



**INDIAN INSTITUTE OF INFORMATION
TECHNOLOGY NAGPUR**

A Project Report

on

Smart Parking System

Submitted for partial fulfilment for the minor project of

Analog and Digital communication

in

Department of Electronics and Communication Engineering

(2017 – 2021)

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Declaration

I hereby declare that the work reported in the B.tech report entitled “Smart Parking System” submitted at Indian Institute of Information Technology, Nagpur India, is an authentic record of my work carried out under the supervision of Dr.Tapan Kumar Jain. I have not submitted this work elsewhere for any other degree.

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Acknowledgements

We would like to express our gratitude to one another at ‘Smart Parking System’ involved in the development and guidance in this project. First of all, we would like to thank to our project supervisor - Dr. Tapan Kumar Jain. He has supported us every time. We would also like to thank our parents for supporting us while making this project and encouraging us to take on real life problems that will make an impact.

ABSTRACT

We had come up with a solution to the problem faced by almost everyone of parking in this modern world. So, getting the right information about space available in the parking lot is very important to the drivers in our city so that they don't waste their time looking for parking spaces or park inappropriately because of lack of information. An Internet of Things (IoT) based Smart Parking System informs the user to find out the availability of parking slots in this parking lot. Our project mainly focuses on reducing time in finding the parking slots. It also avoid the need to travel unnecessarily through filled parking spaces in the parking lot. In this way, it will also help to reduce the fuel consumption which in turn will reduce carbon dioxide emitted in the atmosphere. In this project, we check the status of each parking space in the parking lot and then send the sensor data to the database. Then this data is sent to the Web Server and finally the data is displayed on the website.

Chapter 1

Introduction

1.1 Ultrasonic sensors

Ultrasonic sensors are installed in each parking slot. These provide a cost effective means to aid the users in parking. It uses a target and echo mechanism to determine the distance of an obstacle from it. An ultrasonic sensor sends out a target wave and receives that wave after reflection from an obstacle. The time taken for the wave to return gives an estimate of the distance of the obstacle from the sensor.



Figure 1.1: ULTRASONIC SENSOR

1.2 Raspberry Pi

It is the name of a series of single-board computers made by Raspberry pi - the Raspberry Pi Foundation, a UK charity that aims to educate people in computing and create easier access to computing education.

The Raspberry Pi launched in 2012, and there have been several iterations and variations released since then. The original Pi had a single-core 700MHz CPU and just 256MB RAM, and the latest model has a quad-core 1.4GHz CPU with 1GB RAM. The main price point for Raspberry Pi has always been 35 usd and all models have been 35 usd or less, including the Pi Zero, which costs just 5 usd.

All over the world, people use Raspberry Pis to learn programming skill, build hardware projects, do home automation, and even use them in industrial applications.



Figure 1.2: RASPBERRY PI

1.3 LED Display

A seven-segment display is commonly used in electronic display device for decimal numbers from 0 to 9 and in some cases, basic characters. Use of light emitting diodes (LEDs) in seven segment displays made it more popular, whereas of late liquid crystal displays (LCD) displays have also come into use. Electronic devices like microwave ovens, calculators, washing machines, radios, digital clocks etc. to display numeric information are the most common applications.

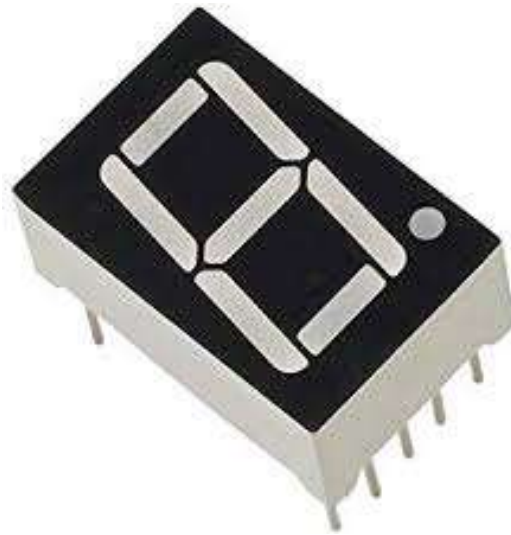


Figure 1.3: LED Display

Chapter 2

Problem Statement

Over-populated nations like India and China face an overwhelming traffic crisis. High number of cars on road have made parking difficult. According to consulting firm IHS Automotive the annual global auto sales topped 80 million vehicles in the year 2013. This means that every ten seconds 26 new vehicles were sold. There is an urgent need to develop efficient parking systems that can streamline the process of parking and make the process easier for users. To solve this existing problem of parking a car in a city we have come up with the idea of making an Automated Car Parking System.

