

Parking Management System

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Abstract- With the increase in number of cars and drivers, parking has become a major issue. This model makes use of sensing technology that captures the surrounding vehicles with the help of an ultrasonic sensor. It is implemented by coordinating these sensors with Arduino Uno circuit boards. The Arduino boards are connected serially via a USB cable to a Raspberry Pi Zero W device which collects the sensor data from the Arduino boards serially and then pushes this data wirelessly to a database in Google's Firebase system. This database system then pushes this data to a remote Android app used by many different clients to view if a space is vacant or occupied in a particular location. This paper describes the new system's functions and configurations together with the specifications required and further discusses its utility as determined by its effectiveness. We can scan parking space more accurately in real parking environment. Our proposed method has benefits of calculation and implementation is quite simple.

I. INTRODUCTION

In the current scenario finding a parking space has become as difficult as to find a treasure. Especially in public places such as hospitals, theatres, malls, IT parks, market are the areas where finding a place for parking is a big problem. If we visit a very big place even if there are empty slots its hard to identify between the cars .This stresses any human being and time invested is total waste. So we need an automated parking system that will help you find the location of the empty spot sitting anywhere in this world. Conventional parking systems do not have any automation and it is always monitored by a group of people and cost of maintenance is also high. So with the help of our parking system model one can easily save his/her time by reserving a parking slot sitting at his/her home and can use the parking in hassle free way. The main motive of taking up this problem statement is the increasing traffic leading to decreasing parking space and its feasibility. In popular cities like Bangalore, Mumbai and Delhi this is a huge problem and this can be solved by our system in an efficient and affordable manner. So we have developed a fully automated system which detects the availability of parking slot in real time and update it on a mobile application which lets the user to spot a vacant space to park at any time. The user can also reserve the parking slot through the mobile application remotely.

II. THE GOAL OF THIS PAPER

A. PURPOSE

The purpose of this paper is to implement a Parking Management System which utilizes Ultrasonic sensors, buzzers, Arduino boards, Raspberry Pi and a personalised Parking management app.

B. OBJECTIVES

- Developing an intelligent parking management system that helps in parking maneuvers. Drivers are free to focus solely on controlling the process.
- This management system is designed so that it becomes easy to supervise and manage the vehicle while parking without struggling to find a parking spot.
- This system will be cost efficient. When you use a digital camera, it's hard to find parking slots in every situation.
- Hence, our project solves this problem as it is solely dependent on Ultrasonic sensors. There is accurate data for measured distance to give us the required vacant parking slot.

III. IMPLEMENTATION

The Parking assist system consists of three main types of units as follows:

3.1 Requirements

1) ULTRASONIC SENSORS:

These are acoustic sensors that are divided into three categories which are transmitters, receivers and transceivers. Transmitters usually convert electrical signals into ultrasound. Ultrasound signals are converted to electronic signals by receivers. Transceivers can receive ultrasound signals and also transmit ultrasound signals.

When in reverse gear, rear sensors are selected and as soon as another gear is selected the rear sensors are deactivated. These sensors help measure the distance between

the vehicle and the object distance and calculate just for the driver’s reference.

2)RASPBERY PI

It is a small computer which is affordable that is plugged in a TV or a computer monitor. It can interact with the world outside and is widely used in project in the digital world, which can range from weather machines to music machines, all the bigger to smaller projects. Raspberry Pi ZERO W is the slimmest and which is by far the most pared down version of Raspberry Pi. It has a built in WIFI.

3)ARDUINO BOARD

It is an electronic platform that is open source and tis is based on easy to handle software and hardware. Arduino UNO is one of the best boards to get started with electronics and coding. This board is robust and is used the most and most documented board in the entire Arduino family. You can easily connect it to a computer with a standard USB cable and it can powered in.

4)FIREBASE

This is Google’s mobile platform that helps in developing application of high quality and helps in growth of a business. This is built on an infrastructure that scales automatically for small and larger applications.

5)PARKING MANAGEMENT APP

This app allows users to access the parking slot information also to reserve slots for parking by extracting data from the Firebase.

6)LCD DISPLAY

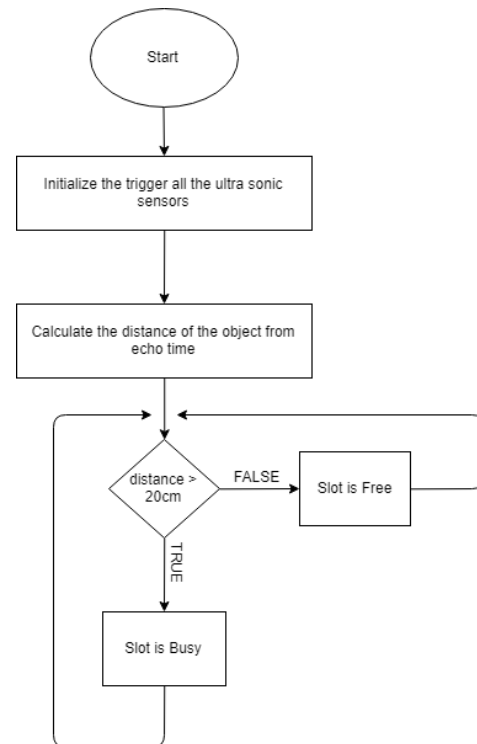
This display is used to show the availability of parking slots in parking location.

