

Intelligent Car Parking System commanded by Android Application

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Abstract - Driving on Indian roads is difficult and even worse is the struggle to get a parking space. This problem increases with the growing population of vehicle owners in the country. The aim of this paper to propose a design of an automated car parking system with the help of Raspberry Pi, QR code and android application that regulates the number of car to be parked on parking area by automating the parking and un-parking of the car. Our system aims to reduce human intervention and reduce the time required for searching empty slots. This system runs on mobile phone platform and provides real-time parking status of specific area so that user can reserve a slot. QR code is use for authentication purpose. The user needs to scan the QR code while parking the vehicle. The action of user is then stored in database. Server Database is updated periodically. This system provides parking facilities such that it leads to increase security and enhances user's experiences.

Key Words: Android App, DC Motor, IR sensor, QR code, Raspberry Pi, Server database.

1. INTRODUCTION

Often when we visit various public places like shopping malls, restaurants, multiplex cinema halls, etc. the difficulty one faces at these places is finding the availability of parking space. In cities with massive amount of traffic searching for parking space becomes difficult. It wastes fuel, time and leads to increase in traffic. The problem becomes even worse when all available parking slots are occupied and one is unable to find a vacant slot. There are various navigational solutions based on GPS devices that can find empty slots. But the system proposed in this paper provides additional information and dynamic updates as parking slots becomes available or occupied. Also provides reservation option for slot booking. This readily solves the parking management issues and helps in smooth functioning. The parking systems deployed include multiple technologies such as Digital Image Processing, Ultra sonic sensor's technology and other. The major setback of these detection systems are Image processing has low accuracy and high dependency to light and weather conditions. While the ultrasonic sensor technology is more sensitive to variations in temperature, expensive for large area of parking system. and also it has more difficulties in reading reflections from different surfaces. Now-a- days smart phones have become an integral part of people's life and has become a device which serves user with facilities that make life easier and comfortable. The system proposed in the paper has been designed and developed to monitor real time information and can be used in all types of parking zones as open or multilevel parking zone.

The designed system includes the following :-

- 1.The user can find a vacant slot with the help of an Android App, also the user can reserve the desired slot for parking .
2. A systematic monitoring system including sensors, Raspberry Pi and server database to check for occupied or available slot.
- 3.The server database is periodically updated for handling real time data and the status is available to the user on the Android App.

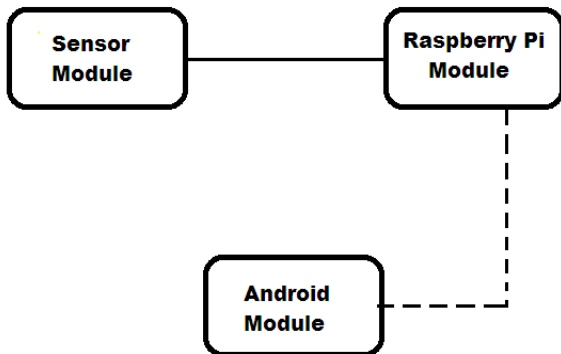
The system proposed provides parking monitoring system with low consumption, also it is easy to implement and is inexpensive . It can be implemented for both open as well as multilevel parking zones. The system can be deployed in any area with ease without interfering the routine operations. This system proves beneficial for driver for detection of desirable slot in limited time and saves fuel and leads to efficient real-time parking operation.

2. LITERATURE SURVEY

Car parking these days is really hectic and consumes time. Car parking in campus is managed by improving the efficiency of the use of efficient parking space, by informing user about available parking spaces and guiding them accordingly. Quick Response code is a type of matrix barcode which contains information about the item to which it is attached. QR code is made up of black squares arranged in a square grid on a white background, which can be read by QR code scanner[1] There were various sensors available to detect occupied and unoccupied slots like ultrasonic sensors and IR sensors. This paper uses IR sensor for its accuracy and reliability in any drastic environmental conditions. IR sensors are connected to Raspberry pi to detect occupancy of slots [2]. The Mobile App is an interface for the end users to communicate with the system using Internet. Mobile application is connected with the server through a secure channel using the internet. Mobile application provide real time information. Data is transferred between the server and the mobile application . For the proper communication between the Raspberry pi and mobile application ,there must be proper connection to a particular channel on the server using the Internet[3].

2.1 COMPONENT SURVEY

This section is divided into 3 main units:-



Block Diagram

12.1. Raspberry Pi unit:-

The Raspberry Pi is a credit-card-sized single-board computer developed in the UK by the Raspberry Pi Foundation. It is programmed by using Python Language. It acts as a controller to the DC motor, Motor driver as well as the IR Sensors, also it acts as server to store the update information on regular basis. The Raspberry Pi will have connections from all sensor nodes. It serves as the communication unit with latest Database status whenever required by Users.

The model used is the Raspberry Pi 3 model B and its specifications include:

1. Broadcom BCM2835 system on a chip (SoC)
2. ARM1176JZF-S 700 MHz processor
3. VideoCore IV GPU
4. 512 MB of RAM

1.2.2. Sensor Unit:-

An infrared sensor is an electronic device that emits and detects infrared radiation. Infrared sensors can detect motion. In the proposed design Infrared sensors are used to detect the presence of a car. The IR sensors data pin's are interfaced with Raspberry Pi's GPIO Pin's. IR receiver and IR transmitter are placed in front of each other such that car is parked in between the sensors. This module will be installed in the parking area, there will be a sensor node for each parking space.

