

COMMERCIAL CAR PARKING AND RESERVATION SYSTEM

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ABSTRACT

Parking Guidance System (PGS) guides the driver to an available free parking space. The system consist of Wireless sensor network(WSN) based Vehicle detection subsystem(VDS) and management subsystem, where VDS detects vehicle and collects information about the free parking space and management subsystem processes parking lot by controlling VMS and regulating for reservation of parking lot. In this paper we present PGS based on WSN and architecture of PGS from hardware platform to applications software .The result succeed in detecting different vehicles and also battery-life time was measured.

Key Words—Parking guidance system (PGS), Wireless sensor network (WSN), Internet of things (IOT), Global system for mobile communication (GSM).

1. INTRODUCTION

As we know nowadays almost every one in the cities owns a car. Because of this increase in automobile population, finding a free parking lot in their office premises or elsewhere is becoming a tedious task. One has to go round about the parking lot to find a free space. Because of this exercise, people generally loose their patience and also leads to huge traffic jam everywhere. Most of the existing parking management systems rarely address the issues of parking space management, vehicle guidance, parking lot reservation etc. Our aim of this project is to develop a GSM Based automated car-parking instrument, which could clearly indicate the driver where there is a free space available. Our aim is to incorporate a GSM based automated parking system, where the driver can send a SMS or Call that particular parking lot, the driver can book his parking lot. The driver will be intimated back with the parking lot number and the location to park his vehicle. Once in every 5/10 minutes (user programmable) the parking lot will be freed if no vehicle is parked and the same will be intimated to the driver who has reserved a parking lot.

2. EXISTING SYSTEM

The major parking lot problems like Difficulty in Finding Vacant Spaces Quickly, finding a vacant space in a multilevel parking lot is difficult if not impossible, especially on weekends or public holidays. Finding spaces during weekends or public holidays can take more than 10 minutes for about 66% of visitors. Stadiums or shopping malls are crowded at peak periods, and difficulty in finding vacant slots at these places is a major problem for customers. Insufficient car park spaces lead to traffic congestion and driver frustration. If a car is parked in such a way that it occupies two parking slots rather than one, this is called improper parking .Improper parking can happen when a driver is not careful about another driver's rights and there is a chances of revenue leakage and results in loss to parking lot owners.

Limitations Of Existing System

- * None of the system is providing the information of each car (plate number) for security purpose.
- * The system do not assign car to a specific parking lot and this result in roaming of cars inside the area in searching of parking space.
- * Some of the system does not synchronize the free parking zones after the vacation of vehicle.
- * Manipulation of bills can be done.
- * Poor guidance for parking a vehicle.
- * It is time consuming.

3. LITERATURE SURVEY

Recently, with the explosive increase of automobiles in cities, parking problems are serious and even worsen in many cities. This paper proposes a new algorithm for parking occupancy detection based on the use of anisotropic magneto resistive sensors. Parking occupancy detection is abstracted as binary pattern recognition problem. According to the status of the parking space, the recognition result contains two categories: 1) vacant and 2) occupied. The feature extraction method of the parking magnetic signal is proposed. In addition, the classification criteria are derived based on the distance discriminate analysis method. Eighty-two sensor nodes are deployed on the roadside parking spaces. By running the system for six months, we observed that the accuracy rate of the proposed parking occupancy detection algorithm is better than 98%.

Acoustic sensors, such as a microphone array, can collect aero acoustic signals (i.e., passive acoustic signals) to identify the type and localize the position of a working ground vehicle. It helps to improve the performance of localization and tracking. The acoustic signal of a working vehicle is complicated. It is well known that the vehicle's sound may come from multiple sources, not only exclusively from the engine but also from exhaust, tires, gears, etc.

4. PROPOSED SYSTEM

This paper proposes a Smart Parking System using GSM Technology which provides advanced features like remote parking monitoring, automated guidance, and parking reservation mechanism. If anyone wants to reserve a parking slot by sending SMS to the parking area or by using an android application, in the parking area the GSM modem gets the message and feeds it to the microcontroller using UART communication. The SST89E516RD2 microcontroller processes the requested message and it will check the availability of free parking lot using an IR sensor. If the parking slot is available, the microcontroller replies with slot number, password, and time to be arrival to parking area; else, the controller replies with unavailable status to the requested mobile number using GSM technology.

