

PERCEPTIVE CAR PARKING BOOKING SYSTEM WITH IoT TECHNOLOGY

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Abstract: Parking spaces are highly in demand especially in metropolitan cities, since people buying cars have increased substantially in-order to fulfill their materialistic desires. Therefore, there is an exigent need for developing a system that can manage car parking areas indicating the vacant and occupied plots in malls, shopping complexes, cinema complexes etc. The objective of this paper is to introduce a web application for car parking management. This system includes infrared sensors which senses/detects the vehicles at the individual parking slot which will be reflected in the web application, and led displays which indicate if that slot is free or occupied. Parking slot details are managed by the concerned authorities. Implementation of this automated car parking system is expected to reduce the time taken to search for a parking slot and also avoid vehicular congestion at parking areas.

Index Terms - IR Sensors, LCD Display, Web application.

I. INTRODUCTION

In the recent past, statistics of vehicles being sold has been increased by 11% in the year 2019 when compared to the previous years. According to the recent survey, there will be a rapid increase in the population of the vehicles to over 1.6 billion around 2035. The increase in the number of vehicles results in the problem of finding a parking space in public places. A smart parking system is the key solution to the problem. This will reduce the users' time and vehicle fuel consumption to a certain level as the person doesn't have to roam around in search of a parking slot which in turn reduces the traffic congestion too.

In this paper, the main focus is on designing and implementing a smart parking system that will help the drivers to find vacant parking slots at a specific parking area.

The car parking system consists of IR sensors and LCD displays which are placed at each car parking slot. The IR sensors detect the presence of the vehicles at the specific slot and LCD display will indicate whether the particular slot is empty or not. These details will be reflected in the web application created for this purpose where a user can book the slot according to the availability.

Abbreviations and Acronyms

LCD - Liquid Crystal Display.

IR - Infrared Radiation.

II. EXISTING SYSTEM

Most of the existing system requires human intervention to park the car. Currently, the most common method for finding a car parking space is a manual process, where the driver finds the space through luck and experience. This process takes a lot of time, effort and sometimes he/she may also not find a place to park the car. An alternative way is to find a car parking area with more space available. However, this is not an optimal solution as the parking area might be far away from the user's destination.

In recent years, studies have been carried out on vehicle-to-vehicle and vehicle-to-infrastructure interactions with the support of various wireless technologies such as Radio Frequency Identification (RFID), Zigbee, Wireless Mesh Network and Internet.

The disadvantages of the existing systems are listed below:

- Time consuming
- Fuel consumption
- Traffic problems
- One way issues
- Causes tension

III. PROPOSED METHODOLOGY

The main aim of this proposed system is to develop an automated car parking system which can regulate and manage the number of cars being parked in a given area at a given time based on the available parking area. This system allows parking and exiting of the cars with the help of the sensing devices. The system uses IoT technology and has a web in the front-end to provide data to the users, such as availability of the slot.

The advantages of the proposed system are listed below:

- Reduced searching time for parking space
- Reduced fuel consumption by vehicles
- Reduces traffic problems and tension
- Real-time updates on parking space availability.

IV. WORKING

The proposed system has been implemented as a miniature model representing only one particular parking area with 3 slots. The working of the system is explained in the below:

Step 1: Check the slot availability

- A web application has been developed where the user can check the availability of the slots and book it from anywhere or on-spot.
- The vacant slots are indicated by green color and the occupied slots are indicated by red color.

Step 2: Booking procedure

- Now, in-order to “**pre-book**” (i.e. booking a slot before arriving at the location) an available slot, the user has to enter his/her vehicle registration number. The user can recheck to see if the slot has been booked.
- For the one who comes to the parking area directly and wants to book a slot then he can directly click on “**let’s begin**” in the web application and park his vehicle, only if the slot is free by entering their vehicle registration number.
- According to the number of bookings and the other related information parking area status will be updated in the application.

Step 3: Parking the car

- The driver enters the parking area and arrives at the location where he had booked the slot.
- IR sensors are placed at every slot in the parking area. As soon as the car arrives at the particular slot, the sensors will detect the car and update this information in the database.
- Before parking the car, a prompt message will appear where the user must first enter the **vehicle registration number** which was provided while pre-booking the slot for authentication.
- If by any chance the vehicle registration number doesn’t match, then the user will not be allowed to cannot park his vehicle.

Step 4: Exiting

- When the car leaves the parking slot the status will be updated to ‘available’ so that new users can book the slots.

V. REQUIREMENTS

1. Software Requirements:

- Python 2.7 or higher
- OpenCV and other packages
- ThingSpeak Cloud

These are used to develop web application for user-Interaction.

2. Hardware Requirements:

- Raspberry Pi Board
- IR sensors
- LCD Display

IR Sensors: It detects the object/obstacles at the surroundings. This detected information is further received by the application which helps to the status of the slots.

LCD Display: It displays the sensed information such as car has entered and the car has exited.

Raspberry Pi Board: An SD card inserted into the slot on the board acts as the hard drive for the Raspberry Pi. It is powered by USB and the video output can be hooked up to a traditional RCA TV set, a more modern monitor, or even a TV using the HDMI port., and also to learn how to program in languages like Scratch and Python.

VI. RESULT

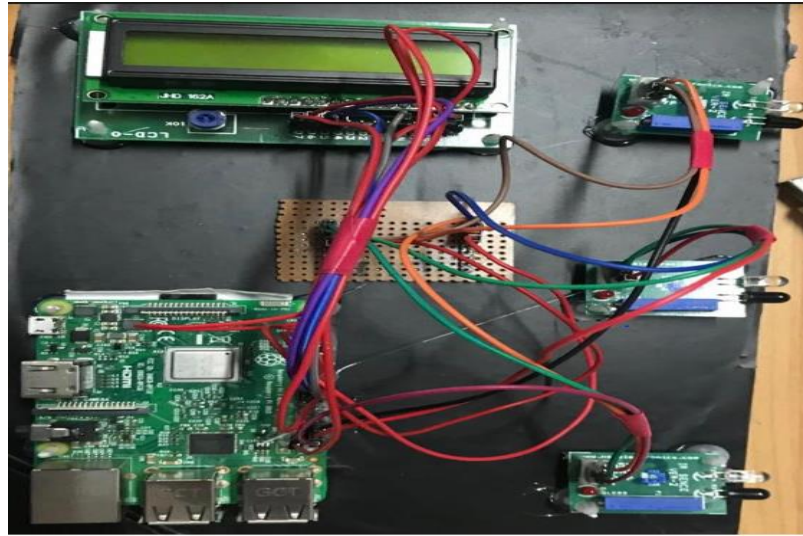


Fig 1: Hardware (Miniature model representing 3 slots)



Fig 2: Web Application Overview

VII. CONCLUSION

The proposed system can be implemented in real-time by incorporating GPS services. A successful implementation of this project will prevent congestion in the parking area. This can be widely used in malls, shopping complex, business buildings etc., where many people can share the parking area. This system reduces the long queues, tension, time consumption and man power by increased efficiency. In addition to all these it also provides safe and hustle free environment.

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