

## Smart Parking System

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**Abstract:** In this paper we proposed a smart parking system to detecting the parking area for the customers. Due to increase of vehicle density particularly in peak hours it is difficult to finding and parking their cars. The purpose of our paper is a Smart parking system with the parking system with the help of Arduino components. The level of traffic congestion increases with the increasing of population rapidly. The traffic congestion occurred due to more number of car users. This Smart parking system is used to show their parking area accurately with the help of OLED display. It avoid unnecessary time consuming to finding their parking space. This system will overcomes a problem like parking offences and fine. We create a system which helps the people to know their parking slot for vehicles.

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**Keywords:** Arduino Mega, Smart Parking Systems, Arduino, Raspberry.

### 1. Introduction

In metropolitan areas searching for vacant parking spaces is difficult to find the daily concern for the most of drivers and it also take a time to park their cars in parking areas. The common result is it rectifies the traffic congestion and air pollutions. In this paper we had fixed the OLED display in the entrance which is used to show whether the parking space is available or not. In these systems no need of any guidance to the drivers. In this implementation of these paper is to make easy to park the cars perfectly. It can be used in schools, colleges, function, malls and make their customers to park their cars easily around any places with the help of smart parking system. We know that parking should be divided into many areas. In Our project each and every space should contain the Ultrasonic sensors while the driver park their vehicle the Ultrasonic sensor will measure and then it will send the data to OLED display that placed is unavailable now.

### 2. Literature

Many of the cities viewed that the drivers had a problem of finding a parking area easily especially in peak hours and festival seasons. Many of the approaches had been overcomes the difficulties of parking spaces. More system and technology are developed for car parking. The Smart parking system was initially implemented in countries like EUROPE, JAPAN [shaheen et al., 2005], USA. Later on other countries also started developing these Smart parking systems.

### 3. Existing System

There are four main type of parking. They are perpendicular, angled echelon parking, parallel parking and double parking. It is difficult to find the parking space for the users. It is hard to search their allotted space before reaching their parking area. Another system is they want to find and search their allotted space manually. Saving a ground spaces required for a parking. A number of cars can parks to their requirements.

### 4. Principle

In Smart Parking System with the help of ultrasonic sensors, we can able to detect car is Parked or not. Now detected signals gets to Arduino mega and the mega with indicator and buzzers, display. If one parking space is filled Display show the next unfilled parking space number.

### 5. Process

If any Car arrives ultrasonic sensor detects and it give input to Arduino mega and mega indicates and glows led also display slot number so we have made four slot available at this time. If car filled in first slot. The led will glow and display will glow and display will show available slots. Display show the Next available slots.

## 5.1 Arduino

Arduino Mega 2560 is a type of microcontroller board. Arduino mega supports the microcontroller. Using USB cable we can easily connect the Arduino Mega to the computer. AC to DC adapter are used in Arduino board. In this battery connections is also used.

**Power jack-** In Arduino board there is a power jack used to power it can be connected using Laptop or Computer through the USB. And then we can also connect using adapter or battery. The maximum power supply in Arduino board is 7 to 12 volt.

**Digital inputs for Arduino mega-** In this Arduino mega board there are 54 pins. By this we can use both input pin and output pin. It will take up to 40mA current(I).

**Analog inputs for Arduino mega-**In this Arduino board there 16 pins. By this we can use both input pin and output pin.

**Reset pin for Arduino mega-**The reset button is used to reset. When it is low level of microcontroller in that time only we are using reset button.

**Arduino programming-** Without the requirement of any other hardware programs. We can easily load the Arduino program to the device directly using USB port. To run this program we need the downloaded version of Arduino software and then we have to write a code. In Arduino tool with the help of toolbar we can able to verify the program, upload the program, we can open a new page using new tool and save the program. These are the menu of Arduino tool. We can also write program using text editor in Arduino software. A messages are displaying the feedback like errors, the text consoles and displaying.

**Step by step Arduino programming -** In initial we want to declare the variables. And then we need initialize the step functions. The total control programming code is in loop function only.

### Few basic Function of Arduino

**Digital read-** In digital read we can able to read the value as digital of the given pin.

**Digital write-** In digital write we can able to write the value as digital of the given pin.

**Pin mode-** In this pinmode we can able to set the pin either input or output.

**Analog read-** In this analog read we can able to read and return the value.

**Analog write-** In this analog write we can able to write the value of analog pin.

**Serial begins-** Serial beginning means we can able to set the value beginning with serial communication setting and bit rate.

