

CSE 2006 - MICROPROCESSOR AND INTERFACING

FINAL REVIEW

# Automated Car Parking Allocation System

*A Microcontroller based Parking Monitoring System*

## TEAM MEMBERS

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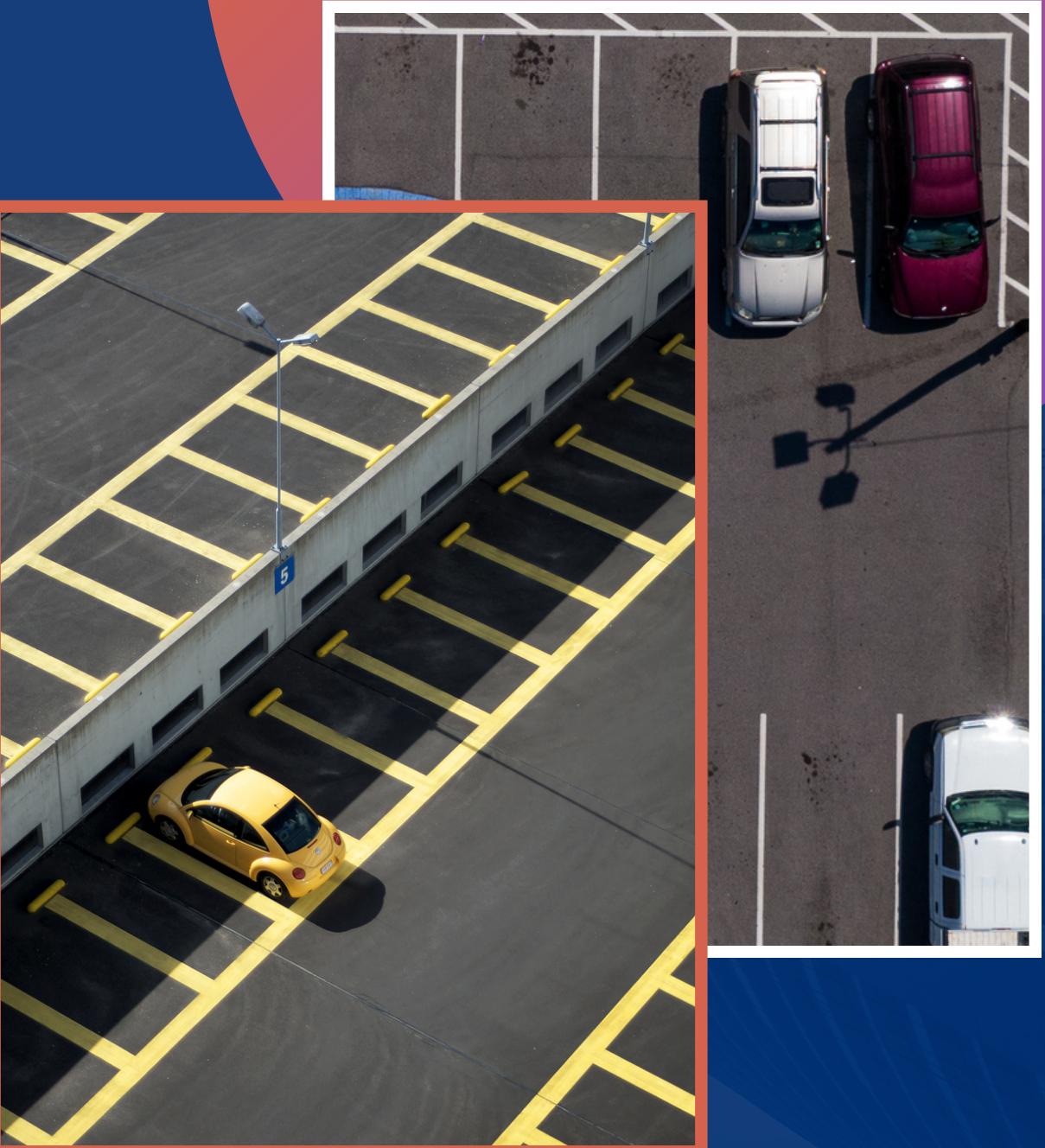
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# OBJECTIVES

The aim of this project is to provide a simple Car Parking allocation system that provides solutions to the problems in car parking allocation. Parking allocations provided in shopping complexes, malls, multi-store buildings etc usually have persons allocated to supervise manually the traffic and to allocate spaces available for parking, directing vehicles to be parked without any disturbances and making the process more complex. In this project, we are going to design and implement a prototype system model, which will regulate trafficking in parking garages along with providing information to the drivers about the availability of spaces.



