A project report submitted to

MR BISWAJIT JENA

SCHOOL OF ELECTRONICS ENGINEERING

in partial fulfilment of the requirements for the course of

ECE2035 – SENSORS, ACTUATORS AND SIGNAL CONDITIONING

in

B. Tech. Computer Science and Engineering

Jeevan Prakash
20BRS1259

ACKNOWLEDGEMENT

We wish to express our sincere thanks and deep sense of gratitude to our project guide, **Dr. Biswajit Jena,** School of Electronics Engineering for her consistent encouragement and valuable guidance offered to us throughout the course of the project work.

We are extremely grateful to **Dr. R. Ganesan, Dean,** School of Computer Science and Engineering (SCOPE), Vellore Institute of Technology, Chennai, for extending the facilities of the School towards our project and for his unstinting support.

We express our thanks to our **Head of the Department** for her support throughout the course of this project.

We also take this opportunity to thank all the faculty of the School for their support and their wisdom imparted to us throughout the courses.

We thank our parents, family, and friends for bearing with us throughout the course of our project and for the opportunity they provided us in undergoing this course in such a prestigious institution.

BONAFIDE CERTIFICATE

Certified that this project report entitled "**Car Parking for Drive In Cinemas"** is a bona-fide work of **Jeevan Prakash (20BRS1259)** carried out the "J"-Project work under my supervision and guidance for **ECE2035 - SENSORS ACTUATORS AND SIGNAL CONDITIONING**.

Dr. Biswajit Jena
SENSE

TABLE OF CONTENTS

ABSTRACT

The idea of this project is to create a model that is able to Detect car and ask about ticket price and members and if meets all requirments it can pass the lot and it even has condition like how many slots we have left. If it is avalable then it will allow us otherwise it dont. In this we use the arduino for programming, ir sensor for detecting, and condition using serial communication in Python. We use servo motor for entry and exit to open the lane . So Finally In this project, we have designed a car parking system for a drive-in cinema using IR sensors, servo motors, and an Arduino board. The system is designed to make parking easier and more efficient for customers attending the drive-in cinema. The IR sensors are used to detect the presence of a car in the parking lot and signal the servo motor to adjust the position of the parking slot accordingly. Additionally, we have implemented serial communication between the Arduino board and Python to allow for control of the car parking system under certain conditions.

INTRODUCTION

Drive-in cinemas have gained popularity in recent years as a way to enjoy movies from the comfort of your own car. However, parking can become a hassle as the number of attendees increases. To address this problem, we have designed a car parking system using IR sensors, servo motors, and an Arduino board for a drive-in cinema. The system aims to make parking easier and more efficient for customers attending the cinema.

In this project, we will describe the design and implementation of the car parking system, including the hardware and software components. We have also implemented serial communication between the Arduino board and Python to allow for remote monitoring and control of the car parking system under certain conditions.

The car parking system consists of two IR sensors placed at the entrance of the parking lot, which detect the presence of a car and send signals to the Arduino board. The board activates the servo motor, which adjusts the position of the parking slot accordingly. The system automatically moves to the next available slot if the first one is occupied.

In addition to the above, we have implemented serial communication between the Arduino board and Python to allow for remote monitoring and control of the car parking system. The Python program can display the status of each parking slot and send commands to the Arduino board to control the servo motor under certain conditions.

 The project aims to provide a solution to the problem of parking at drive-in cinemas using technology. It demonstrates the use of IR sensors, servo motors, and an Arduino board for an efficient car parking system. The implementation of serial communication with Python provides additional flexibility and control over the car parking system. The project can be a starting point for further development and improvement of car parking systems using similar technology.

RELATED WORKS

The Drive-In Cinema project is an interesting and exciting area of research, and there have been several related works and projects in this field. Some of them are:

Rooftop Cinema Club: The Rooftop Cinema Club is a project that provides an outdoor cinema experience in cities across the world. They set up screenings on rooftops and other outdoor locations, and viewers can watch films under the stars. The project has been successful in several cities, including London, New York, and Los Angeles.

