Metro City Parking Arrangement Using Cloud

Anitha Mary M[1], Sai Krishna[2], Devanand [3]

[1]Rajalakshmi Engineering College,
Rajalakshmi Nagar, Chennai,
[2]Rajalakshmi Engineering College,
Rajalakshmi Nagar, Chennai
[3]Rajalakshmi Engineering College,
Rajalakshmi Nagar, Chennai

Abstract: The Metropolitan city parking system using cloud proposes a parking system to solve the problem of unnecessary time consumption in finding parking slot in commercial car park areas. It is developed in such a way that users can find out whether the parking space is available or not using mobile application or web page. In each of the parking spaces an ultrasonic sensor will be used. This sensor will detect the presence of car in the slot and send this data to the Arduino. The Arduino in turn transmits this data to Raspberry pi through serial communication. The purpose of using Raspberry pi is to upload the data into the cloud platform. The Raspberry acts as a node when the web socket is opened. And at the other end of it is the webpage and android application. User can choose either the application or the web page to identify the availability of parking space.The proposed system is developed on the Arduino IDE platform and the results of the proposed system are verified through the Serial Monitor of the Arduino IDE. The capability of the system is to identify the empty spaces in the parking area and depict it through the applications.

Keywords: SPS, Ultrasonic sensors, Arduino, Raspberry Pi, Improper parking Directional signage, ARTIK Cloud, Mobile APK.

1. INTRODUCTION

One of the major problems faced in the cosmopolitan cities is the hap hazard that is caused due to unavailability of sufficient parking slots. To encounter the above situation, the general public tends to park their car on the streets that may lead to further congestion. The metropolitan city parking arrangement is proposed in a view to alleviate this problem. The shopping malls and other public places do not have an automatic system to monitor the parking slots and allot the free parking slot for incoming vehicles. This leads to a lot of congestion and enormous amount of inconvenience for the public who intend in parking cars at malls and other public forums. Man power is required to maintain order in the parking slots. This makes the entire process of parking cars a tedious and a time consuming process. The information regarding the availability of parking slots is not available to the user ends, since there is no system to display associated to it. Moreover, it may lead to confusion among the owners who park their cars at a particular floor in a mall. The financial dependence for the process may scale up, considering the fact that an extended man power is required for parking. The Metropolitan City Parking Arrangement using cloud proposes a technique that provides advanced features such as remote parking and monitoring. The architecture of it from hardware to software implementation with sensor networks is described. A full-fledged prototype system for parking management to realize the design functionalities and features mentioned has been implemented.

In each of the parking spaces an ultrasonic sensor will be used. This sensor will detect the presence of car in the slot and send this data to the Arduino. The Arduino in turn transmits this data to Raspberry pi through serial communication. The purpose of using Raspberry pi is to upload the data into the cloud platform. The Raspberry acts as a node when the web socket is opened. And at the other end of it is the webpage and android application. User can choose either the application or the web page to identify the availability of parking space. The proposed system is developed on the Arduino IDE platform and the results of the proposed system are verified through the Serial Monitor of the Arduino IDE. A prototype of a car park system has been designed to demonstrate the capability of the proposed work. The demonstration has proven the capability of the system to identify the empty spaces in parking lot.
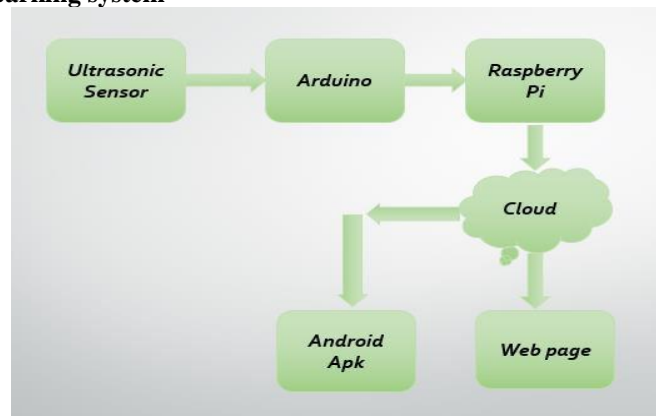
1.2 .Block Diagram of parking system