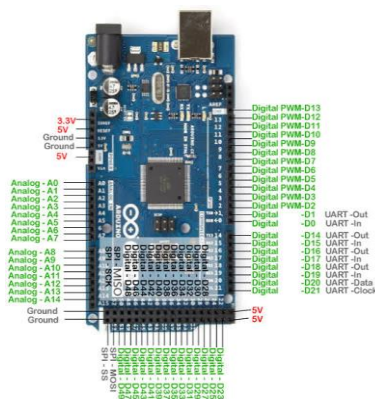
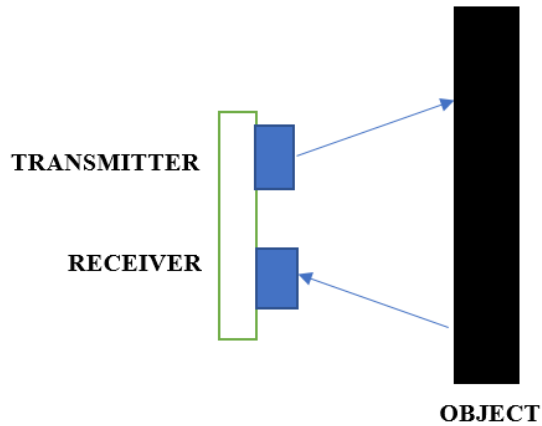


Figure 1. Arduino Mega

## 5.2 Ultrasonic Sensor

Ultrasonic sensor works with emit sound wave at frequency too high for human to hear. It is wait for until the sound reflection back. It is a device just by detecting an object of it can measures the distance. These distances are measured by emitting Ultrasound waves which gets reflected from an object. In ultrasonic sensor have two components the transmitter and receiver. Transmitter emits the sound using piezoelectric crystal. Receiver emits the sound after travelled to the target. It is commonly used in platform of microcontroller like Arduino, Raspberry, Arm etc.



**Figure 2.** Function of Ultrasonic Sensor

**Trigger-** Trigger pins are used to trigger the Ultrasonic sound.

**Echo-** Echo pin is used to produce a pulse when the signal to received they are reflected.

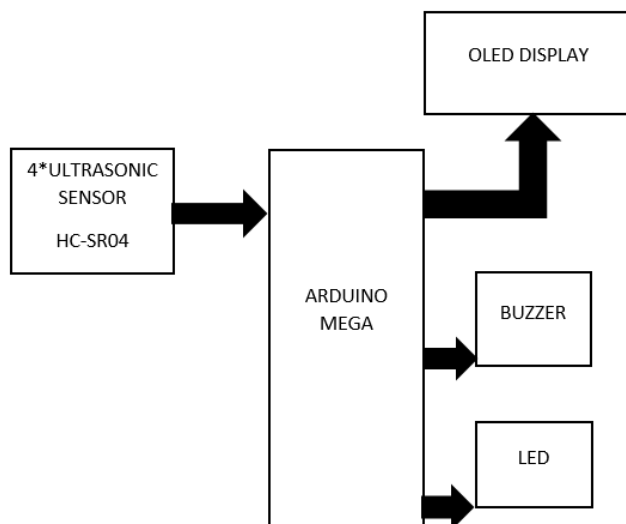
**Ground-** The pin is connected to Ground of the system.

**Vcc-** The Vcc pin Power the sensor with +5v.

In Ultrasonic sensor has two eyes like in the front which the Trigger and Echo. The Sensor works with simple formula that

