

Smart Car Parking Using IoT

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ABSTRACT:

The main aim of this project is to design a smart car parking system for the growing smart world to reduce the time in finding the parking lots, and unnecessary travelling through the filled parking areas and thereby causing more fuel consumption and pollution. This system activates the user to find out the parking area which is near to them and gives the availability of parking slots in that respective parking area. Generally we face a lot of traffic on roads and hence thereby increases the problem for parking. Sometimes we have to wait outside the parking lots for hours and after that we get the space to park our vehicles. So we propose a smart car parking system to simply book a slot. In this prototype we can see any slot which is available on any nearby parking slot in the respective parking area. In this prototype we will use AVR microcontroller and we book our slot through GSM. The functionality of this project will be as like, we have three parking areas and in every area 3 parking slots will be available. Through internet we can find which slot is available. For booking the slot SMS can be used and one you lock the slot it will display as RED icon on internet page, and it will respond that we have successfully booked the slot.

The slots which are available will be shown in GREEN color.

Keywords: GSM Module, ATMEGA328 Microcontroller, IR Sensor.

1. INTRODUCTION:

It's useful for these generation to update with the growing technology. Generally, we face a lot of traffic on roads and hence thereby increases the problem for parking. Sometimes we have to wait outside the parking lots for hours and after that we get the space to park our vehicles. And hence we design a smart car parking system which enables the user to find out the nearby parking area and gives the availability of parking lots in that respective area. The main aim is to reduce the wastage of time, fuel consumption and there by causes pollution.

2. LITERATURE SURVEY:

There are various methods which are prevalent for the development of autonomous or innovative car parking systems. The survey has been motivated us to design a car parking system in order to check the availability of parking lots in the respective area through a mobile application. And this method of parking system is implemented by using IR SENSOR, Atmega8 microcontroller and GSM module.

3. EXISTING SOLUTION:

3.1 Smart Car Parking system using GSM module:

This system is designed by foreign countries like U.S to provide a facility to find the nearest parking lot in the required parking area.

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4. METHODOLOGY:

The system features an efficient way to find out the nearby parking lots in the respective area using IR sensors, GSM module with an Arduino interface. In this prototype the user books the slot through SMS. GSM modem gets the message and fed to the microcontroller using USART communication.

The AVR microcontroller process the requested message and it checks the availability of nearby parking lots in the respective parking area using IR sensor. AVR microcontroller will send back the message confirmation of booking by allotting the slot number. The slot number will be used to enter into the parking area.

The infrared sensor senses the position of the entry of the car from around ten centimeters distance and allows the vehicle to enter into the area. Therefore there will be no collision with other vehicles, preventing the vehicle from any kind of damage or accidents.

5. HARDWARE SPECIFICATIONS:

5.1 MICROCONTROLLER:

A microcontroller is an integrated circuit which is designed to perform specific operations in an embedded system.

4.1 BLOCK DIAGRAM:

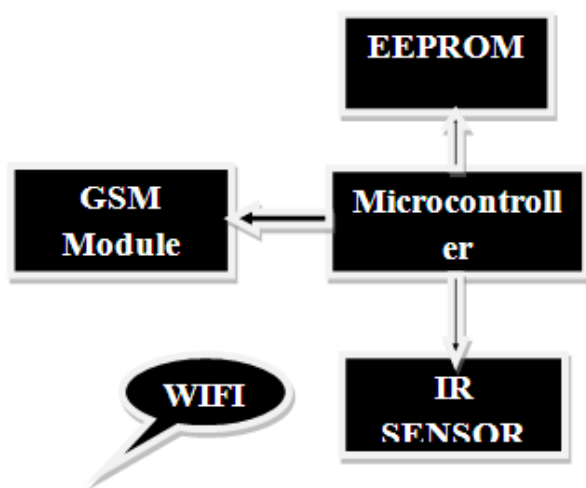


Fig.1. Monitoring Unit.

A microcontroller includes mainly a processor, memory and input/output peripherals on a single chip. The microcontrollers are used in various applications like vehicles, robots, machines, medical devices, mobiles, radio transceivers, vending machines and home appliances etc.

In the year 1996, AVR Microcontroller was produced by the "Atmel Corporation". It basically includes the Harvard architecture that works with the RISC. The Microcontrollers are very fast and they utilize low power to work in different power saving modes. There are different configurations of AVR microcontrollers which are available to perform various operations like 8-bit, 16-bit, and 32-bit. In this prototype we are using ATmega8 of 8-bit microcontroller.

5.2 Atmega8 Microcontroller:

The ATmega8 microcontroller's main feature is that, all the pins of the Microcontroller supports two signals only except 5-pins. It consists of 28 pins where pins-9,10,14,15,16,17,18,19 are used for port-B, pins-23,24,25,26,27,28 and 1 are used for port-C and pins-2,3,4,5,6,11,12 are used for port-D.

PIN CONFIGURATION:

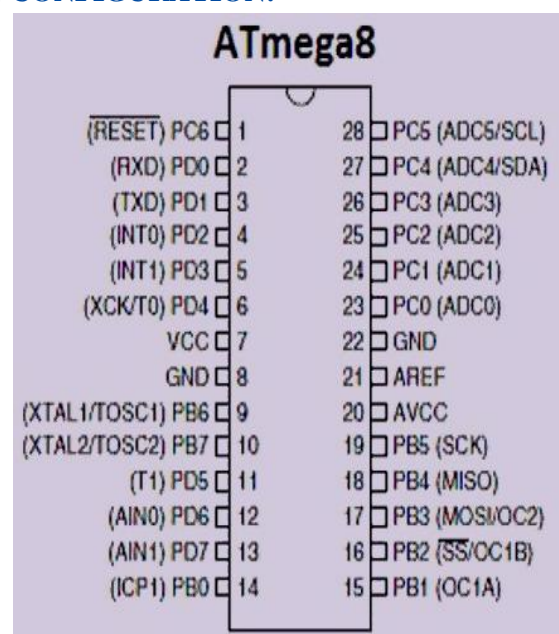


Fig.2 : Pin configuration

5.3 GSM MODULE :

The GSM module is based on latest Simcom’s module. The GSM/GPS module SIM808 from SIMCOM, supports GSM/GPRS Quad –band network and it combines GPS technology for satellite navigation.

