IOT BASED SMART PARKING SYSTEM WITH REAL-TIME BOOKING APPLICATION

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Abstract— *This paper proposes a system for parking reservations in a private car parking field in an urban metropolis. The proposed system design can be used to eliminate unnecessary time consumption to find an empty parking slot in a car parking field. By this system we address the problem raised by previous studies that shows 15 to 25 percent of fuel wastage in cars stuck in traffic is caused by wondering around for finding car parking slots.In this proposed system the reservation is done only by the user using online smartphone application. Hence the user find the empty parking slot and can reserve parking slot as per their preference using an android application through internet access. Check-ins and check-outs will be handled in a rapid manner simultaneously authenticating users to avoid long queues of cars causing traffic jam. Thus, making it convenient for the users to set their own likely parking slot based on the time and cost function at the same time increasing the efficiency of land and traffic management in an urban metropolis area.*

Index Terms— I/O and Data Communications, Data Communications Devices, Performance Analysis and Design Aids, Hardware/software interfaces, Data communications, System integration and implementation Redundant design

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1 INTRODUCTION

Present day's getting a parking space in urban areas is very difficult in peak hours due to unorganized parking spaces. Due to this drivers are stuck in traffic or looking for parking spaces around the location making traffic congestion. This causes waste of fuel and time. So for the convenience of driver a pre booked parking system can be introduced to plan for advance booking based on time slots, for that we proposed the research theory of "Smart car parking management system" using mobile application for Booking Parking spaces espacially for airport or multiplexes. In our proposed system these problems are addressed and resolved by integrating IOTs and RFID for security and real time cloud based application for managing and booking parking space effectively and efficiently.

In urban cities, car parking becomes critical issue with increased population hence increasing the amount of vehicles. A Study showing that in the traffic jam 30% of the cars are looking for parking space and on an average eight minutes' time is required to find specific parking space. This results wastage of fuel, money and time. With great revolution in IOT brings flexibility to the user, it will provide parking availability and maintaining registered drivers database for security and for online payments.

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2.1 ANALYSIS AND DESIGN

The main challenge in the smart parking development is the analysis of real-time data to make an urgent action for allotment of parking space. Enabling smart parking management give benefits to the citizens as well as managing parking for municipal corporations, such as it helps citizens to save their fuel and time by efficiently managing the route to reach the destination by parking in the pre booked parking slot for a certain period of time, as well as to protect themselves from theft by providing a confined

parking space for registered users.

2.2 METHOD

To address the related issues, this prototype is developed using sensory circuits, RFID and IoT.
RFID is used here to detect the car details.
IR sensor is used to find whether the slot is empty or not.
IOT is use to remotely access the generated data and load it to cloud storage.

2.3 FiNDINGS

This system helps user to find parking space availability with the help of Internet of Things (IoT) technology by providing status of parking slots. The database of the parked vehicles is maintained through a shared server. A real time mobile application provides a platform for the drivers to book the slots in advance and the parking information is then updated in server.

2.4 APPLICATIONS / IMPROVEMENTS

The proposed prototype of the parking system includes less human interaction hence increasing the time consumption, flexibility and security. This system is deployable in airports, multiplexes and confined parking spaces, so there is a great possibility to take steps to implement this system on metropolitan level by creating a centralized parking system for a metropolitan area in order to move toward the concept of smart cities and integrating IOT's and RFID's to create a society based on automated systems for citizens.
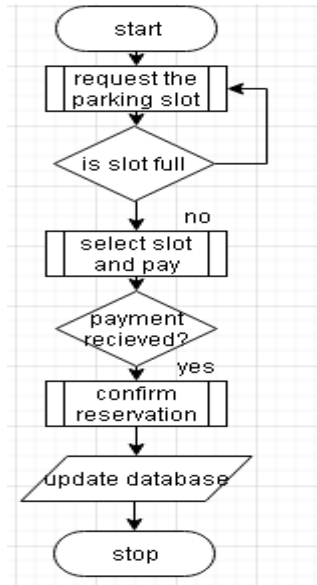
3 IMPLEMENTATION

This system consists of different modules to perform parking management. The modules are divides into 'online booking', 'parking entrance and authorization system', and 'parking exit and payment system' and
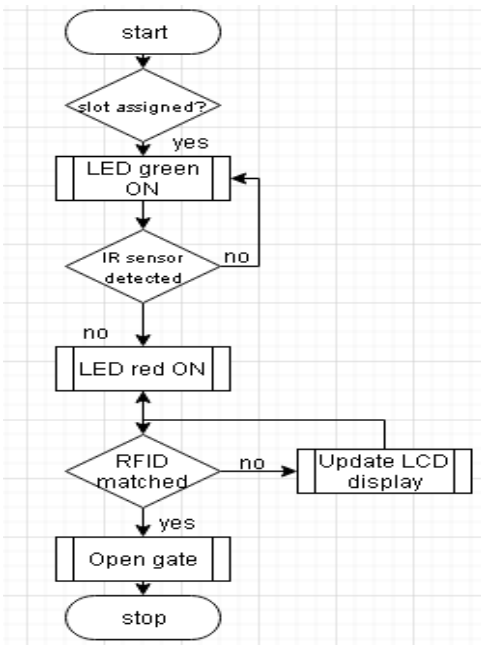
'parking management system'.

3.1 ONLINE BOOKING

Parking slot can only be booked using mobile application prior in time. Request for parking is made against the available slots data which is generated through RFID and is stored in cloud storage. If an empty slot is booked than online payment is made after which the confirmation of booking is generated for the certain time period. The booking procedure is given in below flow chart.

