

# Visvesvaraya Technological University

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*Mini Project Synopsis Report on*

## **“Arduino Automated Car Parking System”**

*Submitted in partial fulfilment for the award of degree of  
Bachelor of Engineering*

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## CHAPTER 1

### 1.1 INTRODUCTION

Smart Parking has designed and developed a range of in ground, surface-mount and overhead indicator vehicle detection sensors. The technology they employ allows us to accurately capture a vehicle's arrival and departure times, relaying this information to Smart Cloud via our Smart Spot gateways.

Nowadays, several application in scientific areas such as medicine, agriculture, social sciences, and computer sciences, as well as non-scientific areas, such as government, society, and industry, among others, have been boosted by the implementation of Internet of things (IOT) techniques. IOT is expressed in diverse areas that are classified according to the problems that can be solved, e.g., those in health, agriculture, networks, cities, and sports, among others. Future sensing solutions will be embedded in large automation systems, such as smart factories, buildings, and cities. Some of the current solutions are focused on the implementation of smart cities solutions. Smart cities are a concept that allows integrating technologies into a community intending to make life easier with minimal effort. These are the result of the need to guide out lives towards sustainability. The initiatives of smart and sustainable cities do not have to be seen as a model of a distant and unattainable future, but as a necessity to the current reality to face the challenges of the current societies, where information and communication technologies (ICT) would play a crosscutting role as articulating tools that guarantee a better result and, where appropriate, facilitate social cohesion, security, and sustainability.

Here we are going to use Arduino and create a smart parking system; it will be useful for the people to find the parking slot. If we use Node MCU instead of Arduino we can connect through Blynk application which help to find the parking slot and its easier to maintain the parking system.

### 1.2 STATEMENT OF THE PROBLEM

With increase in the population, number of vehicles increases and due to unmanaged parking it leads to many problems. In center cities, people faces difficulties as increasing number of vehicles creates congestion, wastage of space, wastage of time, traffic problems, car napping, car vandalism and many other difficulties. Smart parking system can reduce these difficulties and help to find the parking area wisely.

### 1.3 OBJECTIVE OF THE PROJECT

- To Design and build up a prototype of an automated car park system.
- To learn how to control the prototype system for automated parking.
- To acknowledge how to program Arduino and make it works on any system.
- To Guide the driver to find an parking space more convenient and efficient using IOT.

### SUMMARY

Introduction to the project-what is smart parking system, the problem statement and the objective of the project has been covered in this chapter.

## CHAPTER 2

### LITERATURE SURVEY

Smart cities use infrastructure, innovation, and technology for adapting the changes brought about by the overpopulation of cities and thus contribute to the reduction of carbon dioxide emissions, decreasing energy consumption, and promoting economic, social, and environmental development. One of the first steps to be implemented to upgrade the traditional cities to become smart cities is smart parking. Many cities around the world have already started implementations of smart parking projects, making life easier. Intelligent parking helps drivers to efficiently and effectively searches for parking spaces through information and communication technology.[1]

The Smart Parking System is designed by making use of some IOT supportable hardware's such as raspberry pi, auridino boards etc. here we focusing on less power consumption and more performance device so raspberry pi is the suitable microcontroller for our implementation. And NOOBS installer is loaded into the storage device of microcontroller. This installer which consists of various hardware supportable operating systems such as mac os, tiny os, openelec, raspbian os etc. where these operating systems which basically consumes less power.[2]

Smart parking using Iot technology helps to designs and develops a real smart parking system which provides information for vacant spaces and also helps the user to locate the nearest availability. This paper uses a computer vision to detect vehicle number plate in order to enhance the security. The user can pay for the parking space prior to the entry of the car through mobile payment. Thus, insuring the reservation of the parking. The user is notified about the parking location, number of slots available and all other relevant information. The paper uses efficient algorithms and techniques for extracting license plate text. An algorithm operates on the ultrasonic sensor detection of the vehicle entering into the parking slot and calculates the minimum cost for the user.[3]

### SUMMARY

Here we have referred some research paper on smart parking system and noted what we have understood from them in this chapter.

