

Online Parking reservation: IOT based

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Abstract: Number of vehicles are skyrocketing in India due to increase in population and easy lending standards. This has caused imbalance in the number of vehicles and parking spaces available. Specially during the rush hours, it becomes difficult for the people to find parking spaces in the metropolitan areas. This leads to increase in the traffic and indirectly an increase in the pollution. The main purpose of this project is to automatize the existing manual based system with the help of IR sensors, QR scanning and an android App. It helps the user concentrate on driving rather than looking for parking spaces all around and wasting fuel. It also helps the organization keep updated and computerized records of the parked cars. The app will help the clients book their spaces in advance and also on the spot. The routing of map will show them the available spaces near their location. The applied algorithm will help achieve a time-effective and facilitate traffic network and will reduce the traffic thus decreasing pollution too.

Keywords: Slot booking, Android App, Admin Management, Real time Database, QR Code scanning

1. Introduction-

Searching for vacant parking spaces in a metropolitan city especially during rush hours can be a very tedious work. It can also lead to traffic profusion and increase in pollution which has become a big concern nowadays. Our app helps provide exact position of the free slots and scan the QR code which collects and stores all the data into database. It reduces time consumption and also parking issues. According to the times of India survey, 60% of drivers on road feel anxious and stressed due to the road concession. This paper introduces a smart parking system to avoid all these.

1.1 Existing system-

In the existing system, parking problem has become ubiquitous and is growing at an alarming rate. All the work is manually done which results in no maintained records of the parked vehicles. It consumes time and fuel too. And saving fuel has to be one of the main motives for doing this. It takes hours to find one free parking slot in the metropolitan areas which results in wasting time.

1.2 Proposed system-

The proposed system obtains information from the app. It asks the mobile app end user to fill their information and it is directly stored in the database. The additional security feature is the QR scanning. The end user can book his slot once the user is 1.5km in the radius of the parking area where he wishes to park. It is valid till 1hr. Once the user reaches, the user has to scan the QR code which opens the parking barrier and lets the driver park the car. While exiting he has to again scan the QR code which helps the app to update the slot as free for next booking.

2. Literature Survey-

2.1 State-of-Art-Parking Management-

Comparisons of many Parking system has been done in the past decade due to increasing traffic and parking issues. We have well researched about the topic and found some limitations in the previous projects. In the subpart we will explain how we overcome the limitations and worked on them.

2.2 Simultaneous storage of information-

Here, we help the user find the nearest parking area. That parking area gets an unique code which is further scanned by the scanner. This helps decrease the manual work and reduces traffic on the same time. It updates the google spreadsheet and saves the database which can be checked by the admin only using admin app.

2.3 Traffic issues-

Looking at the previous research papers we tried to overcome the issue of time management between the reservation and reaching to the particular parking space. The end user can book the slot only when the user is within 1.5km radius of the parking space and is valid for 1hour (till the user reaches the parking space).

3. Methodology-

3.1 Acquisition of the essential raw data-

We collected raw data regarding the architecture of various cities and their available parking areas in those cities. Once the raw data is collected it is then processed in the form of maps. These maps consisted of all the locations in the city where parking spaces were to be assigned.

3.2 Building the admin software app-

The admin app is designed in such a way that the admin can add as many locations as he wants to. Only the admin has the authority to add locations of the parking spaces and surface them to users. As the admin opens the Parkspot App, he is asked to enter the latitude, longitude and unique ID of the place to be generated. One he presses the submit button he is taken to the next step which comprises of QR generation for the same location, place marker on the map and creating the database. Once this is done a new location is added in the app that users can use.

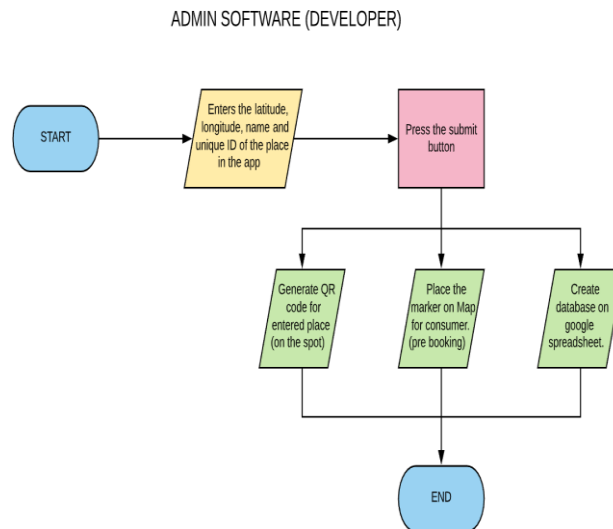


Fig-1: Flow chart of Admin Software (Developer)

3.3 Building the user app for on the spot booking-

The admin app is designed in such a way that the people who would want to book for on the spot parking or would want to pre book the parking spaces, both the facilities could be available. Once the user registers on the app, the user can select the on the spot booking. Once he selects the on the spot booking, the user is asked to scan the QR code. This asks him to verify his mobile number which is further stored into the database. A parking space is allotted if it is available and the end user can park the vehicle after the QR code is scanned and servo motor opens the parking barrier. Scanning the QR code assures the users database has been stored and gets updated once again when the user exits the parking area.