Figure. 1 Block Diagram of proposed system

Ultrasonic sensors are used for measuring the properties of sound waves with frequency above the human audible range. These are based on three physical principles: time of flight, the Doppler effec , and the attenuation of sound waves. An ultrasonic sensor can detect certain clear or shiny targets. On the other hand, their measurements are very sensitive to temperature and to the angle of the target. The Raspberry Pi is a powerful ARM based computer.

2. SOFTWARE DEVELOPMENT

The Arduino IDE is a cross-platform Java application that serves as a code editor and complier and is capable of transferring firmware serially to the board. The development environment is based on processing, an IDE designed to introduce programming to the artists unfamiliar to the software development. The programming language is derived from wiring, whose IDE is also based on processing. The simulation model of the project consists of ultrasonic sensors connected through wires to the Arduino which sends the data serially to the Arduino. The Arduino intron uploads the data onto the cloud with the help of Raspberry pi. The simulation model of the project can be seen as
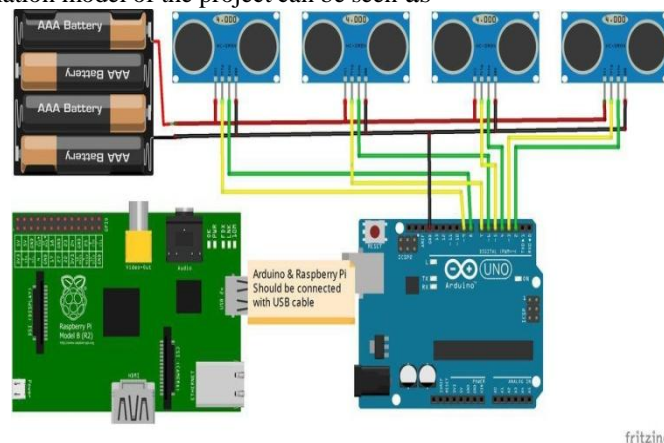

Figure. 2 Simulation model

2.2. Android Studio

Android Studio is the official IDE for android application development.It works based on IntelliJ IDEA Android studio contains a very powerful debugger tool that not only allows you to change the value of variables but also execute arbitrary code at the current scope. This capability is especially helpful when performing more advanced inspections that require the temporary injection of several lines of code at the breakpoint.
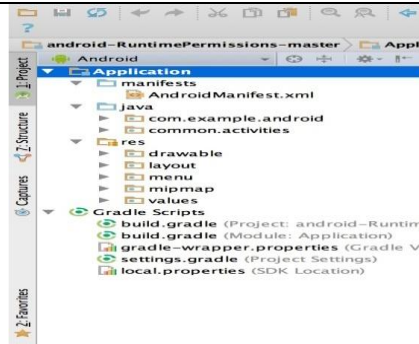
International Journal of Recent Engineering Research and Development (IJRERD)
Volume No. 02 – Issue No. 05, ISSN: 2455-8761
www.ijrerd.com, PP. 93-97

