

Smart Parking System

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Abstract - Locating a parking space in central city areas, especially during the peak hours, is cumbersome for drivers. The issue arises from not having the knowledge of where the available spaces may be at the time, even if known, many vehicles may seek very limited parking spaces to cause severe traffic congestion. The system monitors the availability of idle parking slots and guides the vehicle to the nearest free slot. Cost is minimized by keeping the number of sensors low without sacrificing the reliability. This system's reservation-based parking policy has the potential to smoothen the operations of parking systems, as well as mitigate traffic congestion caused by searching for parking.

Key Words: Arduino, Smart Parking, Smart Parking System, Automated Parking

1. INTRODUCTION

There a lot of instances today where people park their vehicles in places where parking is not allowed or have a lot of problems finding the right places to park. Parking these days in cities is one of the most difficult conundrums for the people. People waste a lot of their time finding the right parking slots, as a result many park their vehicles in congested areas and places where actually parking is prohibited. This leads to a lot of confusion, especially during the rush hours when there is a lot of traffic wasting lots and lots of times. This paper deals with this problem in a very efficient manner as it allows folks to book parking slots prior to their visit to a particular place. The person who needs to book a slot first has to register himself on the website after which he gets to know the available or vacant parking spots nearest to place he wishes to visit. This helps in optimizing usage of parking space and saves time as well as prevents congestion.

This sheds light on the way in which this difficult problem can be solved. The prototype basically looks for the available parking slots and helps the driver or the person to book them. After the booking process a receipt is generated which is evaluated for validity at the place of parking through a unique ID, as this is an insight to an automated system, if the ID is valid then the vehicle is allowed entry into the parking premises. After the driver parks his vehicle, a message is sent to him giving him the confirmation that his vehicle has been parked successfully. People who don't have access to internet can refer to an LCD which shows the available parking slots at the current time.

2. SYSTEM DESCRIPTION

Smart Parking System provides us with two functionalities. One is the online spot booking system and the other is the

traditional parking system. The online booking system makes it easy for the user to look for the parking spots in the city digitally through the use of a website and if needed and if the person wishes to view the availability of the parking slots or book a parking spot particularly for themselves then he/she would need to first register himself/herself on the website by providing the necessary details which would then register them on the website. This would allow them to now check the availability and book a parking spot as well for a specific period of time in the city of their choice. The person needs to provide all the necessary details in order to book a slot and on successful booking a One Time Password (OTP) is generated which the person would need to keep hold of and provide it to the administrator of that particular parking site. The administrator has to login to the parking admin page on the website to verify the OTP. On validation of the password the administrator at the parking spot allows the user to park the vehicle.

For the traditional parking, the available number of slots are displayed at the entrance of the parking area using the seven segment analog display. In case of availability the drivers can go to the parking admin to book the slot for a specific period of time. They are then directed to a specific slot where they can park the vehicle and the count on the display decreases. This count is updated through the signals sent by IR sensor to arduino whenever it detects the presence of a vehicle in front of it. The sensitivity of IR sensor can be adjusted manually. The basic working model consists of four slots in total, two of which facilitate offline i.e. the traditional parking and the remaining two cover the online booked slots. The IR sensors are present in the offline slots which on detecting the presence of a vehicle sends signals to the Arduino Uno which in turn updates the count on the 7-segment display.

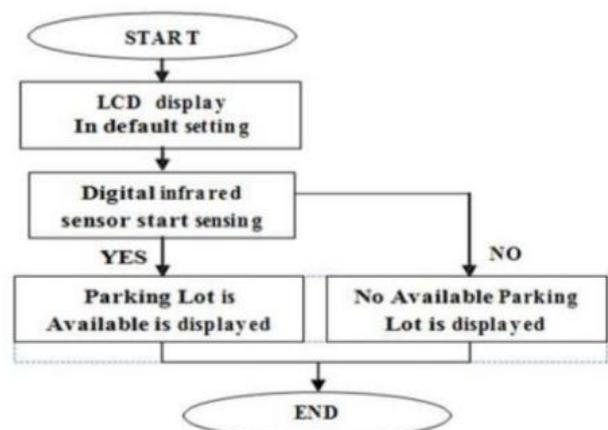


Fig -1: Flowchart

3. SYSTEM IMPLEMENTATION

1.1 Components Used

Arduino Uno - It is a single board microcontroller used to build various digital devices. Various product designed using Arduino are open source. It has various microprocessors integrated to it.

