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RFID Based Smart Car Parking System Using Iot

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Abstract: Now days the use of vehicles is increasing day by day, the major problem in densely populated areas is lack of parking availability. The RFID technique is the mostly used technique to overcome or eradicate the cause. The existing technique of RFID concept is to check the balance amount in the card rather than finding the availability of parking lots at remote location. The major disadvantage in this existing methodology is tracing the amount deducted and it varies from time to time on various slots. Hence we provide a solution i.e., by this proposed method we ensure an efficient monitoring systemthat allows for tracking availability of spaces in parking areas in remote areas like malls, parks and other public places as well. This project forecasts all the possible ways to reduce parking tension. This project aims at interfacing RFID concept with Internet of Things (IoT). IoT establishes a client server communication that enables the user for remote communication regarding availability of parking slots from distance. In order to enhance a mobile friendly environment an website is being developed that gives prior information to the user about the availability of parking slot and thereby enabling them to book the slot for parking from a distance and the slot remains booked for a period of half an hour there by waits for the user to arrive until the specified time is reached. When the time exceeds, the user needs to book the slot again if available. This ensures minimization of traffic constraints in parking areas. This can be implemented in shopping malls where usually traffic problems arise due to lack or unavailability of parking.
Index terms-: arking slot, RFID, IOT, Web Server

I. INTRODUCTION

The metropolitan areas have seen an enormous growth in human population as well as in transportation and movement of vehicles. With shrinking spaces, operating a busy & expensive parking lot having multiple gate scan pose a significant challenge. The parking area has to be secure, with barrier-enforced entrance and exit. With larger number of families exceeding the total number of vehicles, the parking scenario is falling short of the current requirements in the country.

In context to urban transport system, as the use of number of motor vehicles in transport systems went up, the issue regarding parking is one of the major concerns in terms of space occupation. In United States rising traffic issue is an irresistible one, so that they have planned to reduce traffic to automate parking system by delivering prior information to the user using an web page.

With RFID vehicle tracking system there is high identification accuracy, parking areas or gated communities can manage their vehicles efficiently without human intervention as well as easy in-and-out access for drivers and with low deployment and operation cost. RFID's also offers a solution for parking peoples as they require the ability to monitor and record not only access and exit to parking facilities but also log and bill back parking charges by customer.

In this study we design a Smart Parking System (SPS) which enables the user to find the nearest parking area and gives availability of parking slots in that respective parking area. Thus it reduces the fuel consumption which in turn reduces carbon footprints in an atmosphere.

II. EXISTING METHODOLOGY

The existing methodology aims to use Radio Frequency Identification (RFID) technology in automation of vehicle parking system in mall/building. This project also provides an efficient and an alternative method to coin operated meters to pay and display tickets. Simple and cost effective to implement this project as it is a standalone system or alongside traditional parking payment systems to eliminate fraud and reduce cash handling.

An Smart Parking System (SPS) which enables the user to find the nearest parking area and gives availability of parking slots in that respective parking area.And it mainly focus on reducing the time in finding the parking lots and also it avoids the unnecessary travelling through filled parking lots in a parking area. Thus it reduces the fuel consumption which in turn reduces carbon footprints in an atmosphere.

Developing an android app enables to create a mobile friendly environment so that allocated and remaining parking lots can be easily viewed from distances so that accumulation of the traffic in a particular area can be avoided. The idea behind this Android Application is to help the user analyze areas where parking is available and number of slots free in that area and enables them to pre book the slot.

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III.   DRAWBACKS OF EXISTINGMETHODOLOGY

A. Priority on booking of slots is not enabled so the booking of slots for multiple users at the same time is not configured.
B. Pre-booking of slots which minimizes the traffic cannot be established with the help of only RFID concept and specific amount is not clearly configured.
C. User friendly application but the payment access gateway is a major drawback.

IV.   PROPOSED METHODOLOGY

The proposed methodology interfaces RFID technology along with the IoT and with a website. In this project, an SPS with IoT is a one which enables the user to find the nearest parking area and gives availability of parking slots in that respective parking area has been designed. And it mainly focuses on reducing the time in finding the parking lots as well as avoids traffic at a particular area. A webpage is being designed that regulates the number of cars to be parked on designated parking area.

