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# Car Parking System using Arduino

## PROBLEM STATEMENT

To design and implement a parking system which will tell the passenger if there is an empty slot to park his car using Arduino Uno.

## SOLUTION

In the early times the concept of smart cities gained great popularity. The proposed Smart Parking system consists of an on-site deployment of an IOT module that is used to monitor and signalize the state of availability of single parking space.

Car parking system is a system that is used to help manage cars in a parking area in other to avoid congestion and arrange cars in an allocated position. The system also helps to track how many cars pass through the gate and the duration taken by each. Car parking system is also being used in many congested area or location where there are many meeting points of people like where there are more than one shopping complex near to each other or where there is megamall or stadium.

The system does not assign car to a specific parking lot and this result in roaming of cars inside the area in searching of parking space.

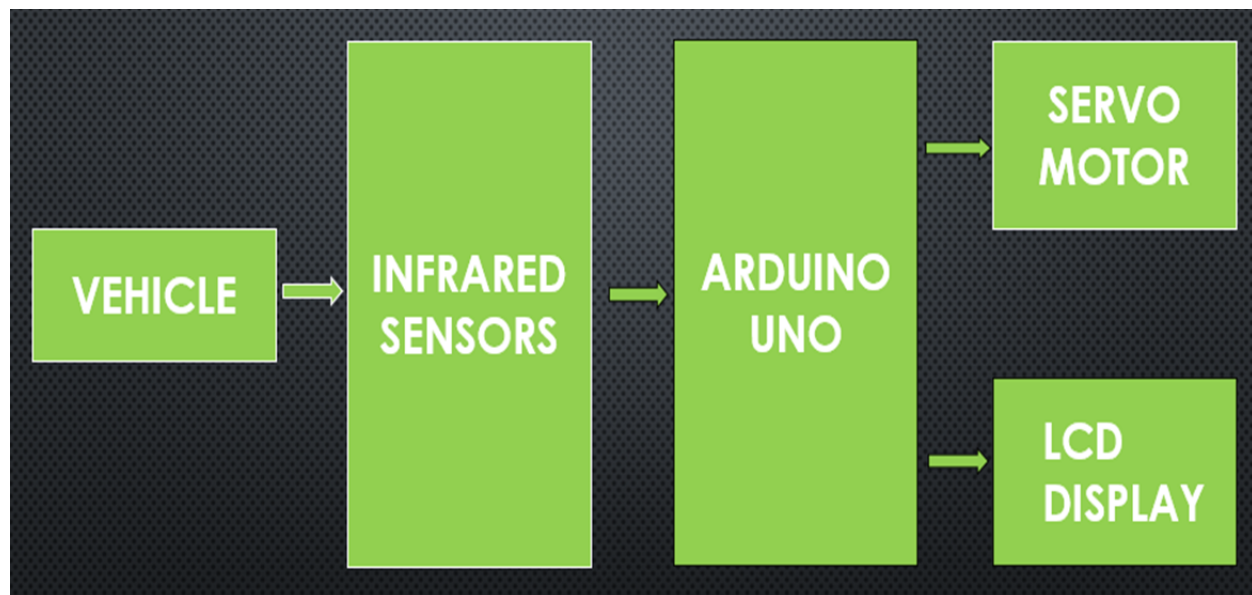
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## COMPONENTS USED

- Arduino Uno R3: Arduino Uno is a microcontroller board based on the ATmega328P. It controls various components used in the project via programming.
- IR Sensor: To detect or sense incoming or outgoing cars.
- Servo motor SG-90: For barrier opening and closing in the parking system.
- 16 x 2 LCD: It is used to display the number of empty slots in the parking area.
- 100 $\Omega$  resistor: For backlight setting of LCD screen.
- 4.7K & 1K: For contrast setting of LCD screen.
- Battery and battery holder (if required): To give power to the entire circuitry.
- Switch (if required): To cut off or turn on the power when needed.