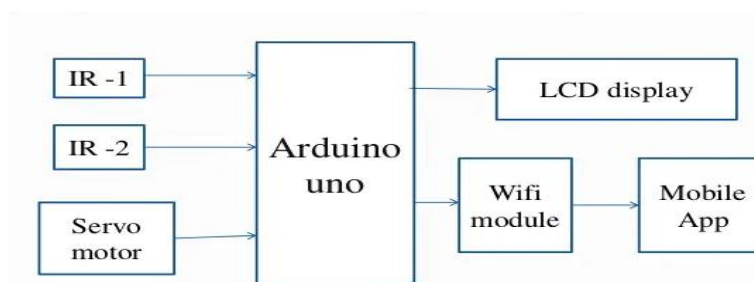
## CHAPTER 3

### METHODOLOGY

#### 3.1 WORKING PRINCIPLE

Parking is limited in almost every big city in the world– leading to air pollution, traffic congestion, and driver frustration. In large parking areas, a driver may exit the area without knowing about new spots that have just become vacant. Finding an empty parking slot may also lead to driver frustration if before the driver can reach it another car takes the spot. Thus, innovative parking systems for meeting near term parking demand are needed. With computer controlled wireless communications, and electronics technologies, intelligent service-oriented parking management can improve driver experience and parking space utilization and improve while decreasing drivers' frustration. Our motivation is to fill the near term parking demand using the Internet of Things (IOT). The contributions of our system include: 1) Reduce time 2) increasing space utilization, 3) improving drivers' experience, and 4) providing intelligent management. 5) Saving Fuel from the point of users' view, Smart City Parking system which is an intelligent and secure parking service.

Below block diagram (figure 3.1) shows the methodology of the smart parking system, here we use Arduino Uno, IR sensors, servo motors and LCD display to implement this project. IR sensors are used to sense the slot of the car parking, and this information is sent to Arduino Uno. We have programmed Arduino such that, sensing information from the IR sensor is received in Arduino Uno and it will display the slot available information in the LCD display. If the slot is full it will say slot is full, if slot is empty it will display the available slot. For more advance we can use Node Mcu instead of Arduino Uno and link it to Blynk application so that it will be useful for the driver to check the slots and park the car wisely.

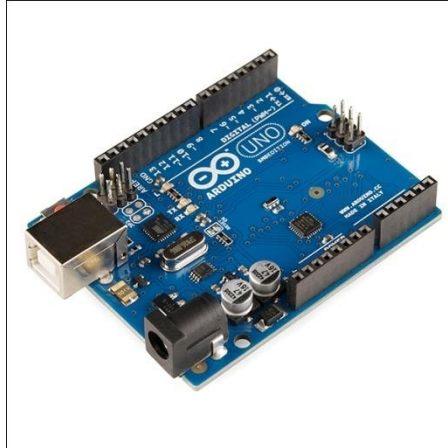


**Figure 3.1: Block Diagram of Smart parking system**

### 3.2 COMPONENTS

- **Arduino Uno:**

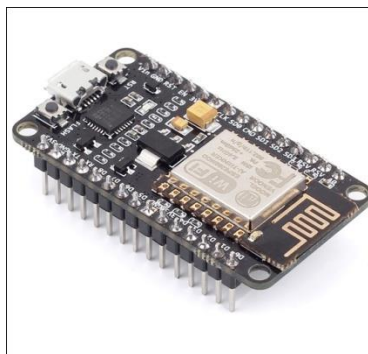
The Arduino UNO includes 6 analog pin inputs, 14 digital pins, a USB connector, a power jack, and an ICSP (In-Circuit Serial Programming) header. It is programmed based on IDE, which stands for Integrated Development Environment. It can run on both online and offline platforms. The IDE is common to all available boards of Arduino. An Arduino Uno is shown in the figure 3.2.