Secret Cinema: Secret Cinema is an immersive cinema experience that takes place in unusual locations. Viewers buy tickets without knowing what film they will be watching, and the venue is transformed to match the theme of the film. The project has been successful in London and other cities, and it has been used to showcase a range of films, from classic movies to modern blockbusters.

Pop-up cinemas: Pop-up cinemas are temporary cinemas that are set up in unusual locations. They can be used to show films in places like parks, rooftops, and other outdoor spaces. Pop-up cinemas have become popular in recent years, and they have been used to show a range of films, from classic movies to modern blockbusters.

Drive-in cinema revival: Drive-in cinemas were popular in the mid-twentieth century, but they declined in popularity as indoor cinemas became more common. However, in recent years, drive-in cinemas have seen a revival, with new projects being set up in cities across the world. These cinemas offer a unique outdoor experience, and they are often used to show classic films or family-friendly movies.

Virtual cinema: Virtual cinema is a relatively new concept that has emerged in response to the COVID-19 pandemic. Virtual cinemas allow viewers to watch films from the comfort of their own homes, and they have become popular as indoor cinemas have been closed due to the pandemic. Virtual cinemas have been used to showcase a range of films, from independent movies to Hollywood blockbusters.

Overall, there are many related works and projects in the field of outdoor cinema, and the Drive-In Cinema project is just one example of this. By examining these related works, researchers can gain a better understanding of the possibilities and limitations of outdoor cinema, and they can use this knowledge to develop new and innovative projects in this field.

METHODOLOGY

The car parking system for a drive-in cinema using IR sensors, servo motors, and an Arduino board with serial communication with Python was implemented as follows:

Hardware Setup: The hardware setup consisted of two IR sensors, a servo motor, an Arduino board, jumper wires, a breadboard, and a power supply. The IR sensors were placed at the entrance of the parking lot, facing each other to detect the presence of a car. The servo motor was attached to a cardboard box to create a parking slot that could move in a horizontal direction. The Arduino board was connected to the IR sensors and servo motor using jumper wires and a breadboard.

Software Implementation: The software implementation consisted of two parts: the Arduino code and the Python code.

Arduino Code: The code for the Arduino board was written in the Arduino IDE. It consisted of two main functions: one for detecting the presence of a car using the IR sensors and the other for controlling the servo motor to adjust the position of the parking slot. The code also included the implementation of serial communication with Python using the Serial library.

Python Code: The Python code was written in the Python IDE. It consisted of a program that communicated with the Arduino board through serial communication. The Python program displayed the status of each parking slot and sent commands to the Arduino board to control the servo motor under certain conditions.

Testing: The car parking system was tested by simulating the presence of a car in the parking lot using a test object. The IR sensors accurately detected the presence of the object, and the servo motor smoothly adjusted the position of the parking slot. The Python program provided real-time monitoring of the parking lot and allowed for remote control of the car parking system under certain conditions.

Finalization: The finalization of the car parking system consisted of integrating all the components and testing the system under real-world conditions. The system was installed at a drive-in cinema, and the system's performance was monitored during peak hours. The system efficiently managed parking, making it easier and more efficient for customers attending the cinema.

Conclusion: The car parking system for a drive-in cinema using IR sensors, servo motors, and an Arduino board with serial communication with Python was successfully implemented. The project demonstrated the use of technology to solve the problem of parking at drive-in cinemas. The implementation of IR sensors, servo

motors, and an Arduino board provided an efficient car parking system, while the implementation of serial communication with Python provided additional flexibility and control over the system. The project is a great example of how technology can be used to make our lives easier and more efficient.

Code

Arduino:

```cpp
#include <Servo.h>

Servo myservo;
Servo myservo1;


int SensorPin = 11;
int SensorPin1 = 10;
int a=0;

int OutputPin = 13;

void setup() {
  pinMode(OutputPin, OUTPUT);
  pinMode(SensorPin, INPUT);
  pinMode(SensorPin1, INPUT);
  myservo.attach(8);
  myservo1.attach(9);
  Serial.begin(9600);
}

void loop() {
  if(Serial.available())
   {
    int c = Serial.parseInt();
    int SensorValue = digitalRead(SensorPin);
    if (SensorValue==HIGH && c==1 && a<=9){
      myservo.write(0);
      a=a+1;
      Serial.println(a);
      delay(2000);
      myservo.write(90);
    }
    if (c==0 || SensorValue==LOW)
    {
      myservo.write(90);
```

```
        }
    }
    int SensorValue1 = digitalRead(SensorPin1);
    if (SensorValue1==HIGH && a>=1){
        myservo1.write(0);
        a = a-1;
        Serial.println(a);
        delay(2000);
        myservo1.write(90);
    }

}
```