7) BUZZERS

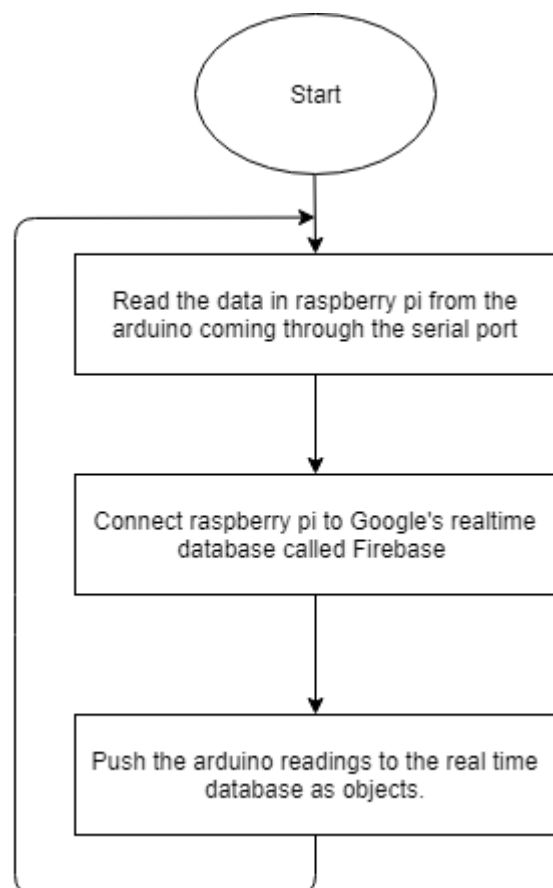
These buzzers are used to assist the drivers to park their vehicles in the parking slot properly.

3.2 Architecture

The algorithm flow chart for the Arduino to read sensor data is shown below,



The algorithm flow chart for reading the data from sensors continuously onto raspberry pi is shown below,



The overall architecture of parking management is shown below,

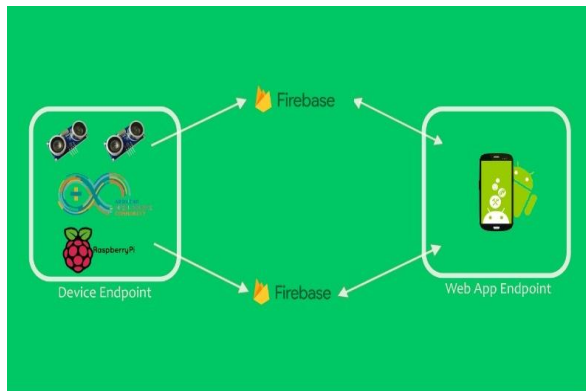


Fig 3: Overall Architecture

3.3 Implementation

1. The first step is the connection of ultrasonic sensors to the Arduino boards.
2. There are two ultrasonic sensors connected to each Arduino board, as these two ultrasonic sensors act as two different slots each.
3. The trigger pin of the ultrasonic sensor emits ultrasonic waves that goes and hits the target object and the echo pin receives back the waves after hitting the target object.
4. The distance is calculated by measuring the time between the transmission and reception.
5. These Ultrasonic sensors are connected to Arduino UNO board.
6. The Arduino boards are then connected to Raspberry PI serially over USB that is collecting all the data from various Arduino boards.
7. Raspberry PI is then connected to a google Firebase and all the data collected by Raspberry pi is pushed to the database of the available information on the parking slots.
8. This database is then updated with the change in the availability.
9. We have a personalized app that is accessible to all the people that are going to use the parking space, this app helps in making it easier to find vacant slots.

We have a common LCD display board that will display the number of available and unavailable parking slots.

IV. CONCLUSION

Our project Parking Management using IoT, uses Arduino boards and ultra-sonic sensors to detect the existence of a vehicle at a parking slot. A group of these data from

Arduino boards are centralised and connected to raspberry pi board. And through serial communication raspberry pi reads the data coming from different Arduino and sends that information to a google firebase database in the cloud. Once the database is synchronized with these endpoints the sensor values are continuously updated in real time. Once the cloud and endpoints are in sync, we use mobile application android/iOS to fetch the data in real time from cloud and give the user an option to locate the vacant parking slot from any part of this world. The user has the capability to reserve the parking slot in prior to have hassle free parking. So this project in overall gives an efficient, affordable and hassle free parking management system. This can be easily maintained and installed.

In future work, we would like to add features like pay as you go. So we'll need to have payment gateway in our mobile application. Also we could give parking some parking assistance to vehicles with some sound buzzer indications. We can automate the whole parking area without any maintenance with automated barriers based on availability.

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