The smart car parking system is a multi client single server system. Conventionally, car parking systems does not have any intelligent monitoring system. Parking lots are monitored by human beings. All vehicles enter into the parking and waste time searching for parking slot and create blockage. Condition become worse when there are multiple parking lanes and each lane have multiple parking slots. Use of automated system for car parking monitoring will reduce the human efforts and streamline process.

There are several existing sensors such as Ultrasonic sensors. These embedded systems are now commonly interfaced with these sensors and mobile phone technologies such as internet to widen their scope and enhance the application areas to a greater extent.

Chapter 3

How it works

3.1 Methodology

We have come up with a small prototype of the Smart Parking System . In this project we have 3 parking slots in our parking lot. Each parking slot has an ultrasonic sensor, which continuously measures the distance from the obstacle i.e. Car in this project. The 7 segment display displays the number of vacant parking spaces in the parking lot. We have implemented a small prototype which has an optimised performance with respect to cost, real time monitoring,etc. As the user approaches the parking lot, the number of vacant parking spaces is displayed on the Seven Segment Display. The user will get the update of the availability of parking spaces available in the parking lot through the website. Our project mainly focuses on reducing time in finding the parking spaces and also avoid unnecessary travelling through filled parking spaces in a parking lot. Thus, it will reduce the fuel consumption which in turn will reduce the carbon dioxide emitted in the atmosphere.

