



# VIT<sup>®</sup>

## Vellore Institute of Technology

(Deemed to be University under section 3 of UGC Act, 1956)

### Project Report

Sensors and Instrumentation  
ECE1005

# Automated Car Parking System

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# ABSTRACT

"Creativity is inventing, experimenting, growing, taking risks, breaking rules, making mistakes and having fun" quoted by Mary Lou Cook, encouraged us to think on such a topic which can make our lives easier by overcoming the most common problem faced by the whole world.

Sometimes, it is very difficult to find a suitable parking place in parking lot. We have proposed a suitable solution to this problem.

Arduino has already made a huge impact on learning. The widespread acceptance gave the open-source hardware a new life, potentially challenging many industrial products and new interesting hardware prototyping and electronics. Recent transition has been made from 8 bit to 32 bits and it is expected that in future

Arduino may be seen in form of a cheap practical computer. Looking at this actionable advancement towards Arduino, allured us to make systematic and organized parking system for vehicles, using Arduino Uno.

Our Project aims at providing a confusion free and easy parking. This project helps the drivers of the cars to park their vehicles with minimum wastage of time with accurate information of the availability of the space to park.

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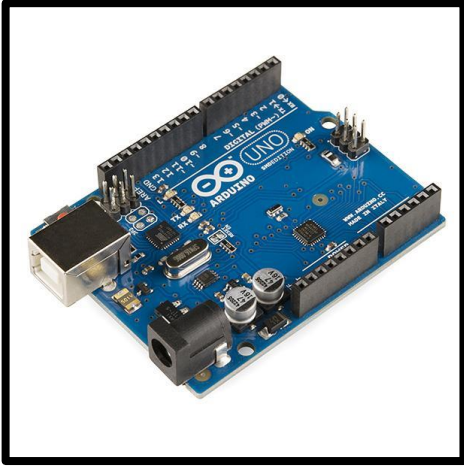
# OVERVIEW

This project's main purpose is to produce a real-life solution to the car parking problem which the whole world is facing frequently. People usually roam around in the parking lots trying to find a suitable place to park in. To solve that problem, we have created the automatic car parking system, using an open-source hardware, programmable sensors and the use of computers to provide an interface to understand the digital output produced.

It includes an Arduino Uno as the microcontroller unit to which the servo motor, LCD (with I2C) and IR sensors are interfaced. The LCD displays the availability of the space, the counter keeps the check of the number of cars entering and exiting the parking space, the servo motor helps as a gate for the entry and exit of the cars.

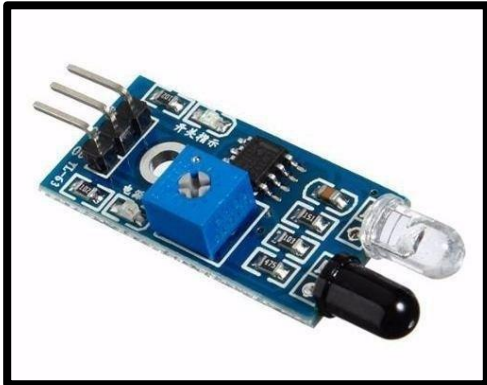
# COMPONENTS REQUIRED

## 1 . Arduino UNO



Arduino Uno a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs). It also has 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It is the most widely used and user-friendly microcontroller.

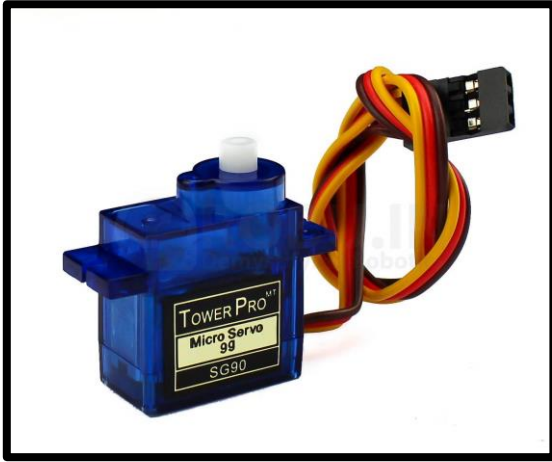
## 2 . IR Sensor



An infrared (IR) sensor is an electronic device that measures and detects infrared radiation in its surrounding environment. An IR sensor can measure the heat of an object as well as detect the motion.