$$\text{“DISTANCE = SPEED X TIME”}$$

## 6. Proposal Diagram



**Figure 3.** Proposal Diagram

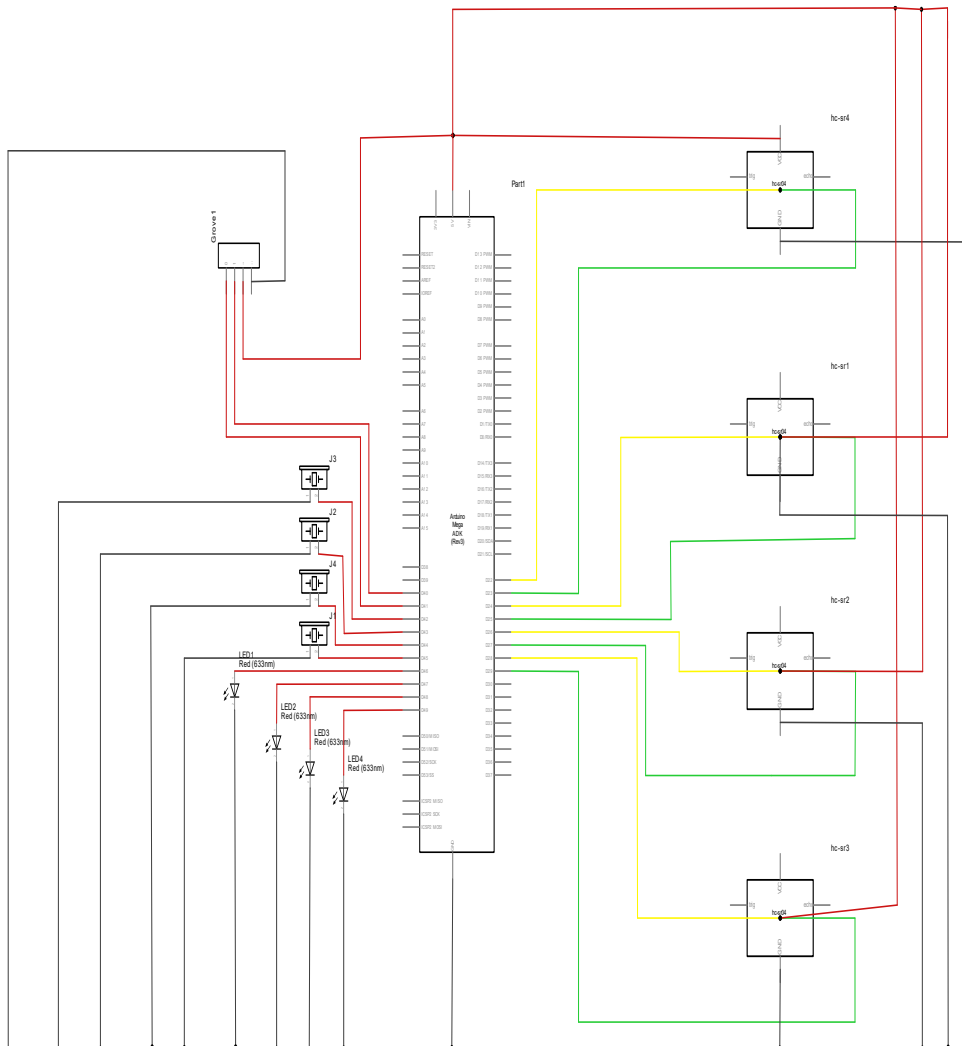
The complete process of Parking System

**Reader section-** In this Ultrasonic Sensor is a 4pin module such as VCC, Trigger, Echo, Ground. ultrasonic sensor will transmit the wave and hits the object and reflect back to the receiver and the receiver will send the signal to the input pins. The signal received from input pin it will pass Arduino mega.

**Control section-** Arduino Mega is used for controlling the complete process of the project.

**Display section-** A OLED display is used in this project for displaying available slots.

### 6.1 Schematic Diagram



**Figure 4.** Schematic Diagram

### 6.2 Proposal System

If any Car arrives the parking area the display will be displaying the slots is available are not. After the car parked the ultrasonic sensor will transmit the wave and hits the object and reflect back to the receiver. Then receiver will send the signal to the input pins. The signal received from input pin it will pass through Arduino mega. Suppose the car is parked at slot the received signal will passed to a buzzer and buzzer will be indicates once and turn off. Slot will be displayed in OLED display. If parking space available led glows. Suppose the slot is unavailable the car will wait until get the parking spaces.

When car parked at slot 1 the buzzer will indicates once and turn off. Same process repeated at slot 2, slot 3 and slot 4. Suppose parked car at slot 3 get free when that free slot will not displayed in display. After completion 4 slot then only the 3 slot will available. Thus the slot 3 is available the led glow.