Website associated with the server enables the user to analyze areas where parking is available in the user's mobile or computer or any devices it shows the number of slots free in that area. Additionally, half an hour prior to his arrival, the user can pre-book a slot in the area he desires if it is available. It enhances the slots availability to the user so that they can book the slots and park the vehicles.

After reaching the slot every driver owning the vehicle parking card also known as the RFID tag should show it in front of RFID reader. This card contains the parking information. The RFID card readers will be fixed at the car parking centers. If a person wants to park his car in the parking center, he has to show his parking card before the reader before parking. The reader reads the in time of the car and passes the data to the Raspberry pi 3 which in turn sends the data to the web server. When the car exits out from the parking center, the driver once again has to show his card so that the reader records the out time now. The time of in and exits enhances the card to detect the amount.
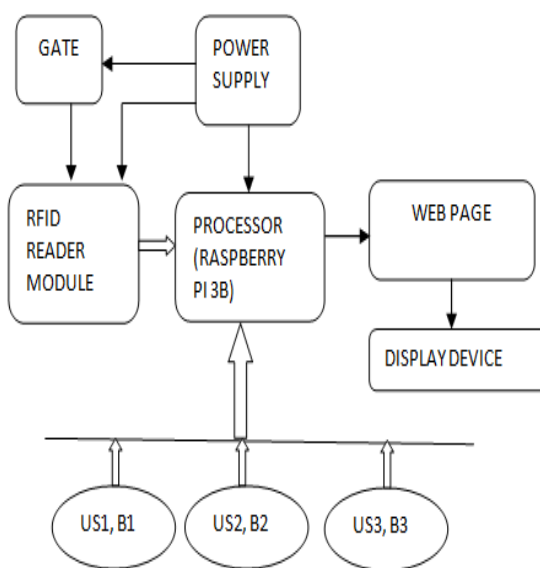
V.   BLOCK DIAGRAM OF THE PROPOSED SYSTEM

Fig 1: Block diagram of proposed system

VI.   IMPLEMENTATION OF THE PROPOSED SYSTEM

A. *The process is implemented in four stages*
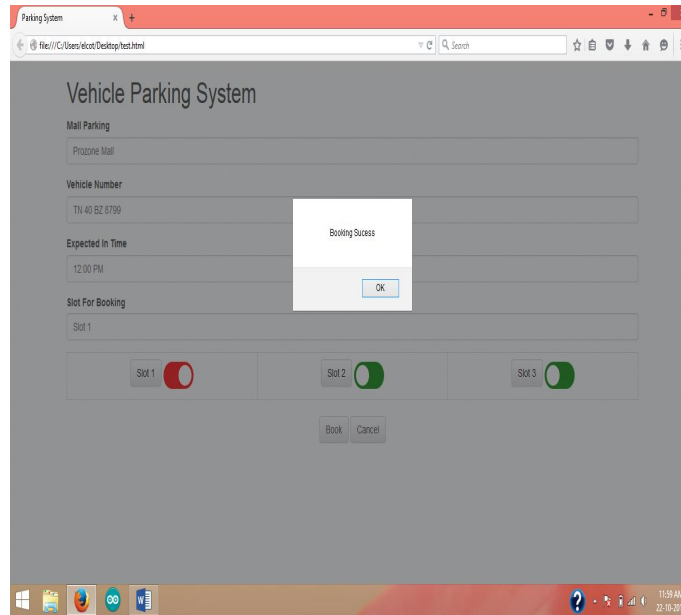1) *Step 1:*The user can check the status of parking availability in the web page through the web page access.

