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EMPTY SLOTS DETECTION FOR CAR PARKING AREA

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ABSTRACT

Vehicle parking has become an important issue in our society and day by day its necessity is also increasing. Still we are using the manual vehicle parking system and that is the main reason for time consumption and wastage of fuel. For manual vehicle parking system adequate amount of lightning is required to find the free space around the parking area to park the car. Another issue is chaos that happens while parking because there is no proper parking system. Anyone can park anywhere which sometime causes damage to the vehicles while moving in or out of the parking slot and we may also face issues because of securities. To solve these problems we are introducing a new car parking system. The working of this system is that the driver will place the vehicle in front of the garage door and there will be a monitor where the number of available parking slots will be displayed.

I. INTRODUCTION

Over the decades our country has been developed drastically, now we are in this state that we have a lot of well contacted roads, commercial building and increasing number of automobiles. While parking these automobiles in parking space we use the manual procedure of parking. Which most of the cases is unplanned and lack of discipline due to this, people can park their cars anywhere they want to, which creates a mess as people do not follow the particular cue most of the time. As a result of this, a huge traffic jam takes place in that place.

While parking in and retrieving car due mismanagement cars can get dent by bumping with each other as there is lack of sufficient space. This leads to arguments, fights among people which sometimes makes huge traffic jam. This is also an economical loss as we

need to repair our damaged car and also cars consumes extra fuel while parking in or out. Traffic jam is an issue here as it kills our precious time. Due to this chaos in parking our valuable time gets wasted. It harms the students, office going staffs and emergency patients to a great extent. It also causes economical loss to commercial places like shopping malls, amusement parks as people are more likely not to visit these places due to this parking hazard. As we are advancing with time, the manual car parking system in commercial spaces is creating hurdle which is causing wastage of time and some economic losses as well. Therefore we need a solution which can overcome these problems.

Here we are introducing Automated Parking Systems as a solution of these problems as well as car parking system in commercial spaces is creating hurdle

which is causing wastage of time and some economical losses as well. Therefore we need a solution which can overcome these problems. Here we are introducing Automated Car Parking Systems as a solution of these problems as well as a replacement to the manual car parking systems at commercial spaces. This system not only saves time and money, it can also earn money by charging for parking spaces.

II. SYSTEM DESCRIPTION

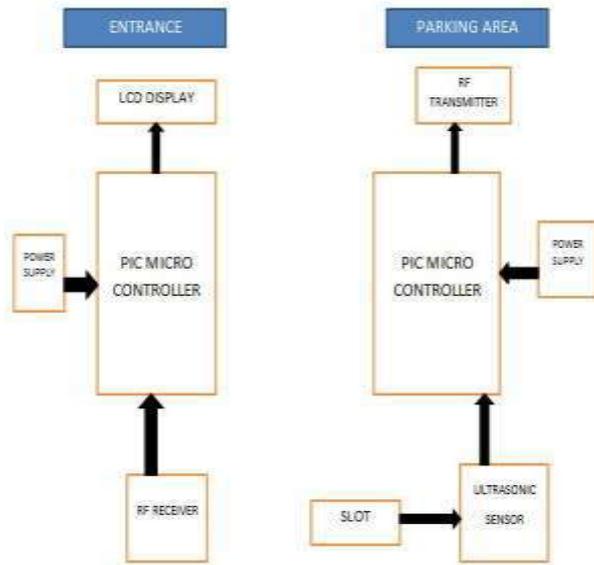


Fig.1 System block Diagram

The customer enters the parking garage and drives the car onto a platform. At the entrance of the parking area, a RF receiver and a LCD display will be present, both are connected to the PIC micro controller-1. The free parking slots will be displayed in the LCD display. The customer drives the car and parks it in any of the displayed slot. In each parking slot an ultrasonic sensor is present. The sensor senses the object and sends the signal to the PIC micro controller-2.

Based on the signal received from the ultrasonic sensor the micro controller transmits the signal to the connected RF transmitter. If the signal read from the ultrasonic sensor is HIGH, indicating that object is present and if LOW, indicating that no object was present. The RF transmitter sends the message to the receiver, then that parking slot will be removed from the free slot list. If the message send from the sensor is LOW, then that parking slot will be added to the free slot list.