It has special features such as ultra-low power consumption in sleep mode and integrated with the charging circuit for Li-Ion batteries which makes it a super long standby time and convenient for the projects that use for rechargeable Li-Ion battery.

It has high GPS receive sensitivity with tracking and acquisition receiver channels. It also supports A-GPS that available for indoor localization. The GSM module is controlled by AT command via UART.



Fig.3.GSM-module

5.4 IR SENSOR: An Infrared Sensor is an electronic device which is used to sense certain characteristics of its surroundings by either emitting or detect the infrared radiation.

IR sensor is based on the principle of optics. It works by applying a voltage to a pair of IR light. This light propagates through the air and once, it hits an object it gets reflected back towards the sensor.

Infrared rays are not visible to the human eye. The main advantages of infrared sensors include low power requirements, simple circuitry, and their portable feature. Eg: Infrared technology is used in our everyday products such as TV has an IR detector for interpreting the signal from the remote control.



Fig.4.IRSENSOR.

6. WORKING:

In smart car parking system IR sensor will sense the position of car and entry gate will be opened and through operational amplifier it will send an amplified signal to controller.

And the controller will send again the empty locations on LCD and it verifies whether vehicle is occupied or not.

LED will show the status of parking lots whenever the vehicle want to exit then it will go to the exit gate again the infrared sensor will sense the position of the vehicle and send an amplified signal for the microcontroller and gate will be opened again LCD will display the fare of parking duration.

OUTPUT ANALYSIS:

The following figures represents the slot vacancy which are available for the vehicles

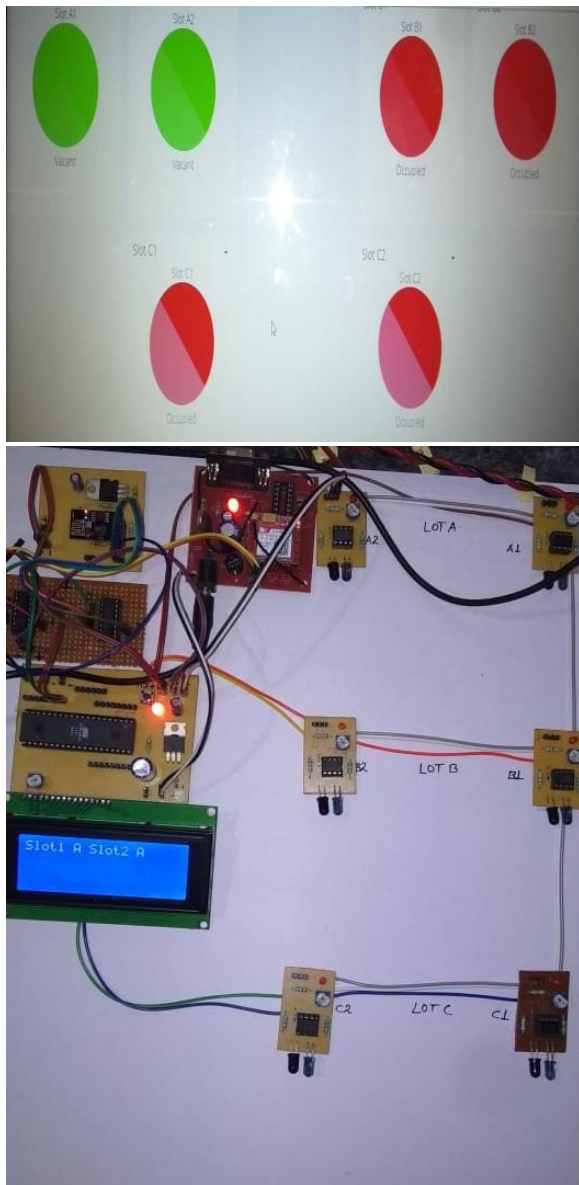


Fig.6:Circuit diagram

The output of the smart car parking system is received in such a way that the slots which are available in the parking area will be represented in the GREEN color and the slots which have been already booked will be shown in RED color as shown in fig 5.1 above.

IV. ADVANTAGES:

1. It enables quick and easy retrieval of vehicles.
2. The system helps to park the vehicles easily and safely in the designed model.

3. This is suitable for parking in offices, shopping malls, theatres and similar places.
4. Low maintenance is required by the system.
5. Sensors used have high sensitivity and are easy to handle.
6. Low cost system, providing maximum automation.
7. It does not require line-of-sight operation.
8. Friendly reorientation of cars for driving in and out.
9. Safety of vehicle.

7. CONCLUSION:

The mechanical model has been designed and the software as well as the control circuit has been implemented successfully. It demonstrates the working of the planned smart parking system. The main advantages are space optimization, cost effectiveness and security.

The smart car parking system detects the nearest parking slot in the respective parking area with the help of sensor, microcontroller, and GSM/GPS module.

The system benefits of smart car parking go well beyond avoiding the needless circling of city blocks. It also enables cities to develop fully integrated multimodal intelligent transportation systems that don't rely on cars on the first place.

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