# The Problem

**After reviewing so many papers we found that all the system which have proposed the parking management system earlier have some issues in real-time application.**

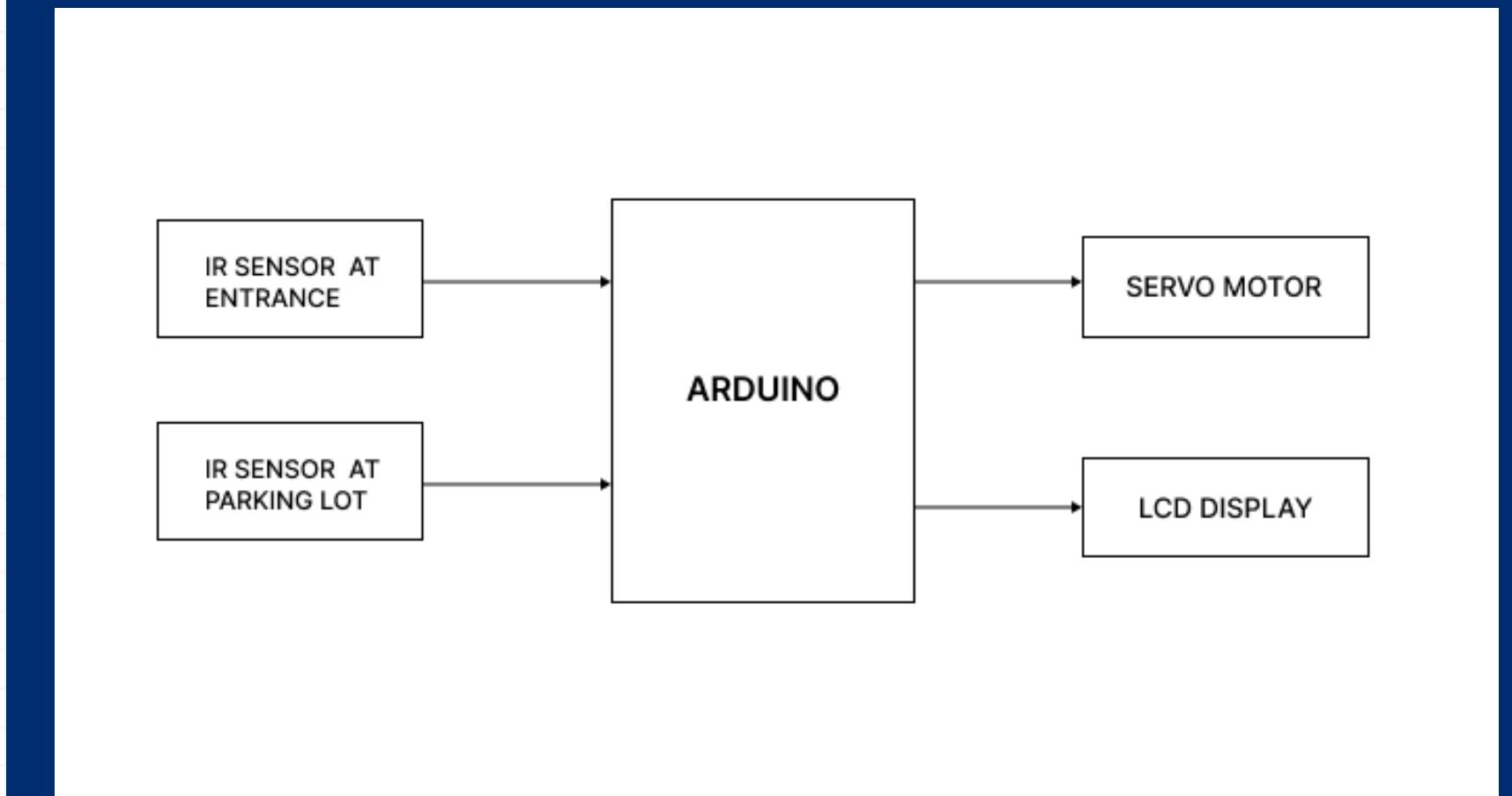
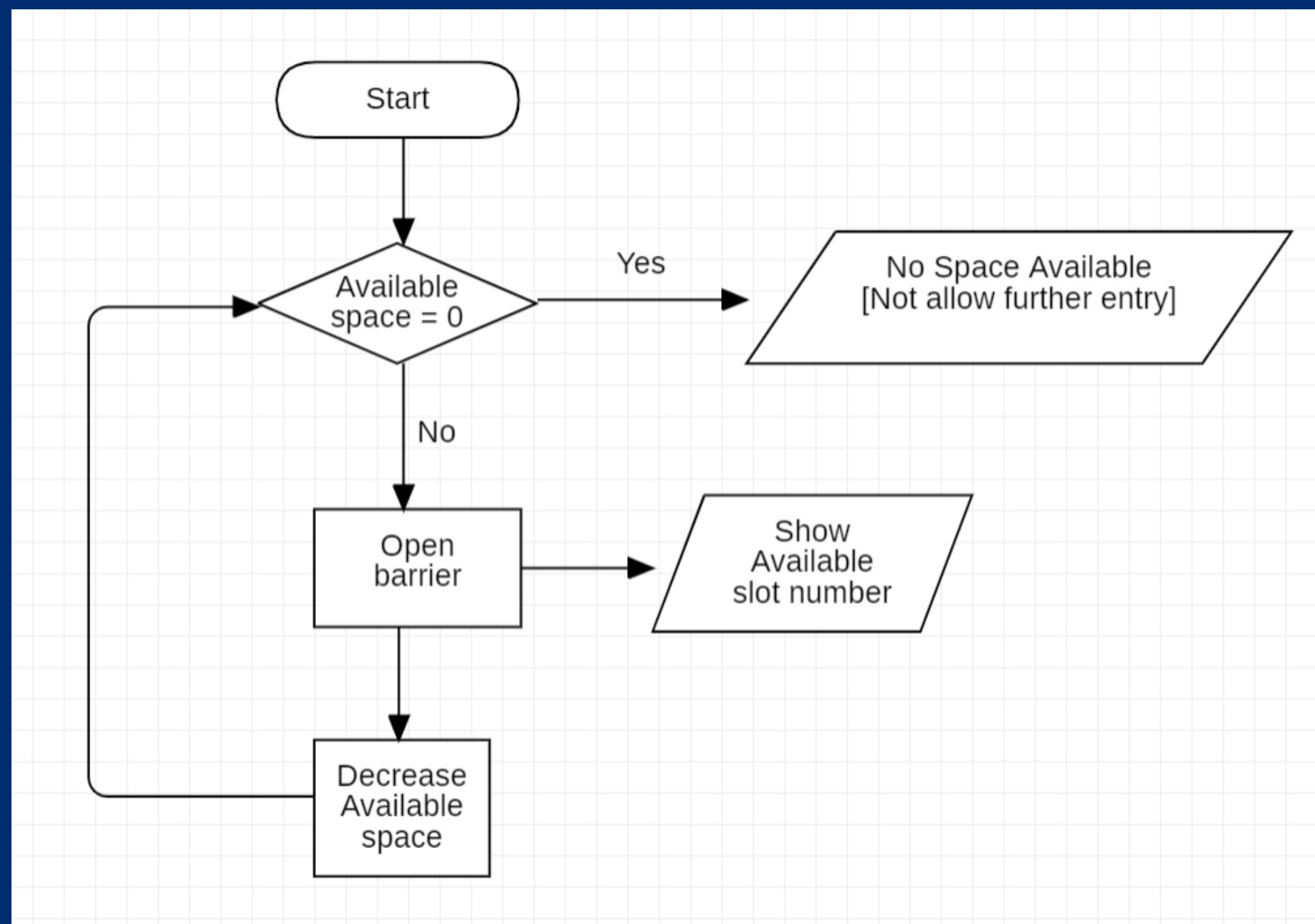
For a scenario if there are many vehicles waiting in the queue to enter the parking lot then there will be a chance of some mistake happens like when a vehicle crossed the gate, even after that the display screen will show the available slots until the vehicle has been parked to the particular available location. It leads to create a chaos in the parking lot because even the slots are not available the vehicle who are waiting in the queue will enter the parking lot. In some papers, we have found that the sensors placed at the gate senses some other objects also like if any human crosses the gate, it will sense that also and leads to incorrectness of the system.