**Figure 3.2: Arduino Uno**

- **Node Mcu:**

Nodemcu is an open source Iot platform. It includes firmware which runs on the ESP8266 Wi-Fi SoC from Express if Systems, and hardware which is based on the ESP-12 module. The term "Nodemcu" by default refers to the firmware rather than the development kits. Nodemcu wifi module library for Proteous 8 download Nodemcu Esp8266 the Node MCU ESP8266 development board comes with the ESP-12E module containing ESP8266 chip having 32 bit LX106 architecture microchip. This microchip supports RTOS and operates at 80MHz to a hundred and sixty megacycle adjustable clock frequency. Nodemcu is shown in the figure 3.3.



**Figure 3.3: Node Mcu**

- **IR Sensor:**

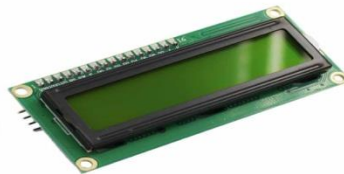
An IR sensor can measure the heat of an object as well as detects the motion. These types of sensors measure only infrared radiation, rather than emitting it that is called a passive IR sensor. Usually, in the infrared spectrum, all the objects radiate some form of thermal radiation. IR sensor as been shown in figure 3.4.



**Figure 3.4: IR Sensor**

- **LCD Display:**

A liquid crystal display or LCD draws its definition from its name itself. It is a combination of two states of matter, the solid and the liquid. LCD uses a liquid crystal to produce a visible image. The term LCD stands for liquid crystal display. It is one kind of electronic display module used in an extensive range of applications like various circuits & devices like mobile phones, calculators, computers, TV sets, etc. These displays are mainly preferred for multi-segment light-emitting diodes and seven segments. Figure 3.5 show the LCD display.



**Figure 3.5: LCD display**

- **Servo Motor:**

A servomotor is a rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity and acceleration. It consists of a suitable motor coupled to a sensor for



position feedback. It also requires a relatively sophisticated controller, often a dedicated module designed specifically for use with servomotors. Servo Motor is showed in the figure 3.6.

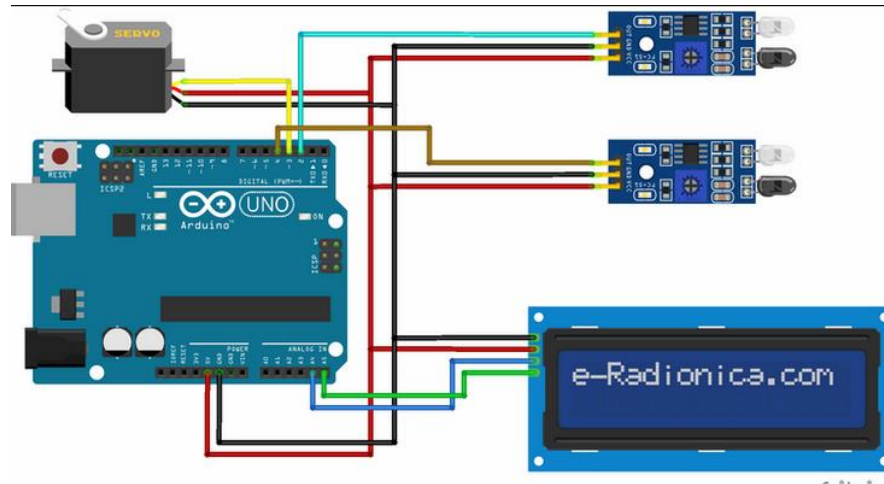


**Figure 3.6: Servo motor**

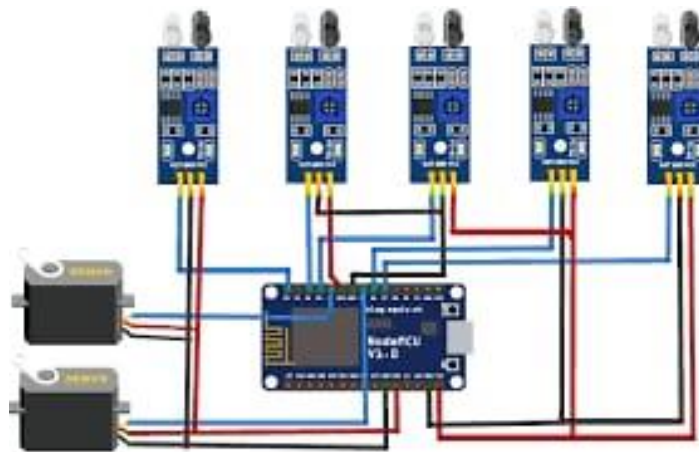
### 3.3 IMPLEMENTATION

The Smart parking system is used to solve the many problems which is faced by many driver in the cities. Smart Parking has designed and developed a range of in ground, surface-mount and overhead indicator vehicle detection sensors. The technology they employ allows us to accurately capture a vehicle's arrival and departure times, relaying this information to Smart Cloud via our Smart Spot gateways.