III. COMPONENTS AND COMPATIBILITY

A. ULTRASONIC SENSOR:(HC-SR04)

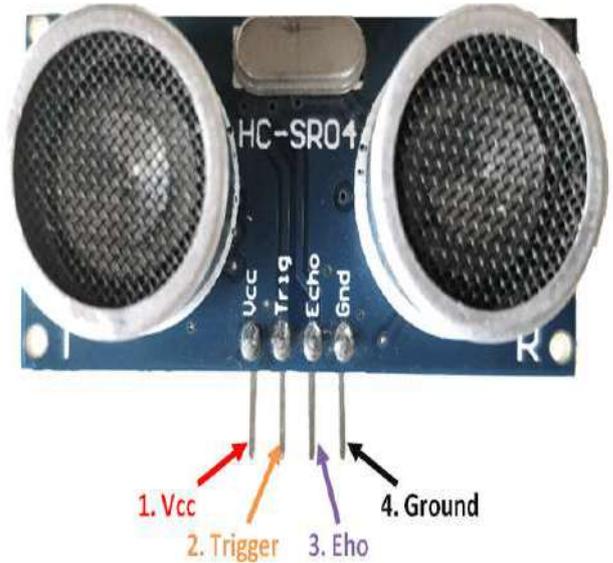


Fig.2 Ultrasonic Sensor

Ultrasonic transducers are divided into three broad categories: transmitters, receivers and transceivers. Transmitters convert electrical signals into ultrasound, receivers convert ultrasound into electrical signals, and transceivers can both transmit and receive ultrasound. In a similar way to radar and sonar, ultrasonic transducers are used in systems which evaluate targets by interpreting the reflected signals. For example, by measuring the time between sending a signal and receiving an echo the distance of an object can be calculated. Passive ultrasonic sensors are basically microphones that detect ultrasonic noise that is present under certain conditions. Ultrasonic probes and ultrasonic baths apply ultrasonic energy to agitate particles in a wide range of materials.

B. PIC MICRO CONTROLLER (16F877A)



Fig.3 Microcontroller

PIC is a family of modified Harvard architecture microcontrollers made by Microchip Technology, derived from the PIC1650 originally developed by General Instrument's Microelectronics Division. The name PIC initially referred to "Peripheral Interface Controller.

PIC's are popular with both industrial developers and hobbyists alike due to their low cost, wide availability, large user base, extensive collection of application notes, availability of low cost or free development tools, and serial programming (and re-programming with flash memory) capability. They are also commonly used in educational programming as they often come with the easy to use 'pic logicator' software.

The microcontroller that has been used for this project is from PIC series. PIC microcontroller is the first RISC based microcontroller fabricated in CMOS (complimentary metal oxide semiconductor) that uses separate bus for instruction and data allowing simultaneous access of program and data memory.

C. LCD



Fig.4 LCD

A liquid crystal display (commonly abbreviated LCD) is a thin, flat display device made up of any number of color or monochrome pixels arrayed in front of a light source or reflector. It is often utilized in battery-powered electronic devices because it uses very small amounts of electric power.

D. RF TRANSMITTER & RECEIVER:

The RF module, as the name suggests, operates at Radio Frequency. The corresponding frequency range varies between 30 kHz & 300 GHz. In this RF system, the digital data is represented as variations in the amplitude of carrier wave.

This kind of modulation is known as Amplitude Shift Keying (ASK). Transmission through RF is better than IR (infrared) because of many reasons. Firstly, signals through RF can travel through larger distances making it suitable for long range applications. Also, while IR mostly operates in line-of-sight mode, RF signals can travel even when there is an obstruction between transmitter & receiver. Next, RF transmission is more strong and reliable than IR transmission. RF communication uses a specific frequency unlike IR signals which are affected by other IR emitting sources.

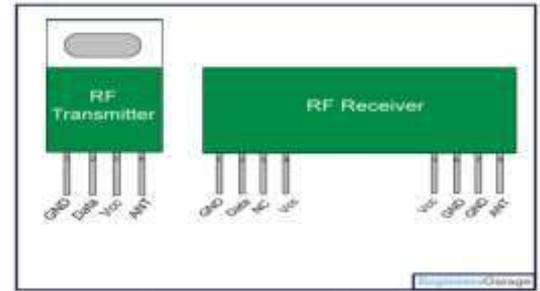


Fig.5 RF Transmitter & Receiver

This RF module comprises of an RF Transmitter and an RF Receiver. The transmitter/receiver (Tx/Rx) pair operates at a frequency of 434MHz. An RF transmitter receives serial data and transmits it wirelessly through RF through its antenna connected at pin4. The transmission occurs at the rate of 1Kbps - 10Kbps. The transmitted data is received by an RF receiver operating at the same frequency as that of the transmitter.

E. POWER SUPPLY UNIT:



Fig.6 Power supply

Regulated DC 5V is used for Harvard architecture based microcontroller, warning indication (i.e. LED indication), audio able alarm unit and Safety monitoring unit i.e. LCD Display unit. Unregulated DC voltage is used for relay circuit which is used to controlling and triggering the various output devices which is to be in the car that which has been adopted with driver circuit.