### 7. Results

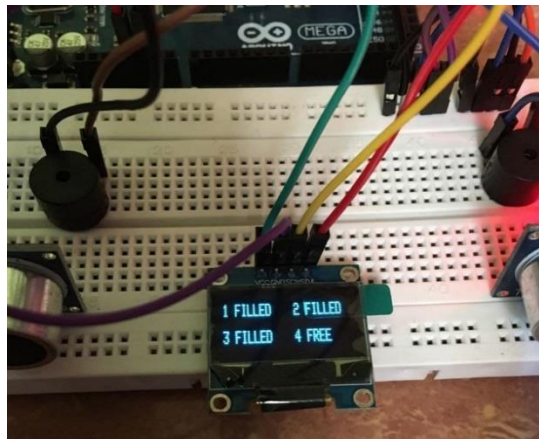
Our result depends on the output of the OLED display. If parking space is available the BUZZER will indicate once and display will be displayed as parking slots are FREE. It not available the LED starts glow slot will be displayed as FILLED.

The following figures shows the output in many cases.



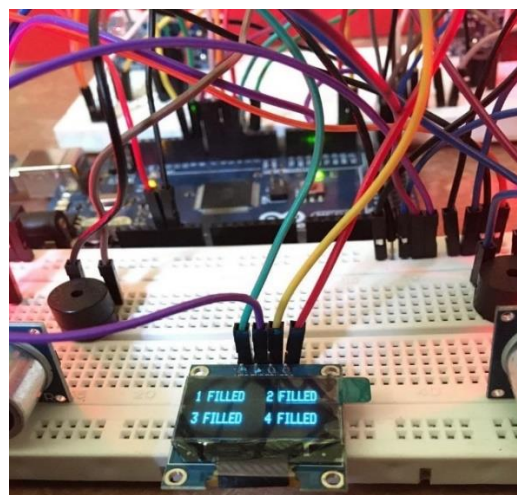
**Figure 5.** All 4-free Slots Available

Figure 6 Represent all the four slots are free which mean all the four BUZZER will start indicating one after another and displayed as all four slots are FREE.



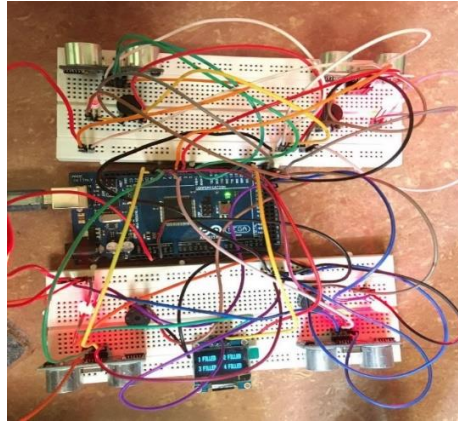
**Figure 6.** Slots are Filled and 4<sup>th</sup>-Slot is Available

In figure 7 except the 4<sup>th</sup> slot remaining all 3 slots are shown as filled. It means 1<sup>st</sup>, 2<sup>nd</sup> 3<sup>rd</sup> slots the LED will start glow and only in 4<sup>th</sup> slot the BUZZER will be indicating.



**Figure 7.** All 4-slots are Filled Slot is Unavailable

In this figure 6.4 all the four slots are filled and in each slots the LED starts glowing and BUZZER indication will turn off. This is the overall view of Our project figure 4.4. In this project we have 4 slots. You can see slot-1, 2,3 and slot-4.



**Figure 8.** Overview of Our Project

In this process our project is working quite good and it has no problem in working output. It satisfied all the condition.

## **8. Conclusion**

The main aim of our paper is to finding an empty space to parking a car. Ultrasonic sensor can be used for detection of availability of parking space. In our proposal architecture for a parking detection system would reduce the time searching for vacant space. The implementation of this system will identifies whether the parking space is available or not. Without the help of any other guidance only with the help of OLED display we can able to park manually in the parking areas. So this system will help the people to save their time and it will avoid traffic jam, parking offence and fines.

## **References**

1. Zhou, F., & Li, Q. (2014, November). Parking Guidance System based on ZigBee and Geomagnetic Sensor Technology. *In Distributed Computing and Applications to Business, Engineering and Science (DCABES), 2014 13th International Symposium on* (pp. 268-271). IEEE.
2. M. S. Rahul Patil, "Smart parking system based on reservation," vol.2, Mumbai, India, 2014.
3. T.N.A.M. Pham, M. Tsai, and D.U.C.B. Nguyen, "A Cloud-Based Smart-Parking System Based on Internet-of-Things Technologies," pp. 1581–1591, 2015.