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Car Parking System an Android Approach

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ABSTRACT: Now days with the increase in vehicle production and world population, more and more spaces and facilities are required. In this project a new parking system called car parking system an android approach is proposed to assist driver to find vacant spaces in a parking in a shorter time.

Different technologies are reviewed and compared to determine the best technology for developing this system. This system uses IR sensors to detect the presence of vehicle in parking slot and display the vacant slot. We create the separate application on the smart phone and by using this application we find shorter and easier path to reach the destination with the help of Bluetooth module. Features of car parking system an android approach includes vacant parking space detection, display of vacant parking slots and give direction on smart phone application to move toward vacant parking slot.

This project also describes the use of a parking system in proper and efficient manner from the entrances into a parking area until the finding of a vacant parking slot. This prototype of car parking system an android approach will help car owners to improve their facilities inside car parking area to effectively guide car driver to vacant parking slot inside car parking area. This system is designed in two floors and each floor contains three parking slots and we can extend it as per our requirements. This system architecture defines the essential design features such as location of sensors, required number of sensors and LCD display board.

KEYWORDS: Android Application, Smart parking management, Wireless network, IR sensor.

I. INTRODUCTION

Currently, most of the existing car parks do not have a systematic system. Most of them are manually managed and a little inefficient. The problem that always occurs at the car park is time being wasted in searching for the available parking spaces [1]. Users will keep on circling the parking area until they found a vacant parking slot. This problem usually occurs in urban areas, where number of vehicles is higher as compared to the availability of parking spaces [2]. These ineffective conditions happened because of the lack of implementation in technologies which are available in the market today.

Nowadays many local car parks are built inside shopping mall or multipurpose building to provide parking lot to car driver. Car park inside a building is become popular in many shopping central because it is user friendly and can prevent car from exposing to the sunlight [3]. This type of car park normally poses a parking guidance system that primarily based on the use of message signs to give drivers information regarding parking availability inside the car park. The availability of parking lot inside car park normally is obtained from the sensors that count the number of cars entering and exiting or, in other cases, by comparing the tickets issued at machines. This information of parking lot availability inside car park is generally expressed in terms of full or empty on display board at the entry of car park. The actual number of parking availability inside car park is rarely given.

Every day, hundreds of cars enter the car park and looking for empty parking slot inside car park. Therefore, it is difficult to find out an empty parking slot. Inside most local car park, car drivers still need to find out empty parking slot themselves. They will definitely waste a slot time for searching an empty parking slots if they do not know where they are, especially when there are only a few of empty parking slot available at each row of parking slot. Therefore, it is important to have an effective empty parking slot tracking system to display empty parking available at each row of parking slot and guide car driver to there.

The development of this project prototype can act as way-finder to guide car driver inside the car park to parking slot available inside car park and guides car driver to go there. It is a PIC microcontroller based project. It uses the infrared sensor to detect the vacancy of each parking slot at a level of car park, sending signal to microcontroller to process and display total of available parking slot on 16x2 LCD displays [4]. At the same time, an arrow also used to shows the location of these available parking slots.



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II. RELATED WORK

Various methods are prevalent for development of autonomous or intelligent parking systems. Study of these systems shows that these require a little or more human intervention for the functioning [5].

➤ Free Parking System

One of the systems for car parking has been proposed by making use of free parking system. In this system the people park their cars or vehicles in the parking area for this they cannot pay any charges for the parking. And also they can't park their vehicles in proper manner in parking area. So they create a trouble for the other people who want to exit the parking area or enter into parking area. This is the major problem occur in the free parking system.

➤ Data Based System

Another system is car parking based on data based system. This system is not free parking system. That means people have to pay the charges of the parking with help of computer. For this parking system permanently one human is required to keep the record of entire vehicles. That human kept the record of vehicles/cars numbers and entry and exist timing. For this system customer pay the charges at the rate of per hours. This system is not human free system. That means permanently one human are required to keep the record of cars or vehicles and this is the major disadvantage of the system.

➤ Billing System

One more system is billing system and is similar to data based system. This system is also required one permanent guard who kept the entry and exit record of vehicles manually. The rate of this parking system is fixed. So the people are paying the charges at the rate of three hours. (Example: for three hours thirty rupees) And if the hours of parking are getting increased then customer has to pay the extra charges for that.

➤ Show Vacant Slot

This type of car park normally poses a parking guidance system that primarily based on the use of message signs to give drivers information regarding parking availability inside the car park. The availability of parking lot inside car park normally is obtained from the sensors that count the number of cars entering and exiting or in other cases, by comparing the tickets issued at machines. This information of parking lot availability inside car park is generally expressed in terms of full or empty on display board at the entry of car park. The actual number of parking availability inside car park is rarely given.

Therefore, it is difficult to find out an empty parking slot. Inside most local car park, car drivers still need to find out empty parking slot themselves. They will definitely waste a lot time for searching an empty parking slots if they do not know where they are, especially when there are only a few of empty parking slot available at each row of parking slot. Therefore, it is important to have an effective empty parking slot tracking system to display empty parking available at each row of parking slot and guide car driver to there. The development of this project prototype can act as way-finder to guide car driver inside the car park to parking slot available inside car park and guides car driver to go there. Thus, we aim to propose a car parking system that represents a fully automated model with minimum human intervention and overcome the limitations of existing system [5].