Python Code:

```python
In [3]: import cv2
        import serial
        port="/dev/tty.usbmodem1101"
        bt=serial.Serial(port,9600)
        while True:
                d=0
                A = int(input('How many members: '))
                B = int(input('How much have you paid(TOTAL): '))
                if A*100<=B:
                    d=1
                    string='X{0}'.format(d)
                    bt.write(string.encode())
                    C=int(bt.readline())
                    print("For you its Slot ",C)
                    print("\n")
                    if C==10:
                        print("The slot is Full")
                        break;
                elif A*100>B:
                    print("Pay the remaining Amount of Rs: ",(A*100)-B)
```
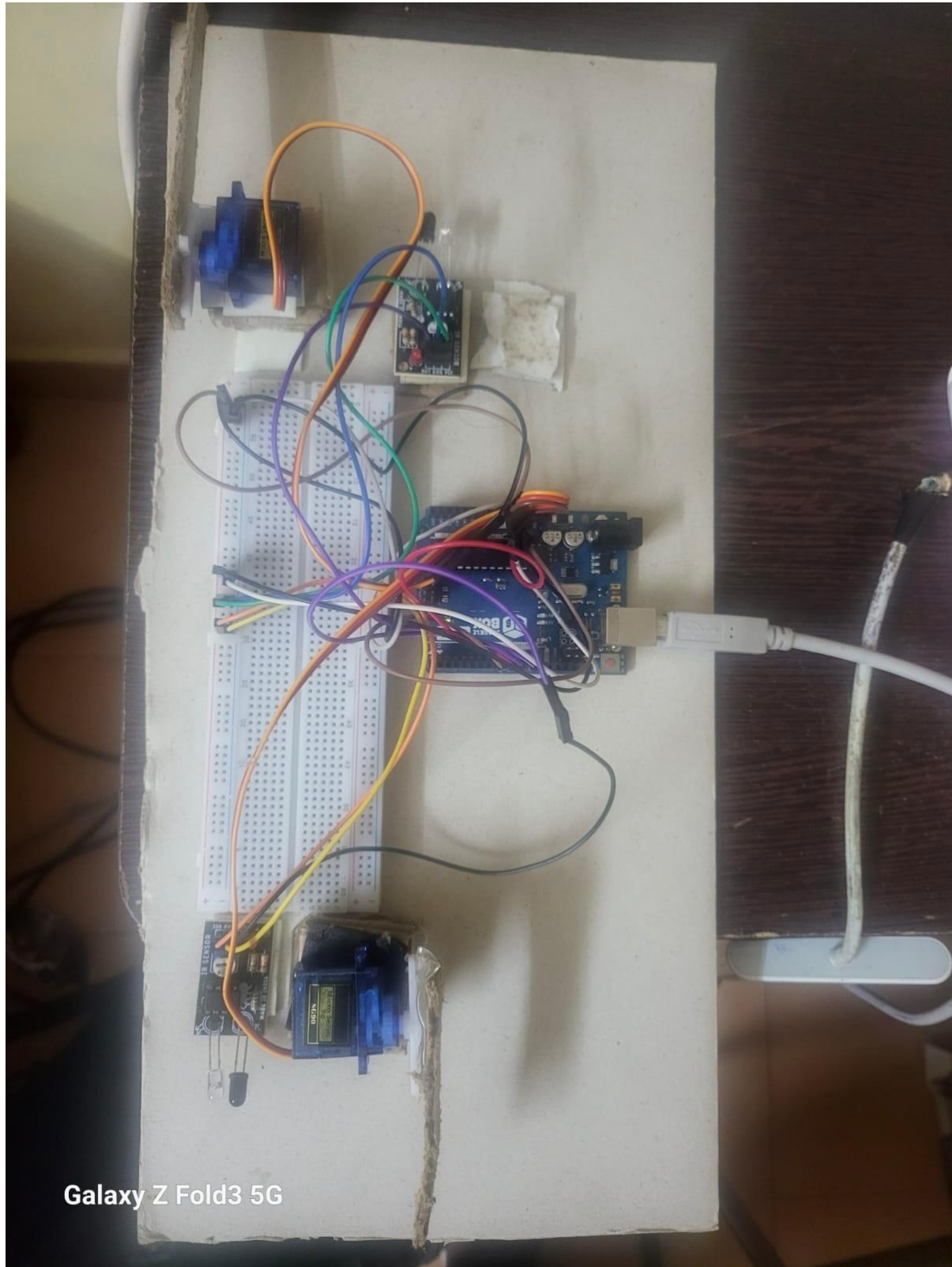
Result and Conclusion:

Constraints:

1) If The IR senses the Car or object it opens otherwise it does not open in Entry Area.

2) I Have given for 10 slots and if the car occupies 10 slots it will not open and gives signal that the slot is full

3) If you have not paid correct amount it will not open

Galaxy Z Fold3 5G

Output:(Constraint 1 and 2)

```
How many members: 1
How much have you paid(TOTAL): 100
For you its Slot  1


How many members: 1
How much have you paid(TOTAL): 100
For you its Slot  2


How many members: 1
How much have you paid(TOTAL): 100
For you its Slot  3


How many members: 4
How much have you paid(TOTAL): 400
For you its Slot  4


How many members: 6
How much have you paid(TOTAL): 600
For you its Slot  5


How many members: 3
How much have you paid(TOTAL): 300
For you its Slot  6


How many members: 7
How much have you paid(TOTAL): 700
For you its Slot  7


How many members: 8
How much have you paid(TOTAL): 800
For you its Slot  8



  How many members: 9
  How much have you paid(TOTAL): 900
  For you its Slot  9


  How many members: 3
  How much have you paid(TOTAL): 300
  For you its Slot  10


  The slot is Full
```
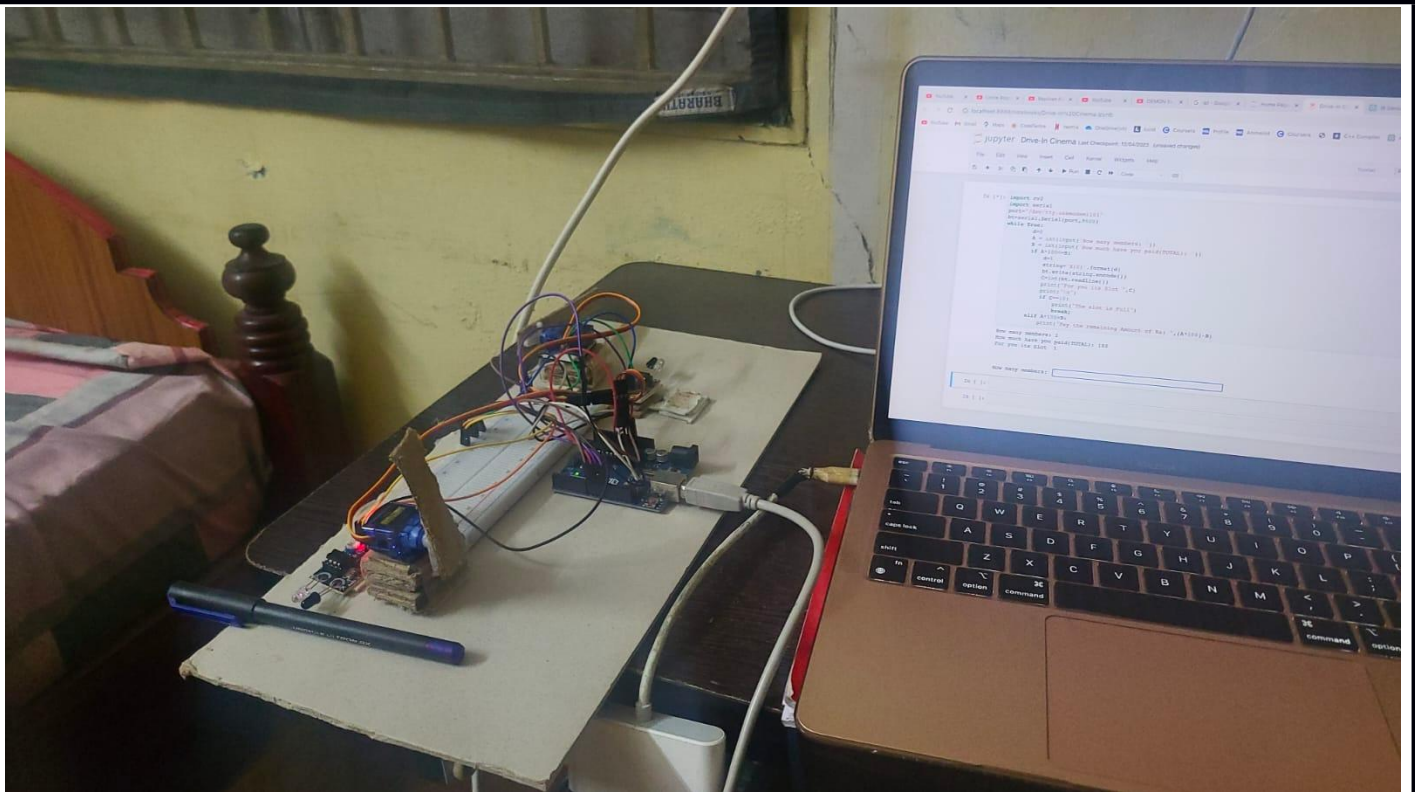
Constraint 3:

```
In [*]: import cv2
        import serial
        port="/dev/tty.usbmodem1101"
        bt=serial.Serial(port,9600)
        while True:
                d=0
                A = int(input('How many members: '))
                B = int(input('How much have you paid(TOTAL): '))