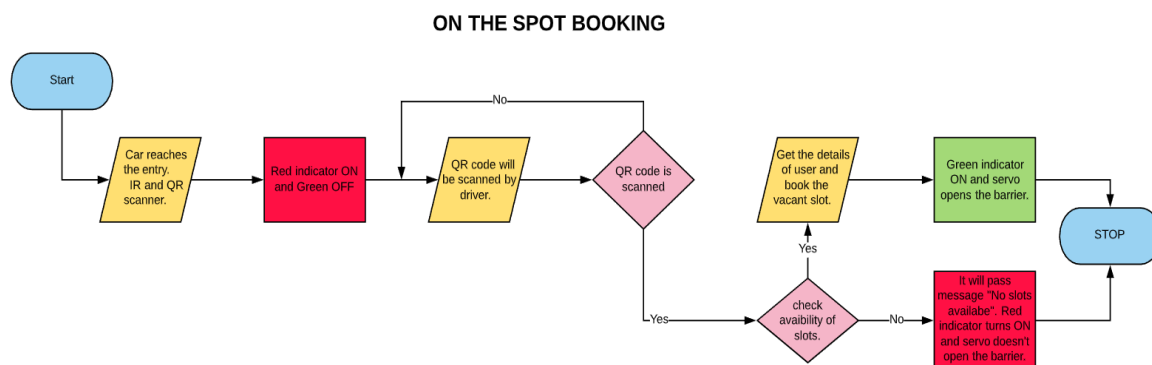


Fig-2: Flowchart of on the spot Booking (Hardware)

3.4 Another option for pre-booking inside the app-

This option was specially designed to control the chaos and traffic around the metropolitan areas. Once the user enters his details, he is asked to move the marker of parkspot to the location he wants to park his car in. This is only available if he is in the radius of 1.5km of the location. Once he selects the location is showed the slots available. If the slots aren't available the pop-up reads "No slot available", else he can select the slot and confirm his details. The pop up further reads "you've successfully booked".

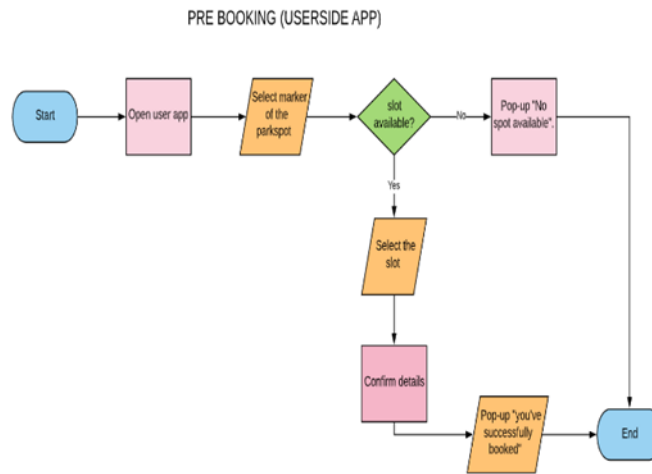


Fig-3: Flowchart of pre booking (user app)

3.5 Online webpage for booking-

The webpage is designed for the developers. This helps the admin to keep track on the parking areas. The admin can open the page anytime and can check the number of vehicles parked and registered in the day. The admin has to only enter the date to see all information available on parking spaces. The admin can also check the details of the parked vehicle and the driver’s mobile number. This way the admin can keep a track on the vehicles and the drivers who are using the app to login and book the parking spaces.

4. Results and discussions-

The architecture of our system is that we have connected IR sensors and servo motors with the main board which is raspberry Pi 4. Raspberry pi 4 is a series of small single board computers. It has USB 2 as well as USB 3 ports. It has both inbuilt wireless networking and Bluetooth. The IR sensors are placed at the parking area with the led lights. So, the IR sensor will detect if a car is parked in the spaces and update the same in the developer app. The servo motors are also connected to the board. Once, the car reaches the entry point and QR is scanned, the servo motor opens the barrier. The other servo motor is kept at the exit. When the car is detected the servomotor opens the barrier and then the app is again updated through firebase.



Fig-4: Model Implementation of Park Spot

5. Conclusion -

This paper presents a smart parking system. The struggle of finding a parking space in the metropolitan areas will be eliminated through the proposed system. Consumers will save time through this system and the organisations will be able to keep an updated

and secured information of the consumers parking in their area. Our online booking system will also alleviate traffic congestion and pollution in the cities.

6. Future scope-

In the future, we can work on image processing to detect the cars. As we used the Raspberry Pi 4, the future scope of image processing will be easy. We can install a camera with better quality and overcome night vision problem. In future zeebee protocol can also be used for communication with raspberry pi.

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