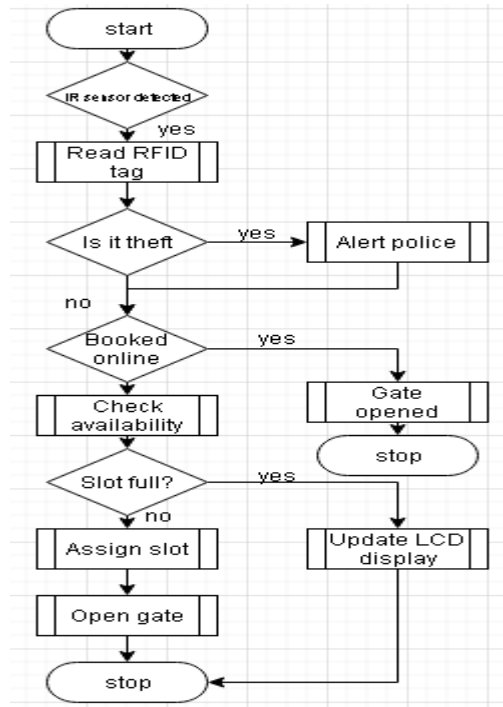update database

3.2 PARKING ENTRANCE SYSTEM

This parking entrance system a complex circuitry sync together including IR sensor, DC motor, LCD display and a RFID reader. IR sensor is used to sense whether parking

slot is empty or not, DC motor is used to open the barrier after authorization of car and booking details. RFID reader is used for the detection of incoming car details like number plate, owner name etc. The LCD display is used as the dashboard to show the allotted parking slot and parking status also. This allotment details continuously updated by IOT and is transmitted to database through which it is also updated in the real time booking application. The data flowchart is as follows
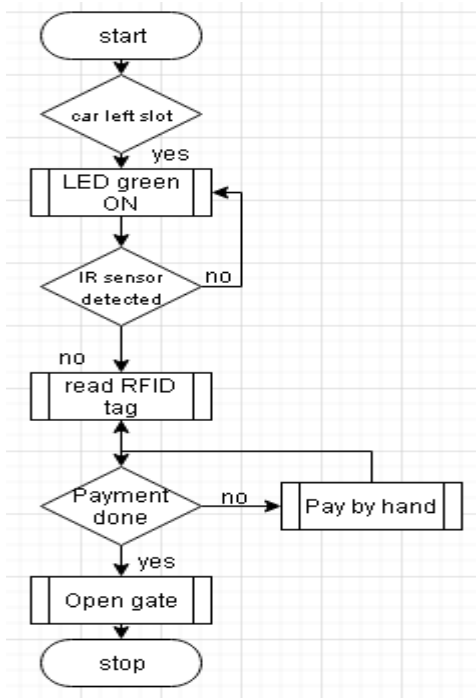
3.3 PARKING MANAGEMENT SYSTEM

Parking Management System module provides directions to the owners to their specified parking slots. Here each slot allotted by one IR sensor paired with, one RFID reader, three LEDs. Primarily it will check if the slot is empty or not, if it is empty then LED green turns 'ON'. If any car entered in the parking slot then IR sensor detects it and LED red turned 'ON' referring that the slot is assigned. This data is continuously updated in database. The flowchart is as follows

3.4 PARKING EXIT SYSTEM

he parking exit and payment system contains peripherals similar to parking entrance system. If the car left from the parking space, then the IR sensor sends the signal and LED green turned 'ON' and at the same time LED red turns 'OFF'. At exit, the RFID scans the car details and shows their payment details. Payment is done before hand through user specific credit details, after the payment settlement is done gate opens and then the updated status data is uploaded to server.

4 USER INTERACTION AND APPLICATION

Below are the steps that a user takes inorder to register and book the parking space.

Step 1: Download the smart parking management application on smart mobile device.

Step 2: With the help of the mobile application search for an specific area for parking fields.

Step 3: Browse through the various parking slots available in that parking field.

Step 4: Select a particular parking slot for the specific time using graphical user interface similar to cinema seats booking application

Step 5: Select the period of time (in hours) for which you would like to park your car for.

Step 6: Pay the parking charges either via ewallet or credit card.

Step 7: Once you have successfully parked your car in the selected parking slot, confirm your occupancy using the mobile application.

5 FUTURE ADVANCEMENT

Following are the aspects which can be improved in both software and infrastructure aspects.

PLATFORM INDEPENDENCE. Platform can be compiled on several different hardware platforms to alter the applications of the system for custom purposes without platform dependent configurations

EXCHANGEABILITY. Components can be exchanged with other implementations without affecting the existing system. Moreover, to increase the scope of the system both generic components and highly optimized platform-specific components can be used simultaneously.

SCALABILITY AND EFFICIENCY. This research can be improved, and many other implementations can be inte-

grated in the existing system in order to utilize the system for mass custom parking and booking management applications

6CONCLUSION

The main intention of this research is to step further is the evolution of smart city by developing a smart car parking management system using Internet of Things. IoT is the current trending area in technology which will be the foundation for the concept of future smart cities, used to access the information remotely. Present days everybody uses smart phones and internet, so online booking provided solution to the predicting parking space issue and user can pay parking fee online. RFID technology is used to detecting the car identity within fraction of seconds and the issue of theft recovery can be done and prevented in future

The parking management provided solution to the perfect parking and reduces resources on finding a parking slot. This system can be employed in airports, multiplexes and corporate offices and eventually implement in the concept of smart city.

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