We can implement this project in parking slots of malls, and some parking places, so that the traffic, time and confusion can be solved. Here we used Arduino Uno, IR sensors, servo motors and LCD display to implement this project. IR sensors is used the sense the slot of the car parking, and this information is sent to Arduino Uno. We have programmed Arduino such that, sensing information from the IR sensor is received in Arduino Uno and it will display the slot available information in the LCD display. If the slot is full it will say slot is full, if slot is empty it will display the available slot. For more advancement we can use Nodemcu instead of Arduino Uno and place one IR sensors at each slot, when car leaves the slot it marks as place is empty and update the slot is available. Nodemcu is used because it as wifi module inside which helps to connect to the Blynk app. Using this Blynk app one easily can see the slot availability and can go and park their car. Figure 3.7 shows the implementation of Arduino Uno with IR sensor and Figure 3.8 shows the implementation of Nodemcu with IR sensor which is one step advanced then Figure 3.7.



**Figure 3.7: Implementation of Smart parking system using Arduino Uno.**



**Figure 3.8: Implementation of Smart parking system using Nodemcu.**

## CHAPTER 4

### 4.1 RESULTS

- It guarantees snappy and computerizes parking and simple recovery of vehicles.
- Up to 3-4 cars can be effectively and securely parked in the outlined model.
- The surface space required is identical to the parking spot of two cars as it were.
- Most reasonable for parking in workplaces, shopping centers and comparable spots.
- Security of vehicles can be ensured using these methods.

### SUMMARY

The Results of our projects that we achieved is stated in this chapter.

## CHAPTER 5

### 5.1 FUTURE ENHANCEMENT

In future works, this framework can be enhanced by including different applications. For Example, internet booking by utilizing GSM. The driver or client can book their parking area at home or while in transit to the shopping center. This can diminish the season of the client to seeking the empty frameworks can be added to enhance this framework to distinguish the question and guide the driver or clients speediest. We will attempts to decrease the mechanical structure and attempt to make it ecofriendly.

### 5.2 ADVANTAGES AND DISADVANTAGES

#### **Advantages:**

- With this technology advanced security features can be implemented.
- It Enhanced User Experience.
- It Reduce traffic and pollution.
- It increases safety of vehicles.
- This technology decreases management costs.

#### **Disadvantages:**

- It requires high cost for construction or installation.
- Though the system is automated, it needs to be regularly maintained.
- A lot of people are not used to the parking management system. As a result, it may be difficult for them to make use of, thereby causing further complications during parking.

### 5.3 APPLICATIONS

We see that, this new system is an added value to the urban life style. The smart parking reservation system can be implemented in shopping malls, restaurants, theatres etc.

### SUMMARY

The Future use of the smart parking system, Advantages and disadvantages of using the smart parking system and some of the application has been discussed in this chapter.

## CONCLUSION

The smart parking system based on IOT concept has been implemented using various sensor circuitry and cloud. It is an efficient system for car parking which prevails traffic congestion. This work is further extended as smart car parking system with automatic entry and exits system also fully automated system using multilayer parking methods. We see that, this new system is an added value to the urban life style. In the current world, where Google cars are introduced and automated driving is growing interest among the people, this will be an improvement of great magnitude. Automated cars can do the parking on their own, if this car parking app is a part of their built in system. Hence, I believe that these simple concepts, when released into the world, will be one of those revolutionary changes in everyday activities.

## SUMMARY

The conclusion what I got by practical implementation of this project has been stated in this chapter.

## REFERENCES

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