➤ Android System

In this project a new parking system called car parking system an android approach is proposed to assist driver to find vacant spaces in a parking in a shorter time. Different technologies are reviewed and compared to determine the best technology for developing this system. We create the separate application on the smart phone and by using this application we find shorter and easier path to reach the destination with the help of Bluetooth module. Features of car parking system an android approach includes vacant parking space detection, display and give direction on smart phone application to move toward vacant parking slot. This project also describes the use of a parking system in proper and efficient manner from the entrances into a parking area until the finding of a vacant parking slot. This prototype of car parking system an android approach will help car owners to improve their facilities inside car parking area to effectively guide car driver to vacant parking slot inside car parking area. This system architecture defines the essential design features such as location of sensors, required number of sensors and LCD display board.

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III. PROPOSED WORK

➤ BLOCK DIAGRAM DESCRIPTION

The basic block diagram of the Display vacant car parking slots using PIC microcontroller is shown in above figure. Mainly this block diagram consists of the following essential blocks

- 1) Power Supply
- 2) IR Transceiver sensors
- 3) PIC16FXX microcontroller
- 4) LCD Display
- 5) Bluetooth module

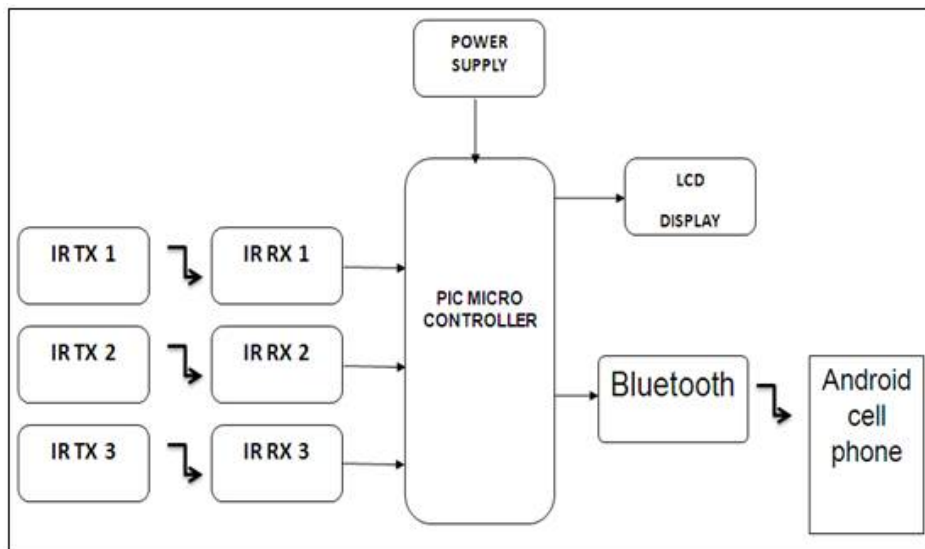


Figure 1. Block Diagram

❖ Power Supply Unit

Linear regulated power supply, all the electronic circuit needs a dc voltage is derived from the single ac phase main supply. For this purpose we have to use a regulated dc power supply.

❖ IR Sensor Circuit

An infrared sensor is an electronic device which is used to sense light wavelength of its surroundings by either emitting or detecting infrared spectrum. It will also capable of measuring the heat being emitted by an object and detecting motion. We use Infrared Sensors for car detection in the parking zones. Each of the sensor nodes determines the occupancy status of a parking space without regard to the types of sensors involved.

The IR sensor pair is used as an input circuit which placed on gate as well as for every parking slot. It sends a continuous high signal to the PIC micro-controller. But when obstacle detected by this input circuit IR receiver will turn off the transistor therefore it gives low signal to the PIC micro-controller. When the car comes on gate, car detected by IR sensors and this signal is fed to the micro-controller.

❖ PIC 16FXX Micro-Controller

PIC (Peripheral Interface Controller) is an 8 bit Micro-controller used in this system and it is the heart of the overall system. PIC16F877A series controller used here seems to be efficient and cost effective for this parking management system. The proposed design uses PIC micro- controller. It is a low power controller that provides support for high speed communications, with the ability to be programmed using different commands. When the vehicle passes the IR sensors, the sensor will detects that vehicle and give the information to the database system. The database notes the vehicle information, simultaneously the micro-controller searching for the vacant slots in the car parking area.

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❖ LCD Display

Interfacing between micro-controller and the LCD is required for displaying the status of parking status. The LCD is set to 16x2 displays. Depending on the status of parking slots, the LCD displays the number of vacant parking slot in the parking area which is placed on the entry gate. The data from the micro-controller is communicated using upper 4 bits of one-of the ports and the data pins of the LCD is connected to data pins D4, D5, D6, D7 of the LCD. The LCD is enabled using Enable (E) pin. Reading and writing of data to the LCD is handled using R/W pin.