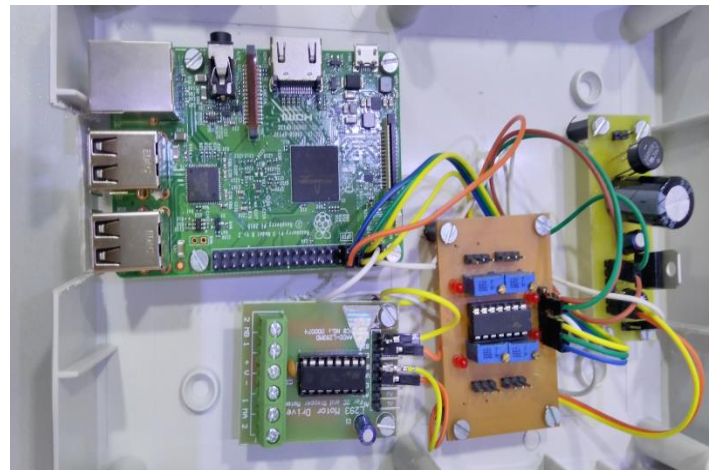
1.2.3. Android Unit:-

This module will be installed as an Android application in the user's mobile phone and it will display the parking slot status as vacant or occupied. The system will require Raspberry Pi with various IR sensors attached to it to serve

as input. The IR sensors will determine the parking status(empty or full). The Raspberry Pi checks update status of the parking slot and stores this information in the server database. This information is available the requested user by the Android Application. The parking slot setup (Raspberry Pi and IR sensor) will be accessible to the Android app over Internet. The Android application will be used by users to check the parking status on their mobile phone.

2. RESULT

2.1 HARDWARE IMPLEMENTATION:-



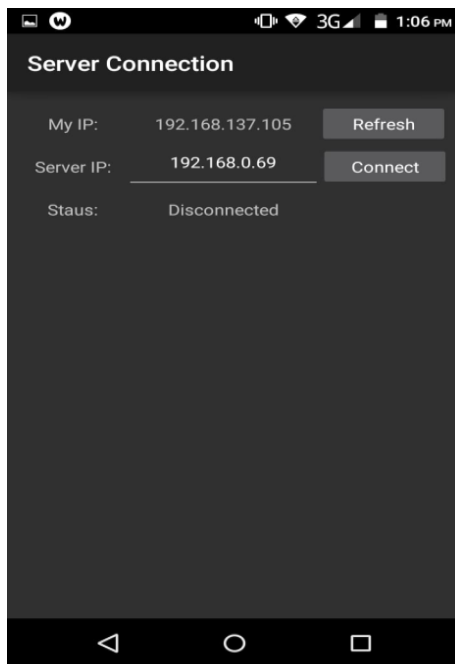
2.2 PARKING MODEL:-



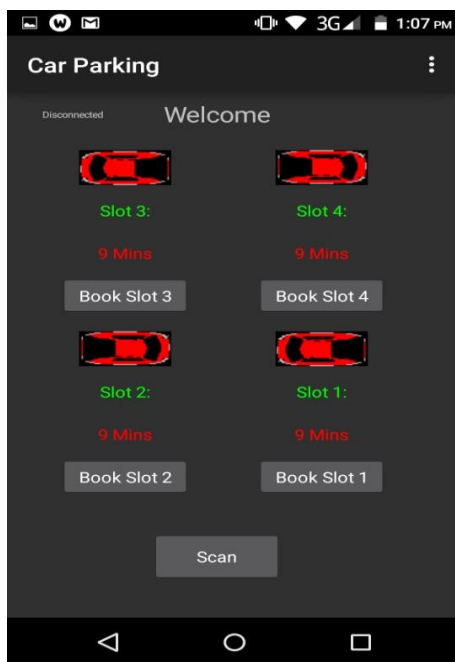
2.3 ANDROID APPLICATION:-

The Android Application needs to connect to the network using login and password and then request server to check for the availability and thus download availability information from the server as shown in Figure (a). The file is downloaded containing the current availability of the parking slots. If the available spaces are present then, the user can book using "Book Slot" button and scan the QR Code.

a) SERVER CONNECTION



b) BOOKING OF A SLOT



3. CONCLUSION

Hunting for parking area in peak hours is a tough job. It increases traffic congestion and results in wastage of fuel and time. This wandering ultimately frustrates the driver. The proposed design in the paper is alleviating these difficulties of the driver by improvising the parking policy with inclusion of reservation option with security feature such as use of QR Code. The designed system also provides online information to the requested user of whether the parking area is occupied or vacant. The user can pre-book

the desired slot, on reaching the parking area, with the help of DC motor the stop bar will open, once the QR code is scanned. The user will get a notification 15 minutes prior he/she reaches the parking area. The user is provided with options such as extended time or cancelled on the android app. On reaching the intended parking area the user is navigated from the gate to the slot. This data is simultaneously updated on the server. This makes the parking process smoother and much easier.

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