We are using a Q-R code generation algorithm to generate Q-R codes. When a customer confirms their booking of parking lots, a unique Q-R code is generated and sent to customers over the internet. This Q-R code will be used as a token or ticket to enter the parking lot. At car parking lots, there will be a Q-R code scanner which is used to scan the customer's Q-R code; if the Q-R code is valid, then only the customer can enter into the parking lot area.

We are also proposing an automated gate control system and E-wallet. An automated gate control system helps in reducing human effort and the gate will open only after verifying the Q-R code; if it is valid, then only the gate opens. This results in more secure and safe parking systems. An E-wallet option is used for payment methods. An E-wallet option made payment methods easier and it provides a bidding option so that the customers can bid their required parking areas, in weekends or public holidays when there is more number of vehicles in the areas like shopping malls, stadium etc. This results in easy and fast booking of parking lots. After the booking of parking lots, the amount to be paid by the customer for parking, which will be calculated automatically, depends on the parking area and time.

Advantages:

- * Provision for reserving a parking slot.
- * Fast and easier method to book a parking slot.
- * Automatically cancellation of the reservation after certain time (2Min).
- * User-friendly interaction system.
- * Avoids revenue leakage.
- * More Secure and safe.
- * Wireless interface between the customers and the System.
- * Cost effective.
- * Secured transaction using Q-R code.
- * Efficient way of guiding.

5. DESCRIPTION

Each parking lot is provided with a vehicle sensor. If the sensors are inactive, it means that particular parking lot is free for parking. The indicator light will blink in series where the driver can follow those blinking lights, which leads him/her to the free parking lot. Once the car is parked, a displayed provided updates that the

particular parking lot is occupied. And the corresponding indicator light is switched off, to indicate that the lot is occupied. Any free parking lot will be indicated in this same manner. Once the car is parked the timer starts to count so the security guard can calculate the number of hours the car parked. Once the car moves from that place that particular lot will be marked empty. After which the amount is calculated, the time of entry and exit along with the amount will be SMS to the driver mobile number.

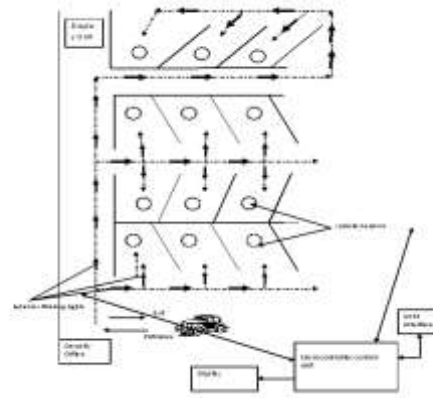


Fig-1: System design of parking system

6. BLOCK DIAGRAM

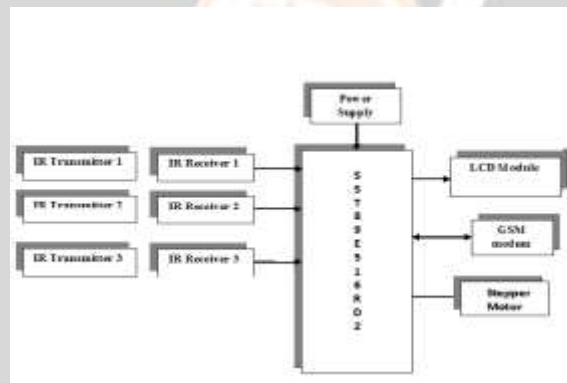


Fig-2: Block Diagram of Car Parking System

Four IR-sensors are connected to the microcontroller SST89E516RD2, which are in turn connected to the respective gates (Ex Enter, Exit...). Depending up on the presence of object at the IR at the gates, the stepper motor is used to open or close the gates. LCD is used to display required messages like available or unavailable slots. GSM module consists of GSM modem connected to the controller to communicate between the user and the module for sending and receiving messages.

7. SYSTEM ARCHITECTURE

The below figure shows the system architecture of the car parking system and it works as follows. This is a Microcontroller based device. The driver has to call or send an SMS to the parking lot booth. The parking lot booth will reply back along with the free parking lot.