Fig 2: Slot Details

2) *Step 2:* login process is done a display is shown to the user that this slot is specified to him/her and a slip is generated with the above mentioned details.
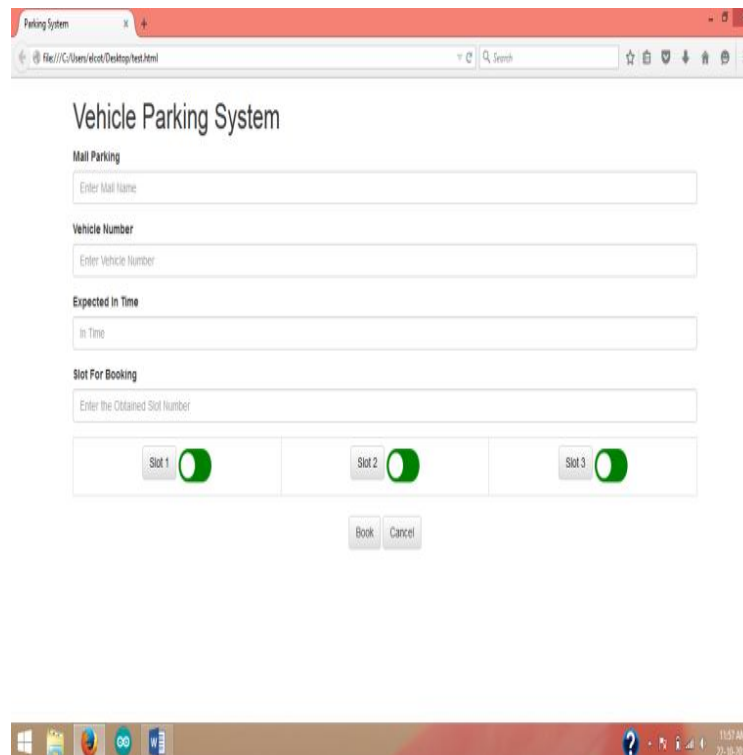

Fig 3: login details

3) *Step 3:* After providing the specific slot for the car parking then the user is given with the activated RFID tag. When the RFID tag is activated then the timer is activated. The timer runs till the activated RFID tag is deactivated.
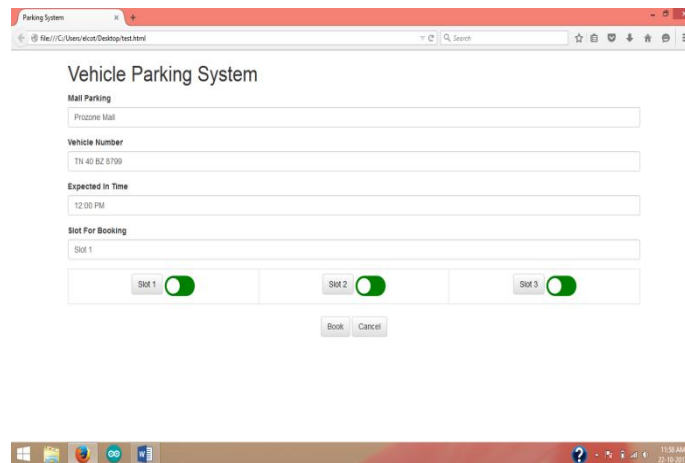
Fig 4: Booking/Clearing of Queue.

4) *Step 4*: Once the parking data is to be closed the car is moved to the exit and the RFID tag is returned to the operator and the tag is closed at the closing the time is noted and based on the time the charge for parking is generated.
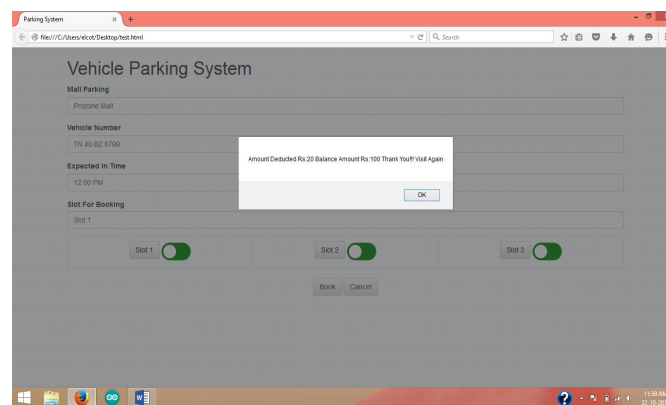

Fig 5: Closing Display

Step 5: After the arrival of the vehicle in the parking area the user has to show their own RFID tag that acts as a gate pass for the entry into the slot to park the vehicle. The raspberries pi 3 checks for the availability of balance in the tag. If balance exists the gate driven by the motor opens and then the slot booked by the user will be correspondingly occupied. If there are nil amounts in balance then the gate will not be opened then the user needs to recharge to park the vehicle in the slot.