3.2 Circuit Diagram

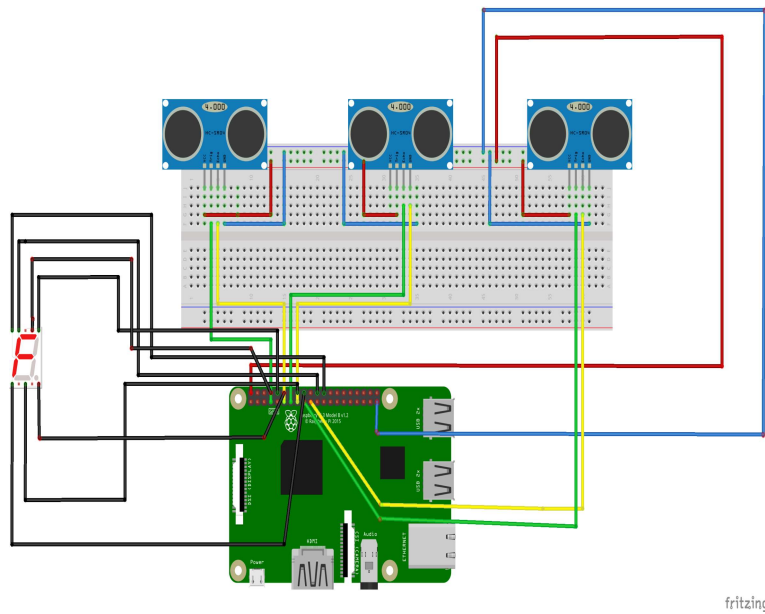


Figure 3.1: CIRCUIT DIAGRAM

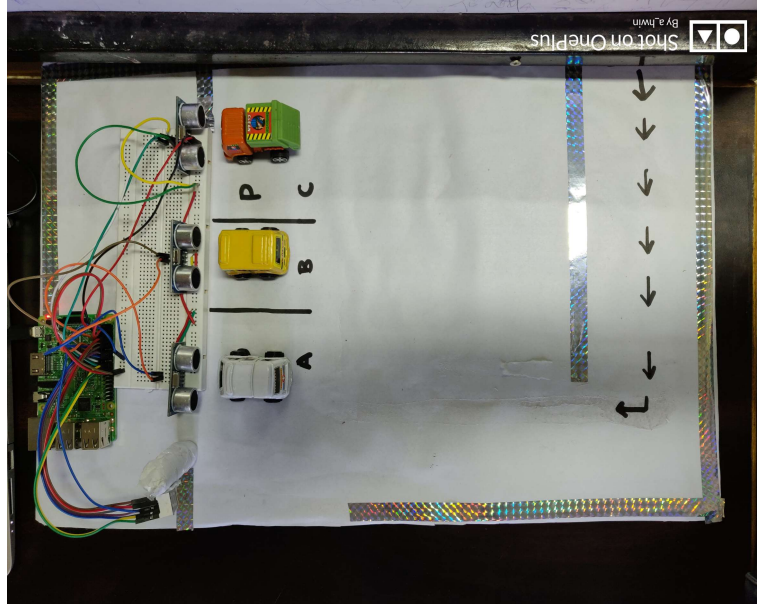


Figure 3.2: Project Prototype - 1

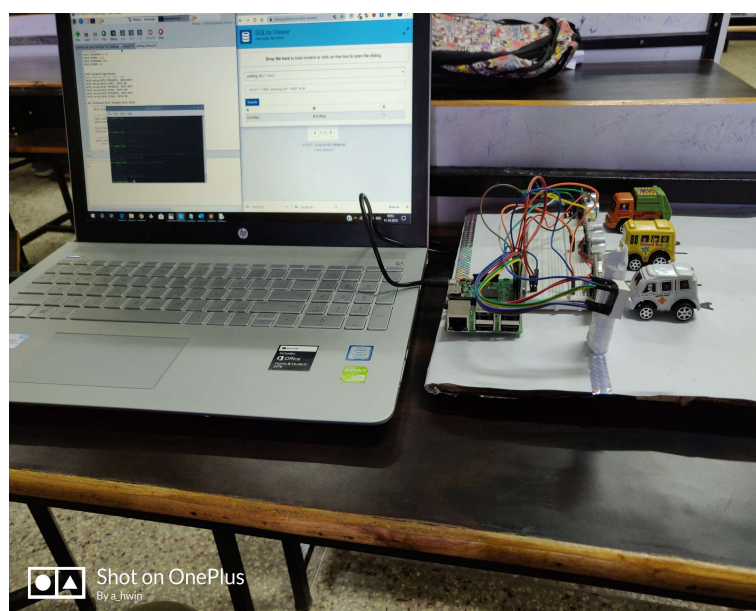


Figure 3.3: Project Prototype - 2

3.3 Flowchart

FLOW OF CONTROL AT THE PARKING LOT

1. Car enters the parking lot.
2. Seven Segment Display displays the number of available parking spaces in the parking lot.
3. Ultrasonic Sensors measures the distance from the car if it is less than 10 cm then we say that parking space is filled otherwise it is vacant.
4. The data of each sensor is stored in the database.
5. This stored data in the database is sent to the web server.
6. Then finally this data i.e. availability of parking spaces in a parking lot is displayed on the website.
7. If all the parking spaces are full then Car has to Exit from the parking lot.