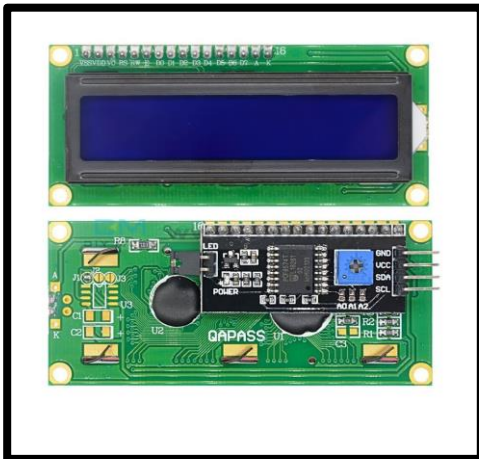
Usually in the infrared spectrum, all the objects radiate some form of thermal radiations. These types of radiation are invisible to our eyes, which can be detected by an infrared sensor. Its operating voltage is 3V to 6V. Its operating range is 2cm to 30cm with an operating angle of 35°

### 3 . Servo Motor



A servo motor is a rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity and acceleration. Servo can rotate approximately 180°. It has an operating voltage of 5V and operating speed 0.12sec/60° with torque of 1.8 Kg-cm.

### 4 . 16 X 2 LCD with I2C Module



This is a 16x2 LCD display screen with I2C interface. It is able to display 16x2 characters on 2 lines, white characters on blue background. This I2C 16x2 Arduino LCD Screen is using an I2C communication interface. It means it only needs 4 pins for the LCD display: VCC, GND, SDA, SCL. It will save at least 4 digital/analog pins on Arduino. All connectors are standard and can be connected with the jumper wire directly.

## 5 . Jump Wires



A jump wire (also known as jumper, jumper wire, jumper cable, DuPont wire or cable) is an electrical wire, or group of them in a cable, with a connector or pin at each end (or sometimes without them – simply "tinned"), which is normally used to interconnect the components of a breadboard or other prototype or test circuit, internally or with other equipment or components, without soldering.

## 6 . Breadboard



A breadboard is a solderless device for temporary prototypes with electronics and test circuit designs. Most electronic components in electronic circuits can be interconnected by inserting their leads or terminals into the holes and then making connections through wires where appropriate. The breadboard has strips of metal underneath the board and connects the holes on the top of the board. Note that the top and bottom rows of holes are connected horizontally and split in the middle while the remaining holes are connected vertically.

# METHODOLOGY

Car Parking System Using Arduino is a vehicle stopping framework that helps drivers locate an empty spot.