Since all electronic circuits work only with low D.C. voltage we need a power supply unit to provide the appropriate voltage supply. This unit consists of transformer, rectifier, filter and regulator. A.C. voltage typically 230Vrms is connected to a transformer which steps that AC voltage down to the level to the desired AC voltage. A diode rectifier then provides a full-wave rectified voltage that is initially filtered by a simple capacitor filter to produce a DC voltage. This resulting DC voltage usually has some ripple or AC voltage variations. regulator circuit can use this DC input to provide DC voltage that not only has much less ripple voltage but also remains the same DC value even the DC voltage varies somewhat, or the load connected to the output DC voltage changes. The power supply unit is a source of constant DC supply voltage. The required DC

supply is obtained from the available AC supply after rectification, filtration and regulation.

IV. EXECUTION (WORKING OF THE CAR PARKING SYSTEM)

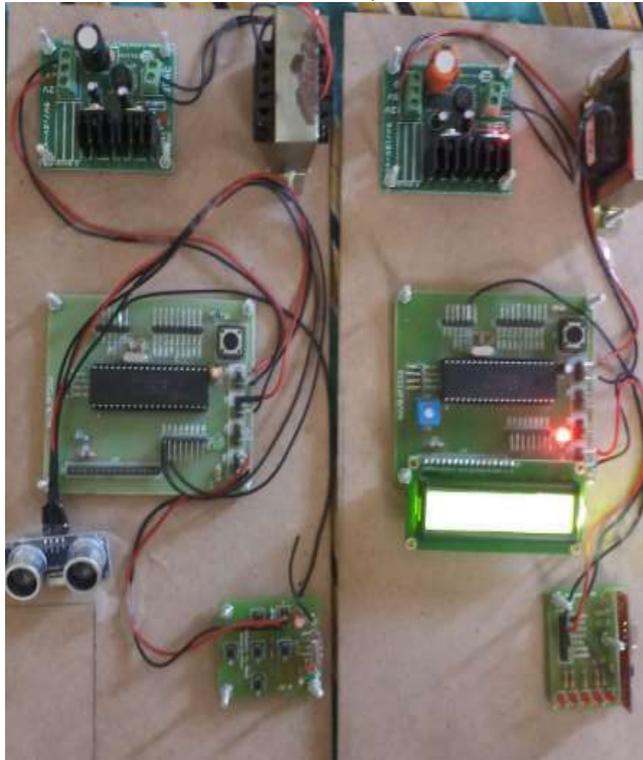


Fig.7 Hardware diagram

The customer enters the parking garage by driving the car to the parking area. The entrance area consists of a LCD display, a 16F877A PIC Microcontroller and a RF receiver. At the entrance of the parking area a LCD display will be present. The LCD display displays all the free slots present in the car parking area. The 16*2 LCD display is used here, which has 2 rows and 16 columns. This is similar to the matrix format that helps to program it accordingly. The LCD display is connected to the 16F877A PIC Microcontroller. In addition to it a RF receiver is also connected. The RF receiver receives the signals sent from the transmitter located at the parking area.

The parking area consists of an ultrasonic sensor, a 16F877A PIC Microcontroller and a RF transmitter. The ultrasonic sensor is placed in the parking slot area, which senses the presence of an object (For Example: Car). The ultrasonic sensor located here acts as a transceiver, so that it can transmit and receive the ultrasonic signals. Its working is based on the signals sent back to the receiver, i.e. the sensor will transmit the ultrasonic signals, if it senses any object on its way, then that object will reflect back a signal and that signal will be received by the receiver in the sensor, which indicates the presence of the object, if there is no object on its way, then the receiver in the sensor will not receive any signal.

The ultrasonic sensor is an output device. The sensor's output will be send as an input to 16F877A PIC Microcontroller. Based on its input, Microcontroller will send the data to the transmitter (For example: If car is present then the microcontroller will send the data as "Y", otherwise the data will be sent as "N"). The transmitter will transmit the data received from the microcontroller to the receiver at the entrance area. The receiver receives the data and sends it to the microcontroller. Based on the received data the microcontroller will display whether the slot is free or not (for example: if "Y" is received then it displays "The slot is free", if "N" is received then it displays "The slot is not free"). If there is "n" number of slots available in the parking area, then it displays the number of the slot which is free (For example: If 5th slot is free, it will display as "The slot 5 is free"). So that the customer can park his/her vehicle on the displayed free slot, if no slots are available to park the vehicle, then it will display as "No slots are free". If there is no free slot, then the customer has to make an alternate way to park his/her vehicle.

This parking system method reduces the waiting time for the customer. Since it is an automatic parking system there is no requirement of labours for assisting the parking area. This system also helps to avoid collision of vehicles while moving the vehicle in or out of the parking slot.

V. CONCLUSION

After studying the car parking project it is found that car parking systems can be introduced in our country and it will be beneficiary in the context of our country. The benefits are time and fuel saving. The maintenance cost for this system is less so it helps the developer to save cost. It also provides security to the parking ground. The car parking systems reduce the hassle in parking grounds and traffic jam. It will make advancement in increasing usage of technology. Therefore we should introduce car parking systems in our society and can utilize its benefit.

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