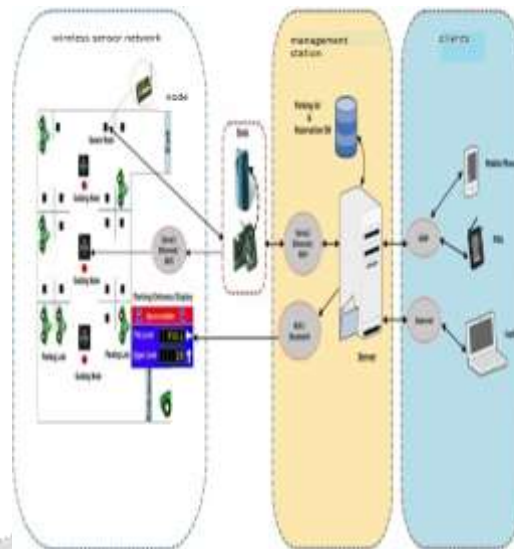


Fig-3: System Architecture

The driver can park his vehicle in that particular parking lot allocated within the stipulated amount of time, if not that lot will be freed for other vehicles. The sensor inputs are connected to the Microcontroller input line, once a signal is sensed for a particular sensor it means the car is been parked at that particular place. The light blink that corresponds to that particular lot will stop blinking to indicate that lot is occupied. And simultaneously the display is also updated and the information is further processed. After the information is processed the time of entry and exit is send through an SMS to the driver along with the duration and cost.

8. FLOWCHART OF PARKING SYSTEM

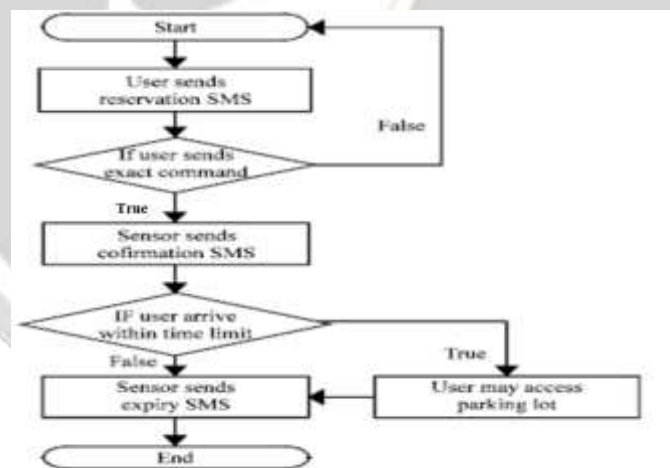


Fig-4: Flowchart of car parking system

The Flowchart begins with the Start. If the user wants to park his car he sends a message to reserve the parking slot through the application created using the GSM technology. If the user sends the exact command and if it is true then the sensors sends the confirmation SMS to the user else it restarts and begins from the start. After the confirmation SMS is received then a timer is set and if the user arrives within the time limit then the user may access the parking slot and park his vehicle else the sensor sends an expiry SMS and the parking slot is made empty and it is reserved for others.

9. GSM ARCHITECTURE

The basic architecture of different cellular standards is the same, their individual components and configuration may differ drastically. Basic components of GSM include Base transceiver station (BTS), base station controller, mobile switching control (MSC) and the variety of registers and network management systems.

The mobile station comprises mobile equipment and a subscriber identity module (SIM) security and authentication or subscriber. The BTS and BSC together constitute the base station subsystem (BSS) and perform all the functions related to the radio channel for speech data signaling and frequency hopping control and power level control. The MSC, VLR and HLR are concerned with mobility management functions these includes authentication and registration of a mobile customers, location updating call setup and release.