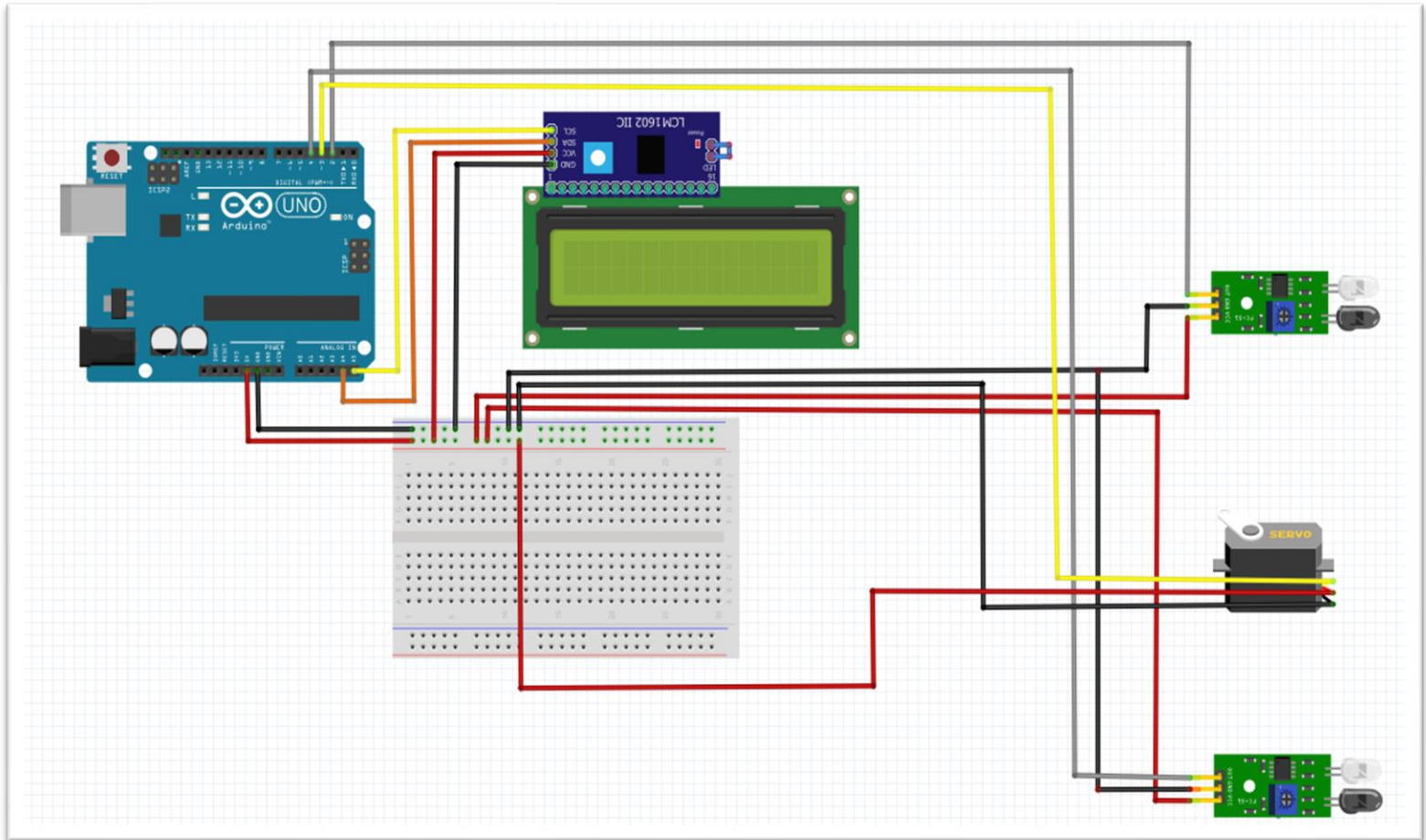
The idea behind our project is: when a car is entered, then the first IR sensor will detect that and give a signal to the servo motor to rotate. The servo motor will rotate from  $0^{\circ}$  to  $90^{\circ}$  which means the gate is now opened. Now when the car passes through the gate and reach near IR sensor 2, then it detects that the car has passed through the gate. And after 1 sec delay, it again gives a signal to rotate the servo motor and hence the gate is closed. This will reserve a slot.

This exact same principle is applied when a car leaves the parking slot. And this releases a reserved slot.

In this project, we have 5 parking slots. Suppose all the five slots are full and a sixth car enters the slot, as soon as the first IR sensor detects the car, it will send signal not to open the gate and the LCD will display “ **Sorry! Parking Full** ”.



# CIRCUIT DIAGRAM



# WORKING VIDEO

[YouTube](#)

[Google Drive](#)

