthak Ahmed, “An Intelligent Parking Guidance and Information System by using image processing technique”, *IJARCCCE*, Vol. 2, Issue 10, October 2013
- [www.google.com](http://www.google.com)
- [www.wikipedia.com](http://www.wikipedia.com)
- [www.studymafia.com](http://www.studymafia.com)