# Proposed Model

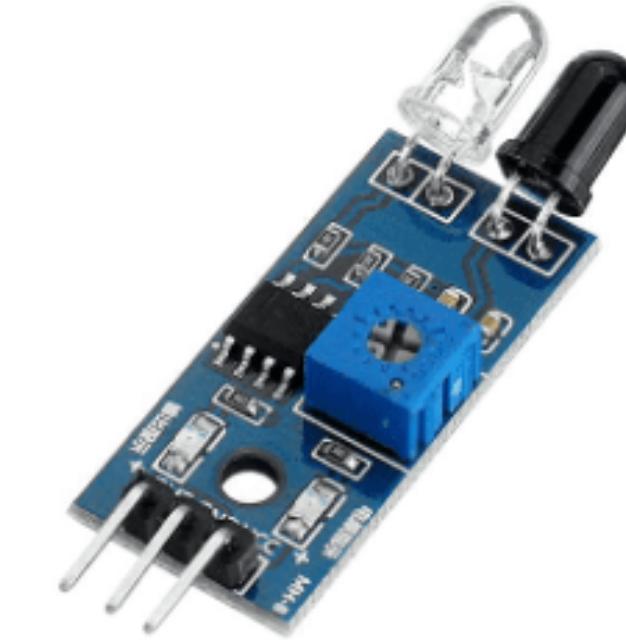
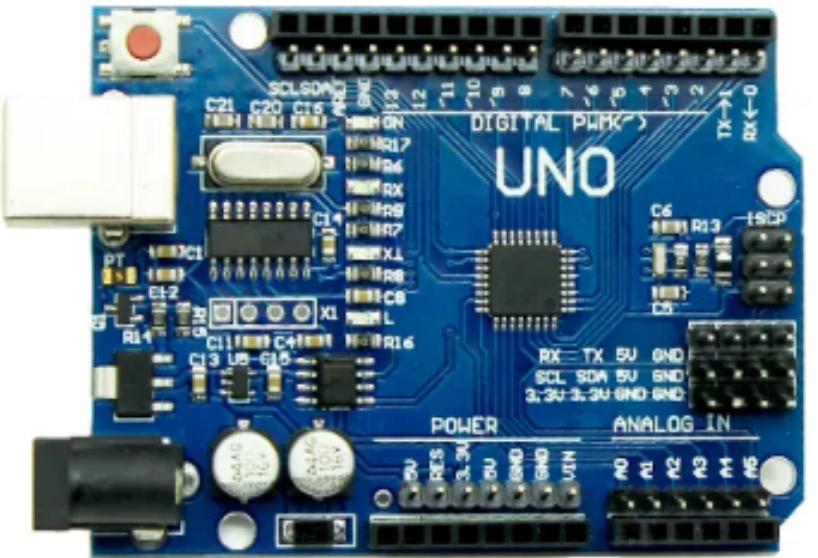


In this project, we have designed and implemented a prototype system model for automated car parking allocation system, which will regulate trafficking in parking garages along with providing information to the drivers about the availability of spaces. Also, a barrier gate has been provided whose main function is to allow and restrict vehicles inside and outside the parking garages based on the available parking slots. The IR Sensors which are placed at the gate provide information to the Arduino UNO which further pass information to the servo motor to open and close the gate. Based on that information, a screen placed at the gate shows slot information.