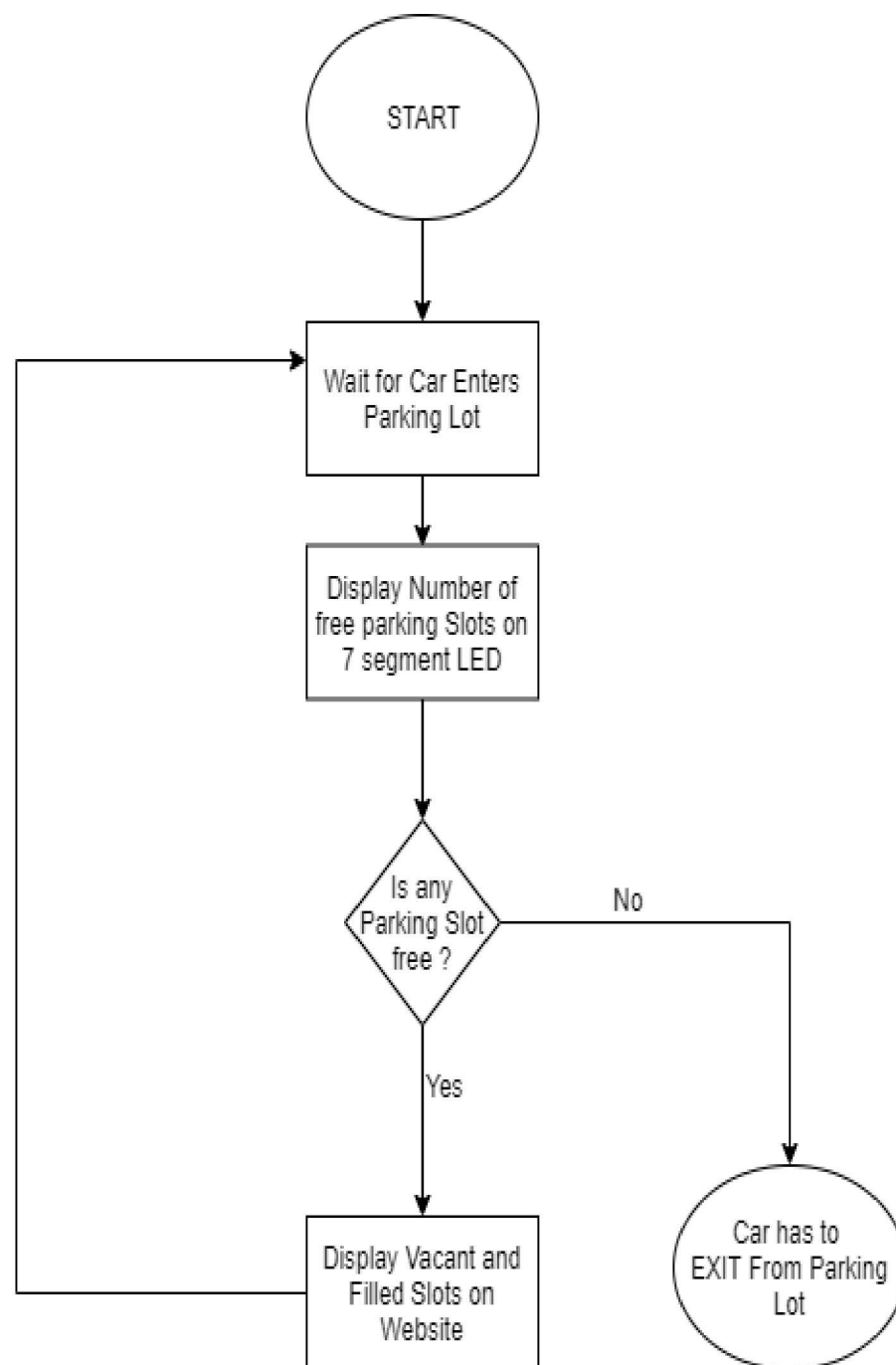


Figure 3.4: FLOW CHART

Chapter 4

Result

We have successfully received the data in the server and it matches the data sent by Raspberry Pi.

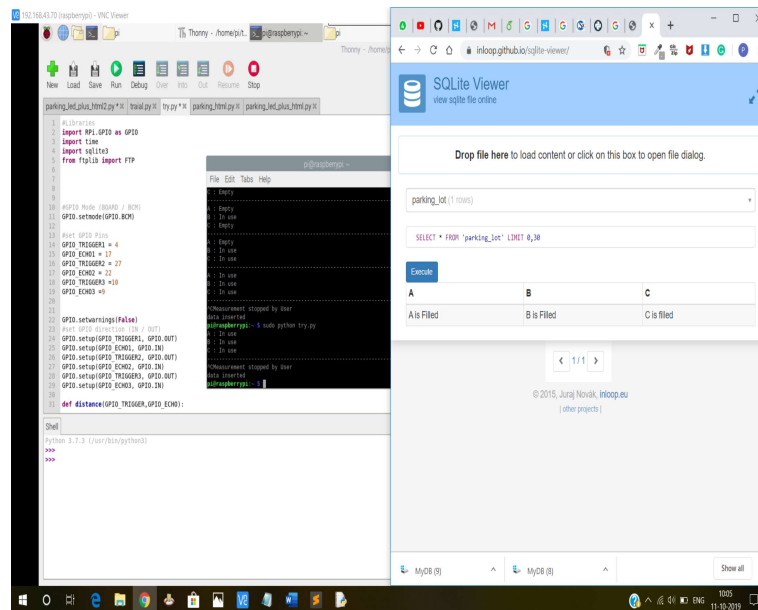


Figure 4.1: Display of Data

Chapter 5

Conclusion

The results after the successful completion of the project are as follows

- We had come to know that direct access to database is remotely restricted and so we have come up with File Transfer Protocol(FTP).
- We have learned how to interface sensor and how to use FTP(File Transfer Protocol) with Raspberry Pi.
- The project mainly focuses on reducing time in finding the parking spaces and also avoid unnecessary travelling through filled parking spaces in a parking lot.
- It will also reduce the fuel consumption which in turn will reduce the carbon dioxide emitted in the atmosphere.

Chapter 6

Difficulties Faced

In our way to complete this project we encountered many difficulties that are mentioned below.

- The interfacing of LCD display with Raspberry Pi.
- Finding out the correct python module and installing it for our project.
- Reading the SQLite file uploaded to the server.
- Establishing a secure connection to the server.
- Direct access to database remotely is restricted by server even after using the correct *username* and *password*

References

- [1] Monil Patel. Smart parking system, July 10 2019.
- [2] Jiannong Cao Vanessa W.S. Tang, Yuan Zheng. An intelligent car park management system based on wireless sensor networks. *2006 1st International Symposium on Pervasive Computing and Applications*, 15(1.6):1.6:1–1.6:64, February 2006.