VII. FLOW MODEL OF THE SMART PARKING SYSTEM

When the system is switched on the process flow starts In the parking system at the time of entry when the user enters, operator checks the server whether the slot is available or not. When there is availability the operator obtains the required details from the user and books the slot and provides the RFID tag after swiping it in RFID reader module. Meanwhile the timer gets on & the ultrasonic sensor is still on. After RFID is enabled the gate open and the car is parked by the user. When the user is parked in correct slot the sensor is loaded and buzzer is in off condition. In case of parking in wrong slot the ultrasonic sensor is unloaded and buzzer is turned on and message is provided as "WRONGLY PARKED". At the time of exit the RFID is turned off so then the ultrasonic is again loaded by their exit the required balance is detected from the amount and the process end.

IoT concept interfaced establishes a client server communication that ensures long distance communication from remote location and additional features of it along with web page creates a mobile friendly environment creating less tension environment by the method of pre-booking the available slots.
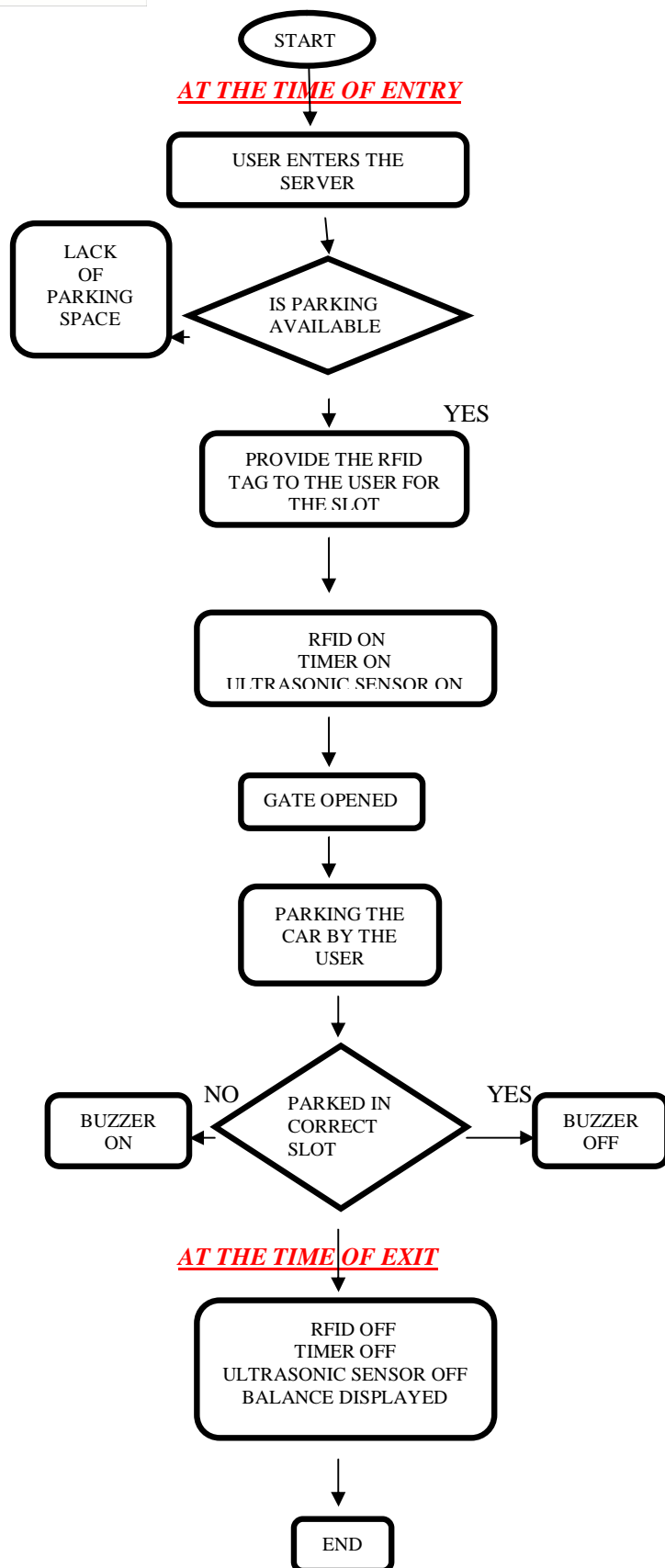
Fig 6: flow chart of smart parking system