Figure. 3 Structure of Android studio
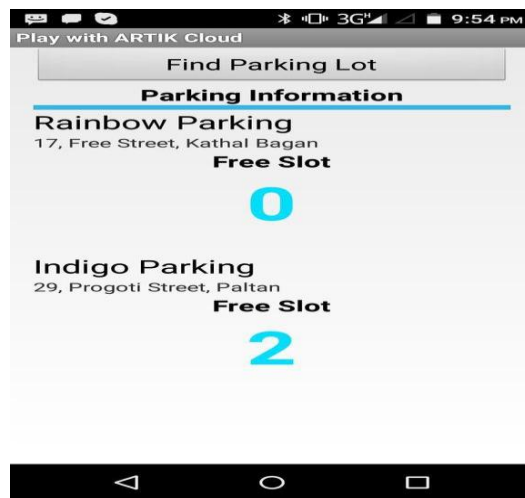

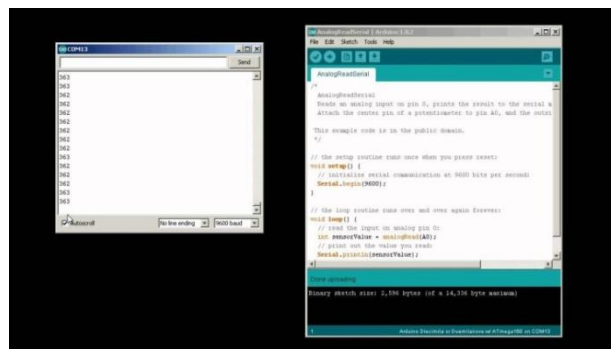Figure. 4 Ardroid application

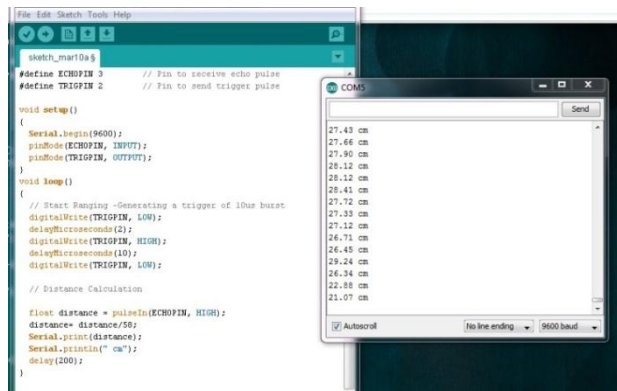Figure. 5 Serial Monitor of Arduino IDE

Figure. 6 Serial port output

3.   SMART PARKING SYSTEM DESCRIPTION

3.2 SPS-User Overview

In order to find vacant spaces, drivers can use the android application or a web page. If there is no internet connectivity they can use the display board which shows how many and which type of vacant spaces are available at each level at that time. The Arduino which in turn is connected to the internet through Raspberry pi uploads the same in the cloud. The application and the web page are updated periodically upon the receiving the data.
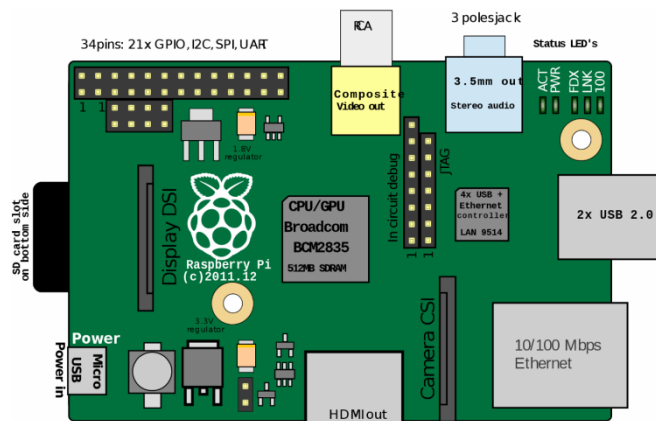

Figure. 7 Raspberry pi Schematic Diagram

3.3 SPS Features

Smart Parking System (SPS) consists of main and secondary features for different purposes and situations. Some of the features mentioned in this paper will be part of future research.

The main features of SPS are:

➢ Detect occupancy status of each individual space in a multilevel parking lot.
➢ Display the number of available spaces at entrance of parking lot, at entrance to each level, and at end of each aisle.
➢ Display directional signage for each aisle, showing drivers which direction has vacant spaces
➢ Line detection system to avoid improper parking.