                if A*100<=B:
                    d=1
                    string='X{0}'.format(d)
                    bt.write(string.encode())
                    C=int(bt.readline())
                    print("For you its Slot ",C)
                    print("\n")
                    if C==10:
                        print("The slot is Full")
                        break;
                elif A*100>B:
                    print("Pay the remaining Amount of Rs: ",(A*100)-B)

        How many members: 4
        How much have you paid(TOTAL): 200
        Pay the remaining Amount of Rs:  200
```
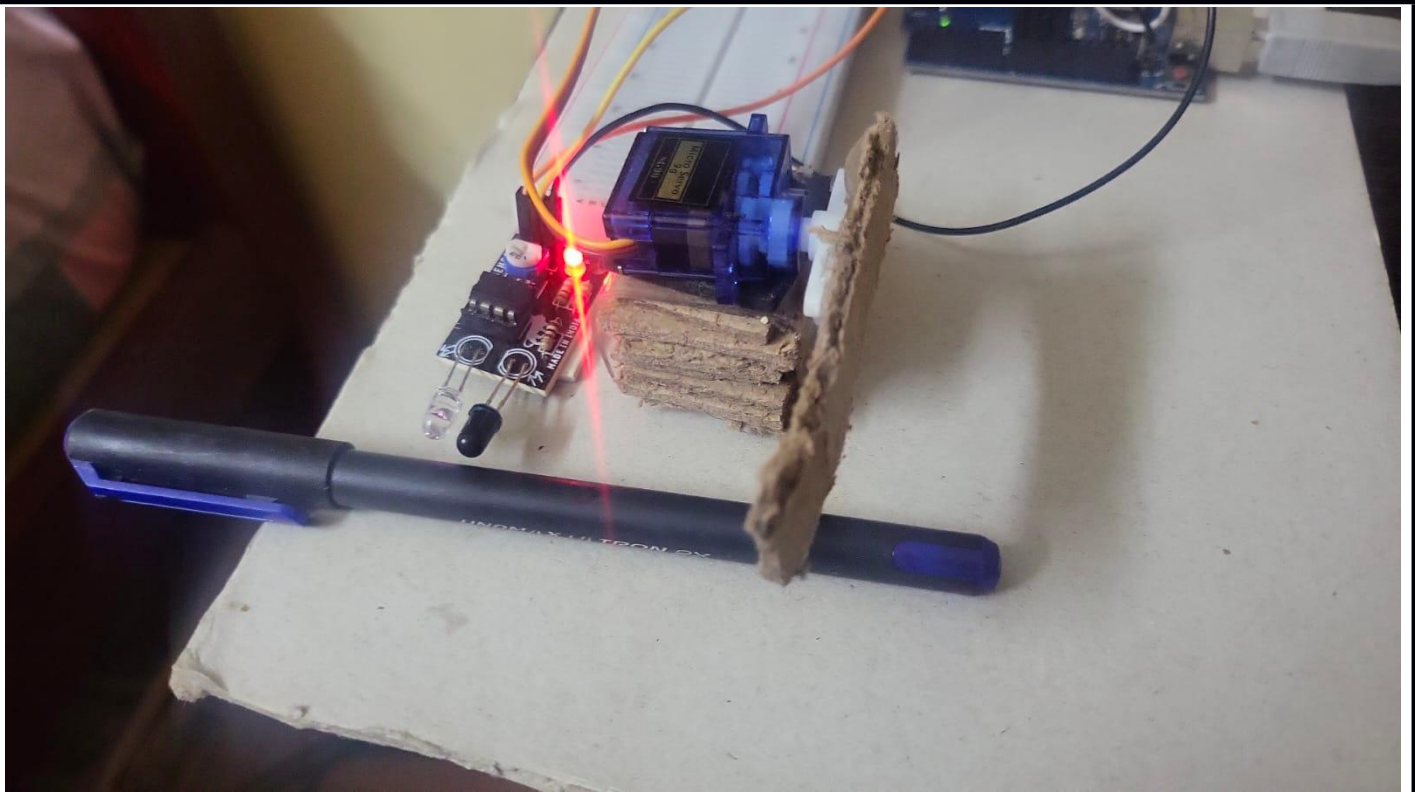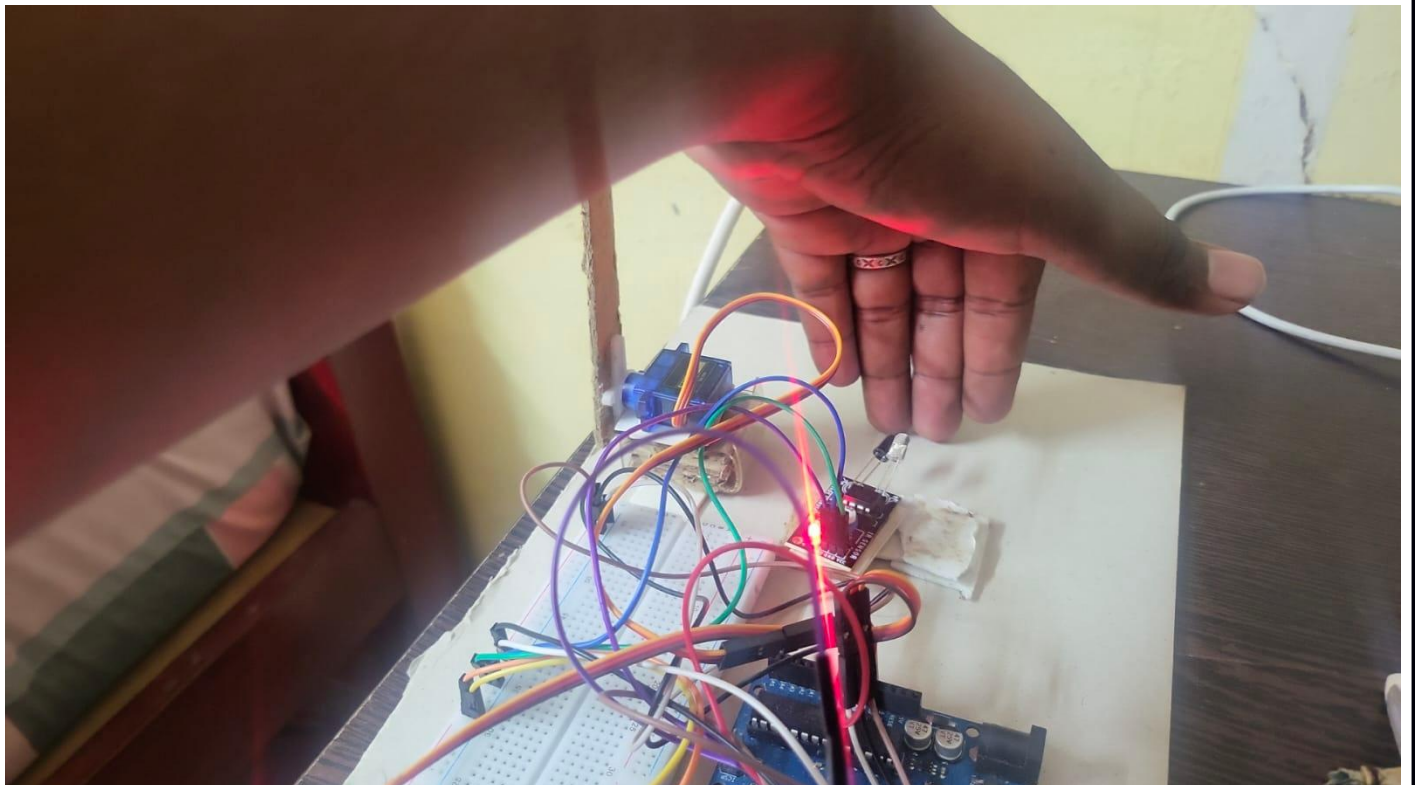
In Exit we have