# Architecture diagram & System flow



# Hardware Components



## ARDUINO UNO

Arduino UNO is a microcontroller board based on the ATmega328P. The Arduino UNO board consists of digital and analog Input/Output pins (I/O), shields, and other circuits. It includes 6 analog pin inputs, 14 digital pins, a USB connector, a power jack, and an ICSP (In-Circuit Serial Programming) header. It is programmed based on IDE via a type B USB cable. It can be powered by the USB cable or by an external 9-volt battery, though it accepts voltages between 7 and 20 volts.. It can run on both online and offline platforms.

## IR Proximity Sensor

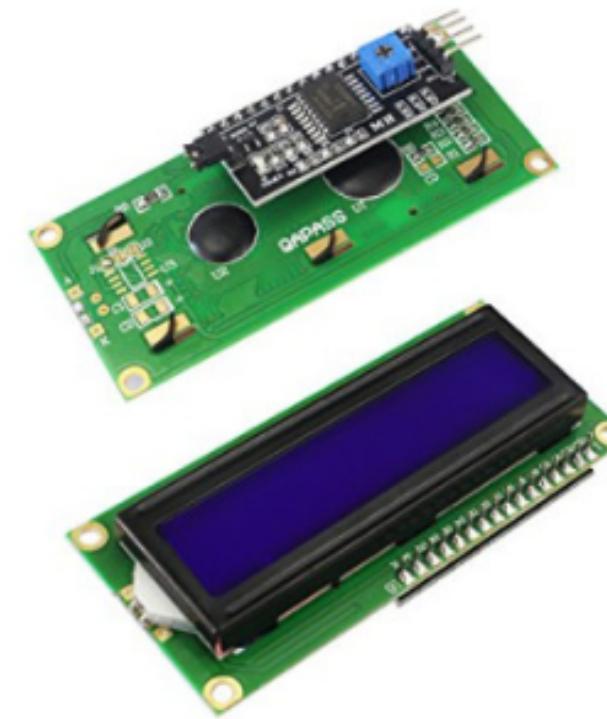
IR Proximity Sensor is a multipurpose infrared sensor which can be used for obstacle sensing, color detection, fire detection, line sensing, etc and also as an encoder sensor. The sensor provides a digital output. The sensor outputs a logic one(+5V) at the digital output when an object is placed in front of the sensor and a logic zero(0V), when there is no object in front of the sensor. An onboard LED is used to indicate the presence of an object. This digital output can be directly connected to an Arduino or any other microcontroller to read the sensor output.

# Hardware Components



## Servo Motor

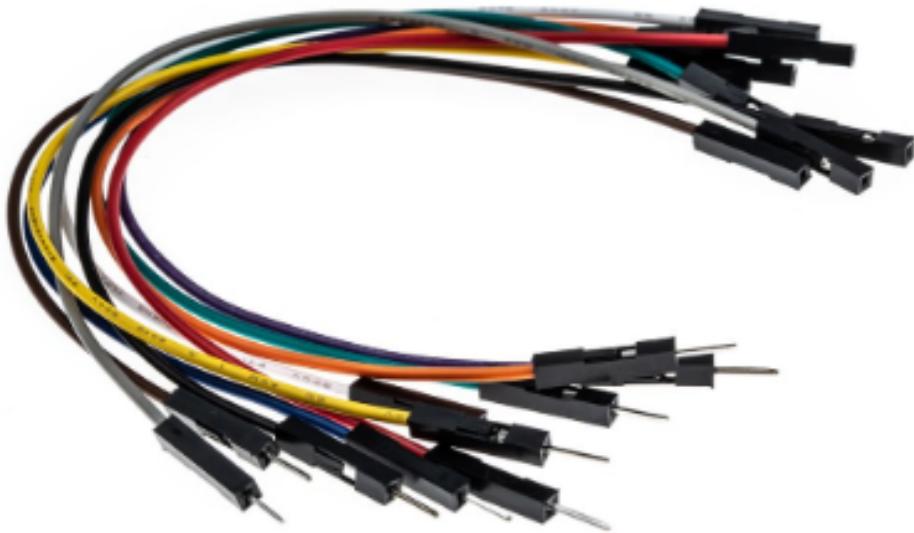
A servo motor is a self-contained electrical device that rotates parts of a machine with high efficiency and with great precision. The output shaft of this motor can be moved to a particular angle, position and velocity that a regular motor does not have. The Servo Motor utilizes a regular motor and couples it with a sensor for positional feedback.