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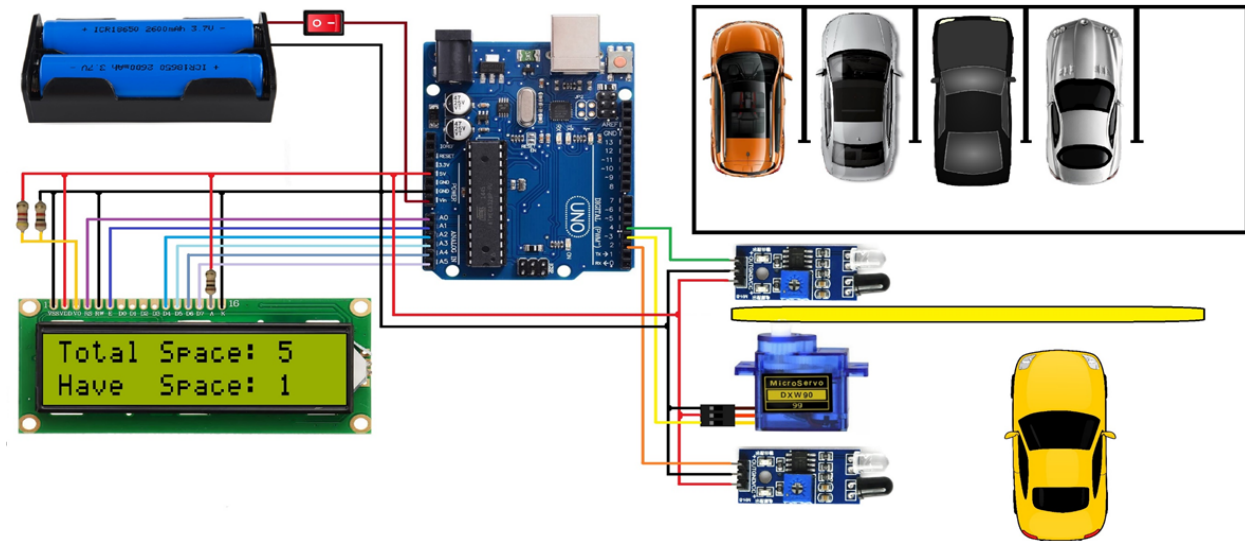
## BLOCK DIAGRAM



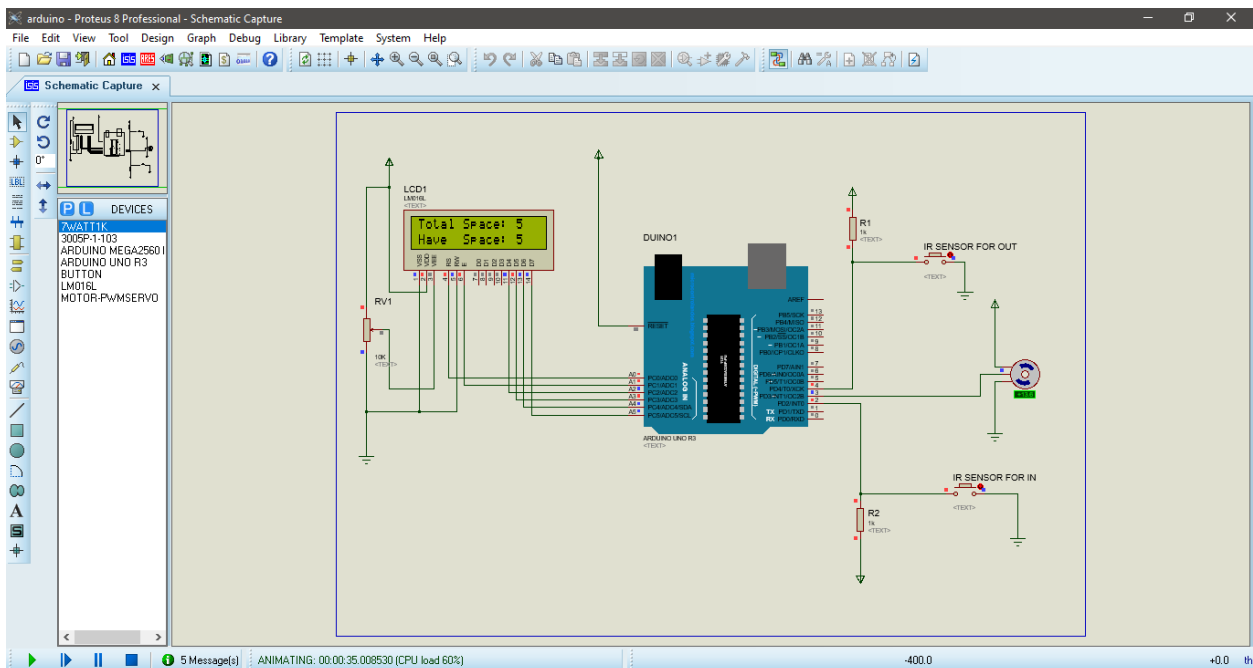
## BLOCK DIAGRAM DESCRIPTION

To design this car parking system circuit using ARDUINO UNO, we have placed IR transmitter, receiver pair at the initial position in the parking slot. IR transmitter transmits Infrared signal or rays into the environment continuously. As soon as a vehicle/ obj is encountered by the IR rays, there is a reflection and as IR receiver receives it, a digital value (0/1) is generated at the output pin which is then connected to the Arduino. The Arduino stores the signal received. And as a result, sends a signal to the servo motor via the signal wire, which decides by how much angle the servo motor has to be rotated. The servo motor rotations decides whether the barrier will open/close for the vehicle to enter/exit from the parking lot. Output from the Arduino is also sent to the LCD display. If the RS pin of the LCD is made high, and is feed an input at its data lines, the input is treated as data to display on the LCD screen. Similarly, if the RS pin is made low, and is feed an input at the data lines, then this will be treated as a command to be written to LCD controller. In this way, the LCD shows the number of vacant and occupied slots in the parking lot.