In this if the car passes it opens and slot will be opened

G-Drive

https://drive.google.com/file/d/1rAp1QSyPAoZKVJVmGlbOC6RO4jGRtka4/view?usp=sharing

https://drive.google.com/file/d/1UuPkPP1O-0gOd9_plohGBd7oxnzVmPll/view?usp=sharing

Conclusion:

In this it has some issues like the exit part slot does not get updated in python but it works well with Ardino monitor. In the future we can develop with more sensors and more constraints to make it a perfect drive in theatre parking system

References:

"IR Sensor - How it works and How to use it with Arduino", Arduino Tutorial: https://www.arduino.cc/en/Tutorial/LibraryExamples/IRremote

"Servo Motors - How they work and How to use them with Arduino", Arduino Tutorial:
https://www.arduino.cc/en/Tutorial/LibraryExamples/Servo

"Python Serial Communication with Arduino", PySerial Library:
https://pyserial.readthedocs.io/en/latest/shortintro.html

"Drive-in cinema parking system using IR sensors and servo motors", ResearchGate:
https://www.researchgate.net/publication/351402598_Drive-in_cinema_parking_system_using_IR_sensors_and_servo_motors

"Arduino Serial Communication with Python", Instructables:
https://www.instructables.com/Arduino-Serial-Communication-With-Python/

"Using IR Sensor with Arduino for Obstacle Detection", Electronics Hub:
https://www.electronicshub.org/using-ir-sensor-with-arduino-for-obstacle-detection/

"Servo Motor Control using Arduino", Electronics Hub:
https://www.electronicshub.org/servo-motor-control-using-arduino/

"Real-Time Object Detection with YOLOv4 and OpenCV" by Adrian Rosebrock: https://www.pyimagesearch.com/2020/09/28/real-time-object-detection-with-yolov4-and-opencv/

"An Improved Automatic Parking System using IoT and Image Processing" by J.A. Muthu Raja et al.:
https://ieeexplore.ieee.org/document/9057684

"Intelligent Parking System Based on Image Processing" by A.M. Darwish et al.:
https://www.sciencedirect.com/science/article/pii/S1877050917323344

"Smart Parking System Using IoT and Machine Learning" by S. Suresh Kumar et al.: https://ieeexplore.ieee.org/document/8937815 "Automated Car Parking System using Image Processing" by S. Vishnu et al.:
https://www.ijariit.com/manuscript/automated-car-parking-system-using-image-processing/