IR Sensor - An infrared sensor uses infrared rays to detect objects. It emits infrared radiation to sense its surroundings. The basic concept of IR sensor is used as an obstacle detector, it does this by emitting an infrared light which bounces off an object and the signal is received by the initial receiver.

Servo Motor - It is an electrical device that is used to rotate objects at a specific angle or with some specific degree with precision. An AC powered motor is an AC Servo Motor and a DC powered motor, DC Servo Motor.

Seven Segment Analog Display - A seven segment display is the most basic electronic display device that can display digits from 0-9. They find wide application in devices that display numeric information like digital clocks, radio, microwave ovens, electronic meters etc.

1.2 Working

When the driver reaches the parking spot his OTP is checked by the person in control of the parking site, after the authentication the person in charge opens the gate through a servo motor. The driver now moves to the particular parking slot, once the vehicle overlaps with the slot the IR sensor now detects the presence of a vehicle and sends IR signals to the arduino which reduces the count of the number of parking slots available. This particular piece of information is now relayed with the help of 7-segment display. The system provides real time updating on the status of the parking slots all over the city with the help of the internet.

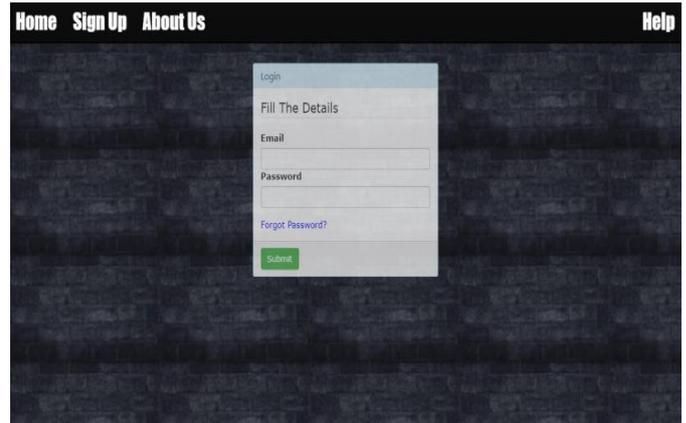


Fig -3: Login Page

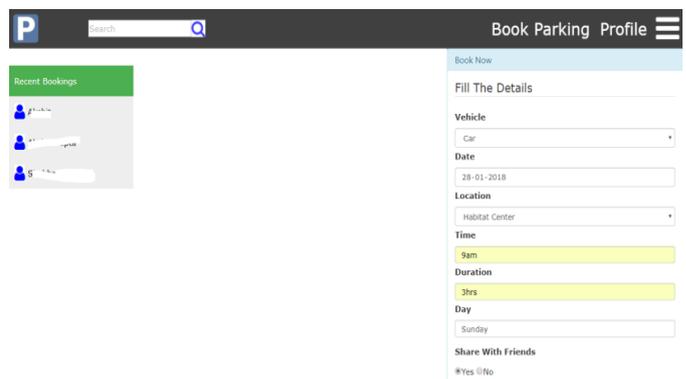


Fig -4: Dashboard (Booking Page)