## 20x4 LCD Display with I2C module

In a 20x4 LCD module, there are four rows in display and in one row twenty characters can be displayed and in one display eighty characters can be shown. This liquid crystal module uses HD44780 (It is a controller used to display monochrome text displays) parallel interfacing. I2C is known as Inter-Integrated Circuit (I2C) communication. It is used to establish communication between two or more ICs (Integrated Circuits). It could also be used as a communication protocol between two ICs that are located on the same PCB.

# Hardware Components



## Jumpers

Jumper wires are simply wires that have connector pins at each end, allowing them to be used to connect two points to each other without soldering. Jumper wires are typically used with breadboards and other prototyping tools in order to make it easy to change a circuit as needed.



## Female and male header

Pin headers are stiff metallic connectors that are soldered to a circuit board and stick up to receive a connection from a female socket. While pin headers (often called PH, or headers) are male by definition, female equivalents are also quite common, and we refer to them as female headers (FH) or header connectors.

# Software Components



## Arduino IDE

A screenshot of the Arduino IDE interface. The title bar reads "sketch\_feb01a | Arduino 1.8.13". The menu bar includes File, Edit, Sketch, Tools, and Help. The toolbar contains icons for save, upload, and other functions. The main code editor window displays the following sketch:

```
sketch_feb01a
void setup() {
  // put your setup code here, to run once:

}

void loop() {
  // put your main code here, to run repeatedly:

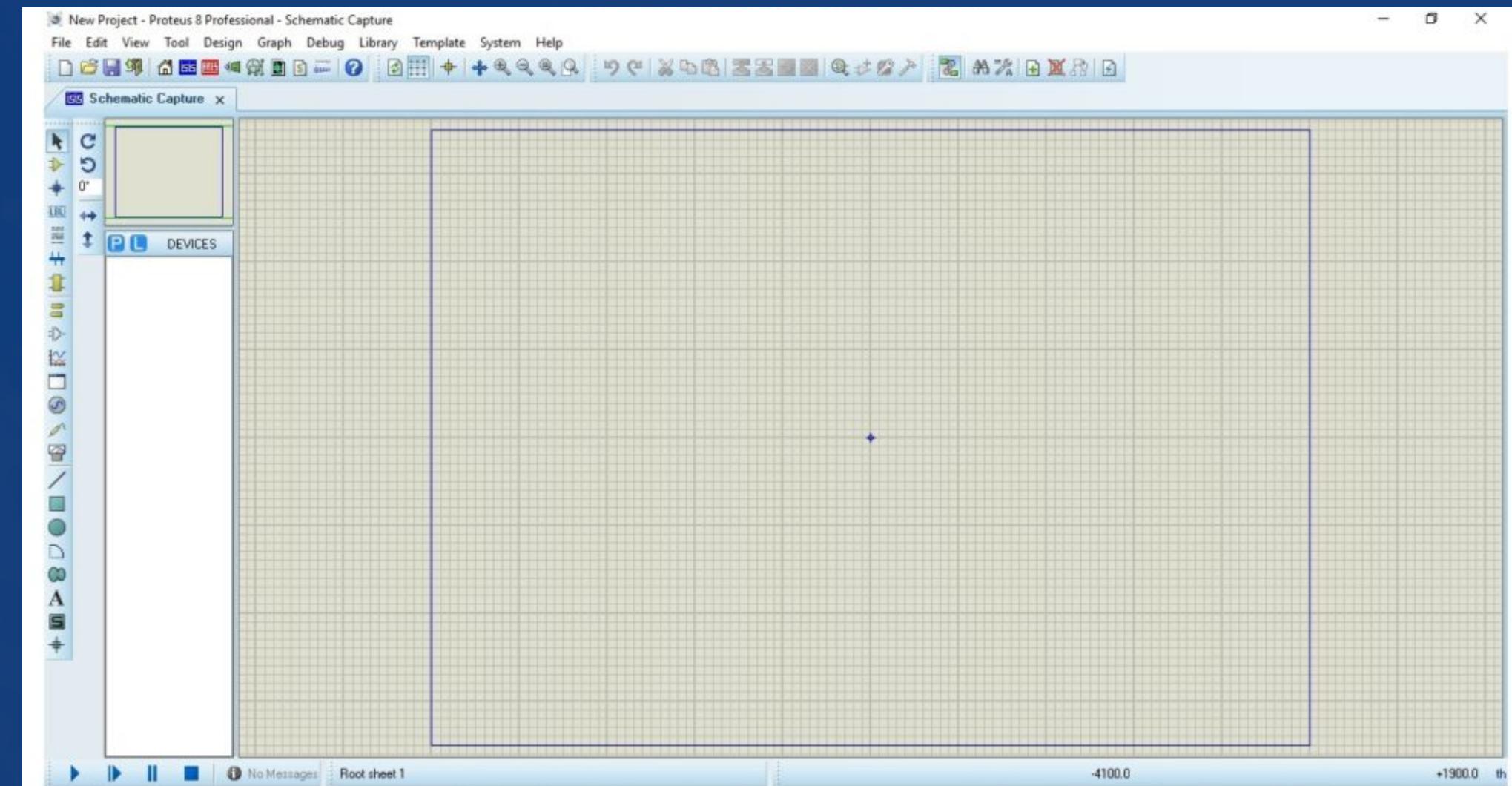
}
```