❖ Bluetooth Module

Bluetooth module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. Serial port Bluetooth module is fully qualified Bluetooth V2.0+EDR (Enhanced Data Rate) 3 Mbps Modulation with complete 2.4 GHz radio transceiver and baseband. It uses CSR Blue core 04 External single chip Bluetooth system with CMOS technology and with Adaptive Frequency Hopping Feature (AFH).

The Bluetooth module is interface to micro-controller. For the connection purpose Bluetooth module scan for new devices. To transmit or receive the signals to/from android cell phone we have to pair with that Bluetooth module or by default it will auto pair with cell phone. After successful pairing with Bluetooth module we transmit or receive the signal. Depending upon the IR receiver signal to micro-controller it sends a signal to android cell phone.

❖ Android Cell Phone

Android is a mobile operating system, it is commonly installed on variety of smart phones and tablets. Android is a very user friendly operating system. Using this android OS variety of applications can be installed, by this way automatic parking slot detection can be achieved. Android is a mobile operating system (OS) based on the Linux kernel and currently developed by Google. With a user interface based on direct manipulation, Android is designed primarily for touch screen mobile devices such as smart phones and tablet computers, with specialized user interfaces for televisions, cars, and wrist watches. Android is the most widely used mobile OS and, as of 2013, the highest selling OS overall. Android is popular with technology companies which require a ready-made, low-cost and customizable operating system for high-tech devices. Android's open nature has encouraged a large community of developers and enthusiasts to use the open-source code as a foundation for community-driven projects, which add new features for advanced users or bring Android to devices which were officially, released running other operating systems.

In the vacant car parking using adaptive mixing features specifies the number of vacant parking slots in the particular area. It calculates total number of slots engaged and frees slots. It shows graphical view for engaged and free slots via application. Green colour indicated as vacancy and red colour indicated as occupancy. This information frequently updated into controller from android mobile phone. It displays the vacant slot and path to reach that vacant slot in green shade otherwise the full slots are in red shade. The image displayed on cell phone is shown in figure b.

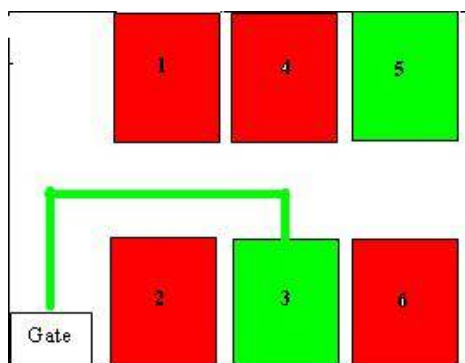


Figure 2. Image displayed on cell phone

❖ Slot Allocation Algorithm

The slot allocation method follows a sequence as discussed above. It has the Parking Area Control Unit and the Smart Parking Area control Unit (SPAC). The functions are as follows:

1. Initially the vacant slot detection is made by controller.

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2. Transforming request for parking slot from the mobile using Android application.
3. The parking allocation control unit (Bluetooth module) gets the request slot number from the mobile.
4. Checks for the parking slot for availability.
5. If it is free go to the next stage otherwise goes to the initial state.
6. If the parking slot is free, the vacant slot and shortest path in the parking area is displayed on mobile phone.
7. If the parking slot is not free then it will go to the initial stage.

❖ ADVANTAGES

1. Easy to car parking.
2. Discipline will be maintained while parking.
3. Less time consume system.
4. Cost of IR sensor is efficient.
5. Easy implementation.
6. We can also use other sensors like TSOP, PIR and LASER-LDR etc.

❖ DISADVANTAGES

1. IR sensor need to clean regularly.
2. If we can use another sensor then cost will be high.

❖ APPLICATIONS

This system can be used in different parking area like

1. Building
2. City centre malls
3. Colleges
4. Companies
5. Airport
6. Railway station etc.

➤ FUTURE WORK

1. By modifying this circuit we can include security alert.
2. Manage the improper parking.
3. Online booking of car parking slot.
4. Automatic gate control is possible.

IV. RESULT AND DISCUSSION



Figure 3. Android app view



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In this way we can show number of slots status on the cell phone by using android application. In this application empty slots are shown by the green color whereas the full slots are shown by red color. It shows that slots status only when the car is on gate (i.e. U R HERE).

V. CONCLUSION

In this way we conclude that this project displays the vacant car parking slots using PIC microcontroller and android cell phone. The proposed parking management system takes into account all possible attributes that is expected from it.

The vacant car parking slots are given by as per priority based. The main contribution of study is to introduce the most significant parking problem that is finding vacant space & smallest path to reach that vacant space. It helps to give the proper management of parking. It reduces instances of single car improperly parking across two spaces. Parking detection system would decrease searching time for vacant slots. It is important to have an effective vacant parking slot tracking system to display vacant parking available at each row of parking slot and guide car driver to there. And therefore it reduces the effort of the driver to find vacant slot and also time to reach that vacant parking slot.

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