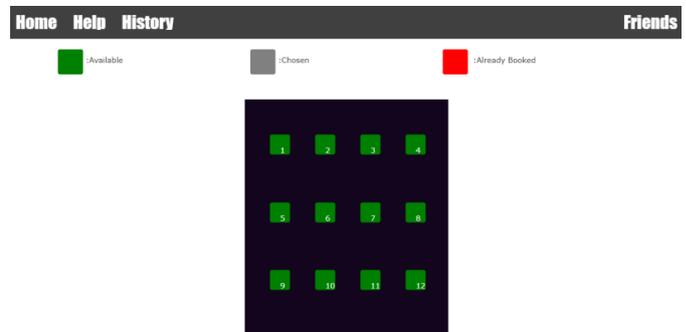


Fig -5: Slot Availability Page

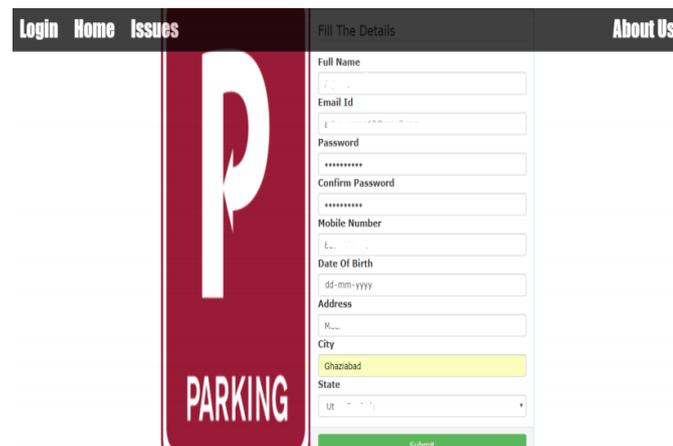


Fig -2: Signup Page

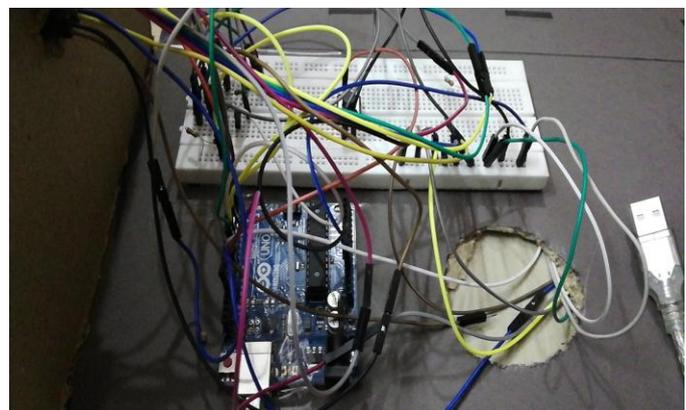


Fig -6: Arduino Uno Connectivity

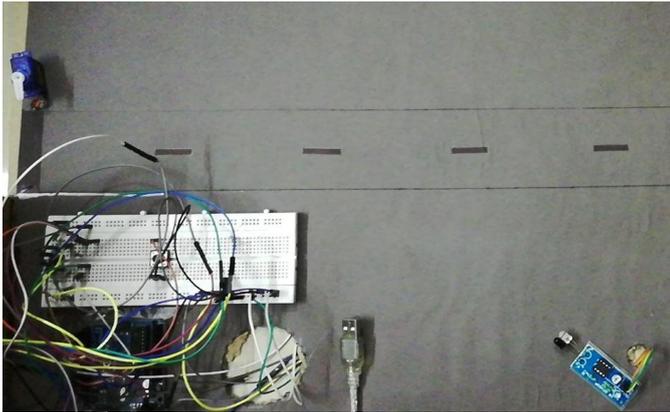


Fig -7: Traditional Parking Model

3. CONCLUSION

We can hereby conclude that this system provides a very efficient and comfortable way of dealing with parking problems that people are facing in their day to day life and tackles the conundrum of systematic parking and congestion saving both time and money. Using this methodology and strategy we can help alleviate the stress and confusion that a driver has to face in order to an easy enough task as parking his vehicle.

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