IX. RESULTS AND DISCUSSIONS

Parking slot allotment implementation using IOT concept for smart car parking are as follows:
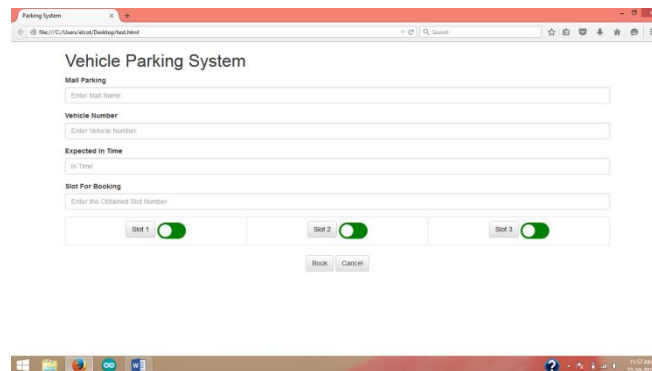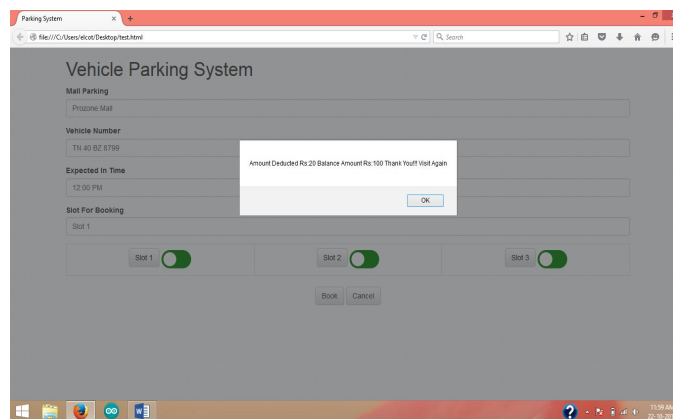

Fig 7: empty parking slots

Fig 8: filled parking slots

X. APPLICATIONS

A. It is an efficient system for car parking which prevents traffic congestion.
B. Can be implemented in mall, hospitals and multi store building.
C. Provides large scale parking system.
D. The processing time can be made short and easily configured.
E. The booking becomes easier and the payment also manual so no need to worry about the online transactions.

XI. CONCLUSION

This project implements an IoT based smart parking system, which overcomes all the problems of existing parking system. This design suggested is simple, economic and provides effective solution to reduce carbon footprints in the atmosphere. It is well managed to access and map the status of parking slots from any remote location through client server. Thus the time of parking for the users becomes easy and they haven't to move in non-parking availability areas in the city. So it reduces time and it is cost effective also. The development of reservation for parking slots commanded by web page server proves to be a solution for demanding traffic issues. The proposed system reduces the driver's effort and time to search parking space. Also the RFID interfacing to IoT avoids the need for the presence of human operator at the gate. Booking option makes the user to experience a tension free zone and allocation is purely based on the time interval for duration of half an hour. When the time exceeds the slot needs to be booked again if available. It helps the administration to allocate the vacant slot to the next person. The booking of parking slots is allocated based on slots priority. Thus reducing traffic as well as pollution to greater extent. Thus the proposed Smart parking system proves to be the best solution for all traffic related issues.

XII. FUTURE WORK

A. Our future work is to create car parking system to work as an operational platform in a smart city.

B. The relevant management and control entities, including a highway Centre, emergency Centre, traffic control Centre, and police can get access to the information managed by the car parking information Centre with high authority.

C. The sensors deployed in the car parking area periodically send updated information as regards occupancy of the car parking lots to the car parking meters, which push this data to the information Centre.

D. Users can interact with the system by installing the corresponding car parking application on their mobile devices.

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