(a) Cloud Overview

The ARTIK cloud plays a major role, it acts as a database for the data which is been sent from   the Raspberry   Pi. The data is retrieved from the cloud in the form of web page and mobile application. The both forms will display the number of vacant spaces available in the parking lot. The user can simply install the application in their smart phone or they can visually access it in the browser.

4.   SYSTEM ARCHITECTURE

The ATmega328 chip is derived from the original Arduino processor, the ATmega8. It contains more memory and more peripheral capability than its predecessor while using less power. The Atmega328 processor can operate from a wide range of power supply voltages. This makes it well suited for battery-powered applications. At the lowest voltages, the processor has a maximum clock rate of 4MHZ. To run at the maximum clock rate of 20MHZ, the chip needs at least 4.5V. The Arduino board provides 5v for the ATmega328 chip, so it can run at any speed up to maximum of 20MHZ.The current crop of ATmega328 chips from Atmel feature
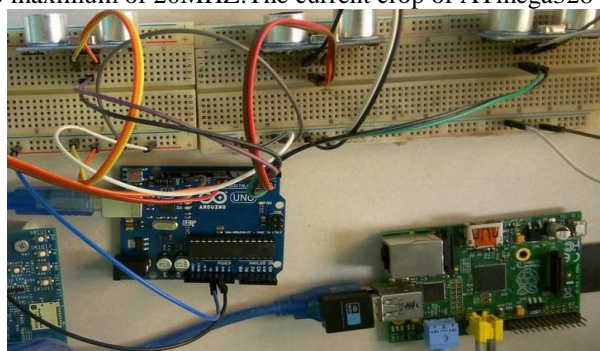

Figure. 8 Parking Area Arrangement

Conclusion

Metropolitan City Parking Arrangement Using Cloud was developed as an end user application to find a specific slot in a parking lot in a commercial building. A model for finding free parking spaces has been developed. The code for ultrasonic sensors for detecting a vehicle was dumped into the Arduino and the response is acquired by the same. The data is finally sent to the Virtual hard drive which is Cloud for storage purposes. At the other endo of it, this data is usefully retrieved using an android application and a web page. With the advent of smartphones, it is easy to track free parking spaces. On the other hand, FPGA implementation has a lot of coding complexity when compared to the proposed system. Metropolitan City Parking Arrangement Using Cloud has less coding complexity with respect to the existing systems. The user need not waste precious time in finding parking slots and it also reduces the fuel consumption while searching for the parking slots to a small extent.

References

[1]. M. Fishbein and I. Ajzen, "Belief, Attitude, Intention and Behaviour: AnIntroduction to Theory andResearch", (1975).

[2]. P. W. H. Coopers, "From Beijing to Budapest - Winning Brands. Winning Formats", (2005), pp. 126.

[3]. A. Kianpisheh, N. Mustaffa, J. M. Y. See and P. Keikhosrokiani, "User Behavioral Intention toward UsingSmart Parking System", Proceeding of ICIEIS, (2011) Kuala Lumpur, Malaysia, pp. 732-747.

[4]. D. B. L. Bong, K. C. Ting and K. C. Lai, "Integrated Approach in the Design of Car Park OccupancyInformation System (COINS)", IAENG International Journal of Computer Science, IJCS, vol. 35, no. 1,(2008).

[5]. M. Y. I. Idris, E. M. Tamil, N. M. Noor and K. W. Fong, "Parking Guidance System Utilizing WirelessSensor Network and Ultrasonic Sensor", Information Technology Journal, ISSN 1812-5638, (2009).

[6]. C. C. Huang and S. J. Wang, "A Hierarchical Bayesian Generation Framework for Vacant Parking SpaceDetection", Circuits and Systems for Video Technology, IEEE Transactions, (2001), pp. 1.

[7]. I. Masaki, "Machine-vision Systems for Intelligent Transportation Systems", Intelligent Systems and theirApplications, IEEE, vol. 13, (1998), pp. 24-31.