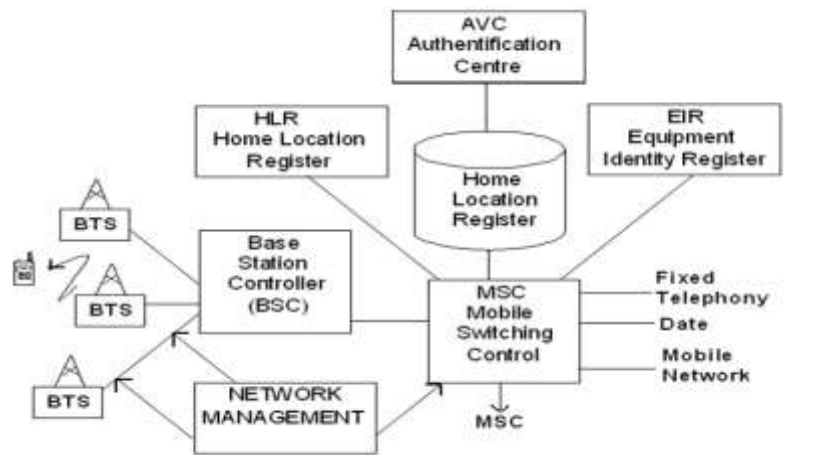


Fig-5: GSM Architecture

The HLR is the master subscriber database and carrier information about individual subscriber numbers. Subscription levels, call restrictions supplementary services and the most recent location of subscriber. The VLR acts as a temporary subscriber database for all subscribers and contains similar information as that in HLR. VLR obviates a need of the MCS to access the HLR for energy transaction. The authentication Centre (AUC) works closely with the HLR and provides the information to authenticator all cells in order to guard against fraud. The equipment identity register (EIR) is used for equipment security and validation of different types of mobile equipment. In particular it monitors and reports faults and performance data besides helping in reconfiguration of network. GSM also defines several interfaces which include the radio interface, the interface between MSC and BSC, the interface for external data device and signaling interface which allows roaming between different GSM networks.

10. WORKING OF SMART CAR PARKING SYSTEM

The steps involved in Smart Car Parking system are as follows:

User registration: To Book a slot for parking ,first user must register their details like name of the user, car number etc. by using android application.

The screenshot shows a mobile application interface titled 'Car Parking'. It features a list of input fields for user registration: 'Customer Name', 'Vehicle No.', 'Contact No.', 'Password', 'E-Mail Address', 'Area', and 'City'. Each field is represented by a dark rectangular box with a light-colored border and text.

Fig-6: User Interface for registration

Select nearest parking slot: After registering user details new window will be opened automatically so that we can select nearest parking area and check the availability status of that parking area.



Fig-7: (a) nearest parking places. (b) parking areas availability status.

Confirmation of booking: Once user selects particular parking slot, he/she get the confirmation of booking in the form of Q-R code and that code is used for verification in parking area .after verifying the Q-R code , if it is valid then only users can park their cars.

Updating the Parking area status: After verifying the Q-R code ,if it is valid ,customer is allowed to park their cars ,after parking cars in a respective slots ,the information will be updated by central processing system so that the number of available slots will be decreased and information about parking area's status will be displayed on LCD display.

Payment : When user is leaving parking slot he/she must scan the same Q-R code which they used for enter to go out also. After scanning Q-R code automatically cost will be calculated and displayed on users interface. The amount to be paid can be collected manually or by online transaction. Once user left the parking area the updated information about parking area will be displayed on LCD.

11.RESULTS

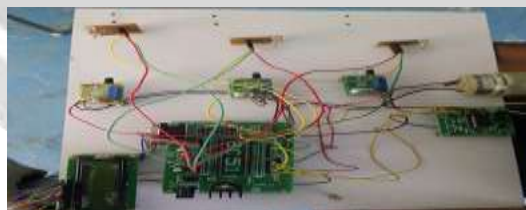


Fig-8: Embedded circuit at the parking section

This paper proposes a system that helps users automatically find a free parking space by using reservation system at the least cost based on new performance metrics to calculate the user parking cost by considering the distance and the total number of free places in each car park.

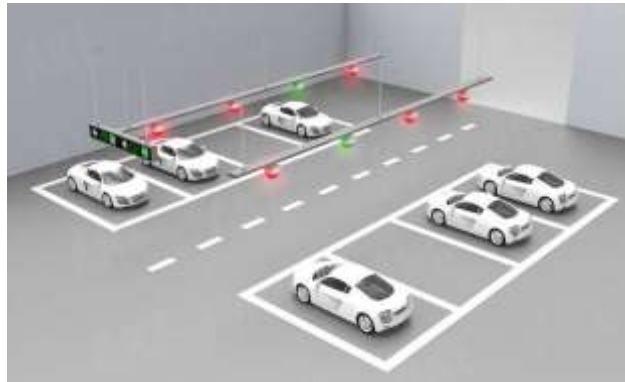


Fig-9: Expected outcome

12. CONCLUSION

In this study, the smart parking system has been presented. From the various examples of the implementation of the smart parking system being presented, its efficiency in alleviating the traffic problem that arises especially in the city area where insufficient parking spaces are undeniable.

With the study on all the sensor technologies used in detecting vehicles, the pros and cons of each sensor technologies can be analyzed. This system helps the user to decrease the wastage of time in searching free parking lot and also improve the parking lot utilization. Although, there are certain disadvantages in the implementation of vehicle detection, the advantages far outweighs its disadvantages.

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