Slot 1

Slot 4

Slot 2

Slot 5

Slot 3

Arduino  
UNO

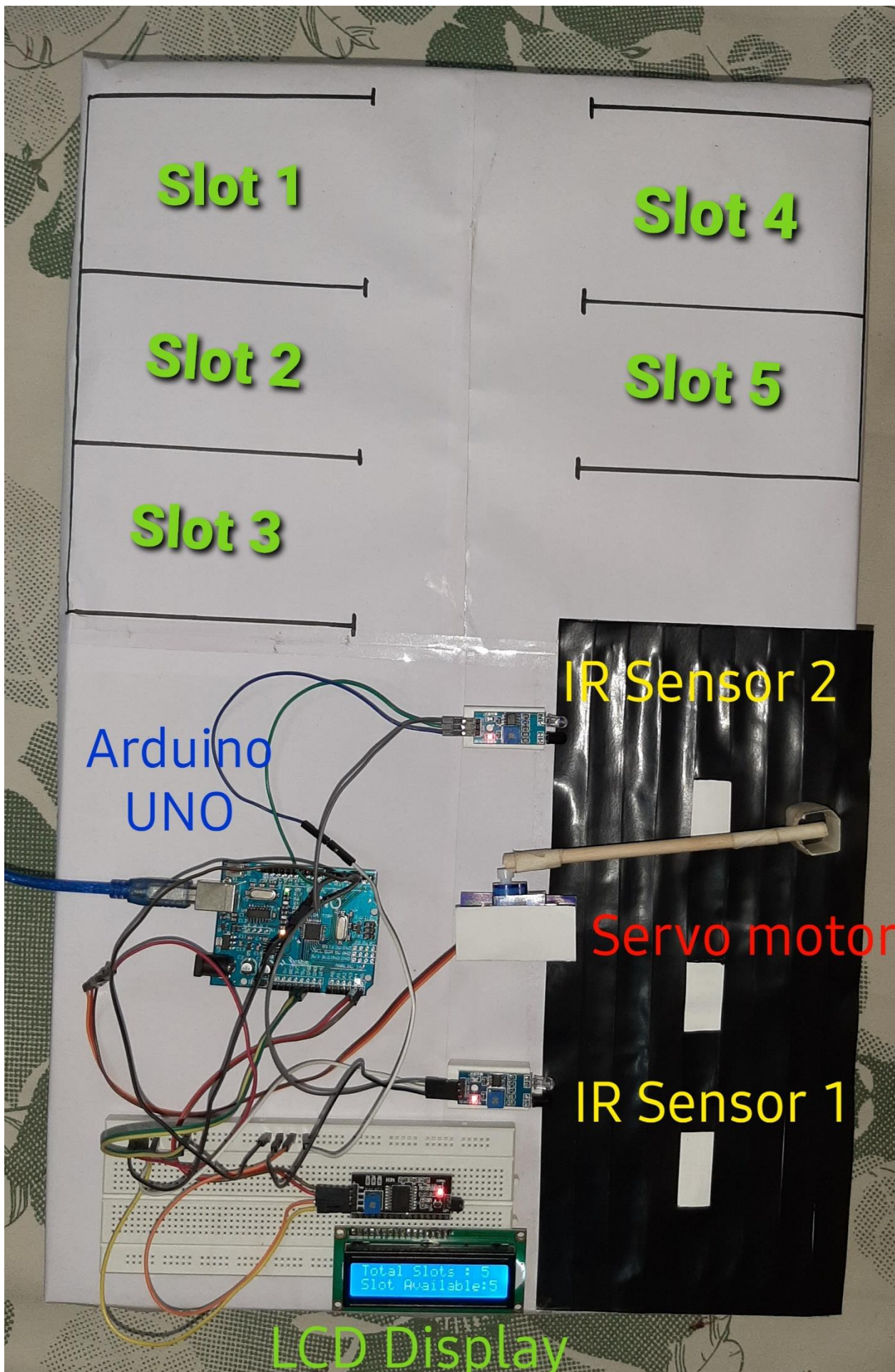
IR Sensor 2

Servo motor

IR Sensor 1

LCD Display

Total Slots : 5  
Slot Available:5



# CONCLUSION & FUTURE WORK

Our project detects the empty slots and helps the drivers to find parking space in unfamiliar city. The average waiting time of users for parking their vehicles is effectively reduced in this system. The optimal solution is provided by the proposed system, where most of the vehicles find a free parking space successfully. Our preliminary test results show that the performance of the Arduino UNO based system can effectively satisfy the needs and requirements of existing car parking hassles thereby minimizing the time consumed to find vacant parking lot and real time information rendering. This smart parking system provides better performance, low cost and efficient large scale parking system.

In future, this framework can be enhanced by including different applications, For Example, internet booking by utilizing GSM. The driver or client can book their parking area at home or while in transit to the shopping center. This can diminish the season of the client to seeking the empty parking area. We will attempt to decrease the mechanical structure and attempt to make it eco-friendly.

Also, we can push the data to a webpage which will give us a tabular output which shows availability of parking places. This can be done using IOT.

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