## CIRCUIT DIAGRAM

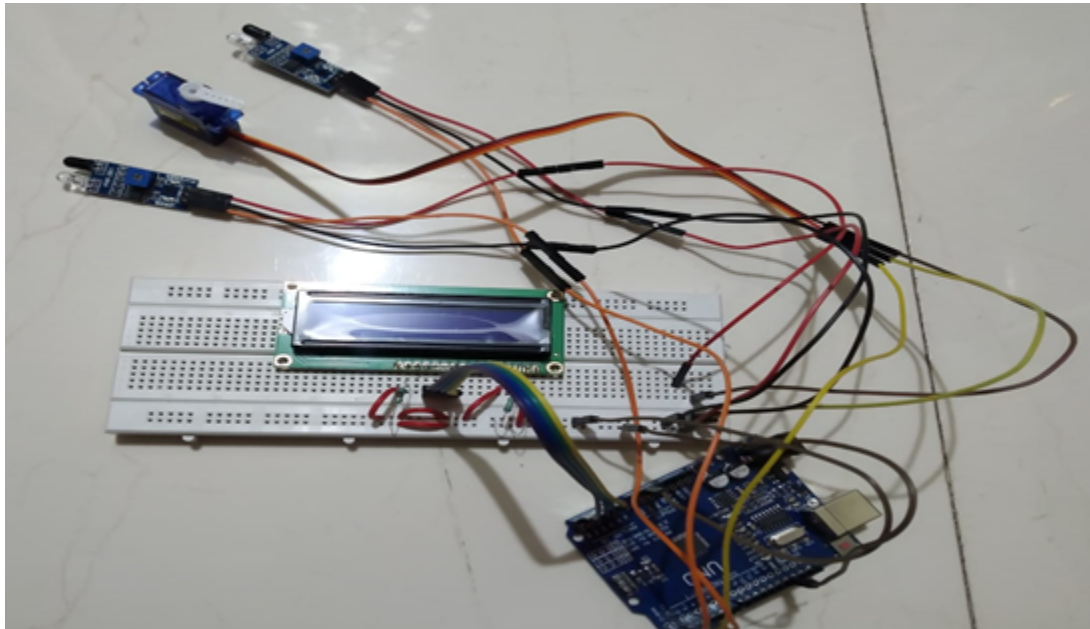


## PROTEUS SOFTWARE SIMULATION



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## HARDWARE IMPLEMENTATION



## WORKING

We have used 2 IR sensors, out of which one is at the entry point. An IR Transmitter continuously transmits IR rays into the environment, the rays reflect back to the receiver after striking any vehicle trying to get in/out of the parking area. When a vehicle approaches the first IR sensor, a signal is sent to the Arduino and in turn the Arduino sends a signal to the servo motor which in turn rotates, and the barrier thus opens/closes depending upon the respective angles of rotation.

Push buttons have been used instead of IR transmitter receiver pair while performing in the PROTEUS SOFTWARE, because we cannot use IR transmitter receiver pair in the PROTEUS SOFTWARE. The designing has been in a way such that the servo motor rotates from 0 degrees to 100 degrees. As soon as a car approaches the first IR sensor, a high output signal is sent from the IR sensor to the Arduino, which in turn sends a signal to the servo motor and thus the servo motor rotates from 0 to 100 degrees, and the barrier opens up for the vehicle to get in. As soon as the car enters, the Have Space variable decrements by 1. After this as the car is out of the IR sensor 2, after a delay of 1 second, the barrier would close again. Now the next time, another

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vehicle approaches, the same procedure continues. Simultaneously, the Have Space variable would go on decrementing until it reaches the value 0. At this moment, the LCD would display the message "SPACE NOT AVAILABLE" and the barrier won't open. Now as the vehicles would start exiting out of the parking area, they would first approach the IR sensor 2, by which the barrier would open, incrementing the Have Space variable by 1 and as soon as the vehicle would be out of IR sensor 1, the servo motor would rotate from 100 to 0 degrees, closing back the barrier. Similar procedure would continue.

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## **APPLICATIONS**

The system uses Arduino UNO to handle chaos- free and guided parking.

It is so handy that it can be installed at places like:

Parking lots of offices, malls, toll plazas, commercial buildings, etc.

## **DRAWBACK**

The sensor cannot differentiate between a vehicle and any other object i.e. the system would record the entry of even a human passing through the sensor.

## **FUTURE SCOPE**

The system can be upgraded by adding image recognition software which would basically detect the shape and size of the object and differentiate between any other object and a vehicle. Thus the drawback introduced earlier can also be removed using this.