The status bar at the bottom shows the text "Arduino/Genuino Uno on COM45".

# Software Components

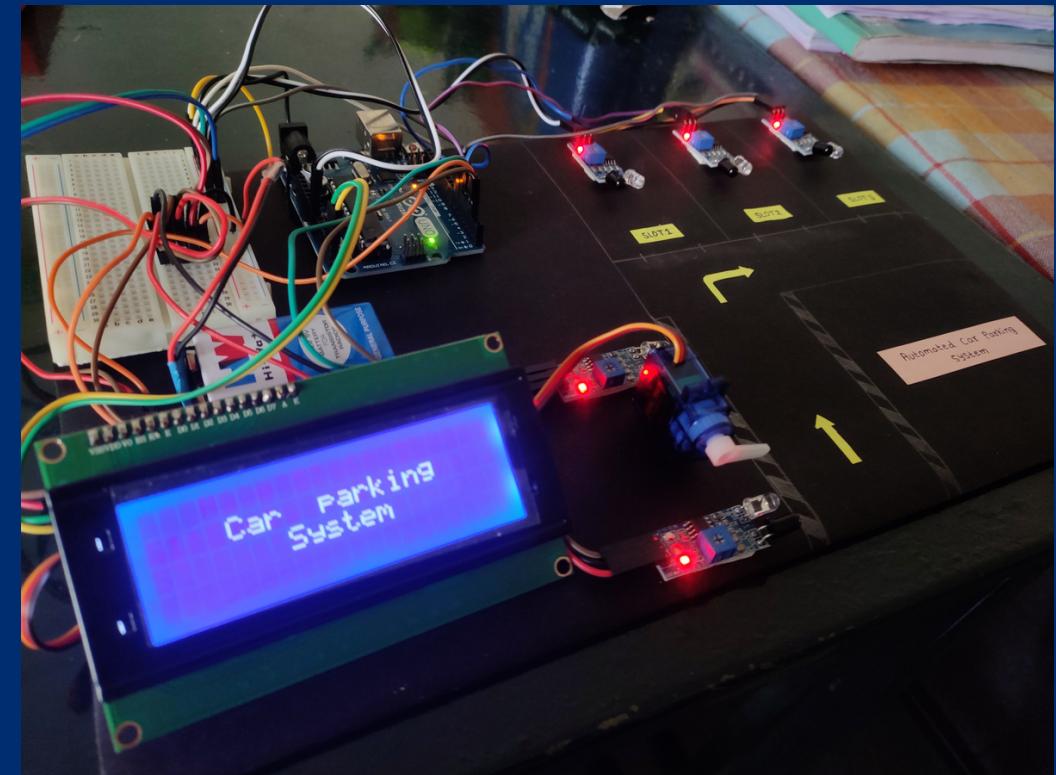


## Proteus Simulation

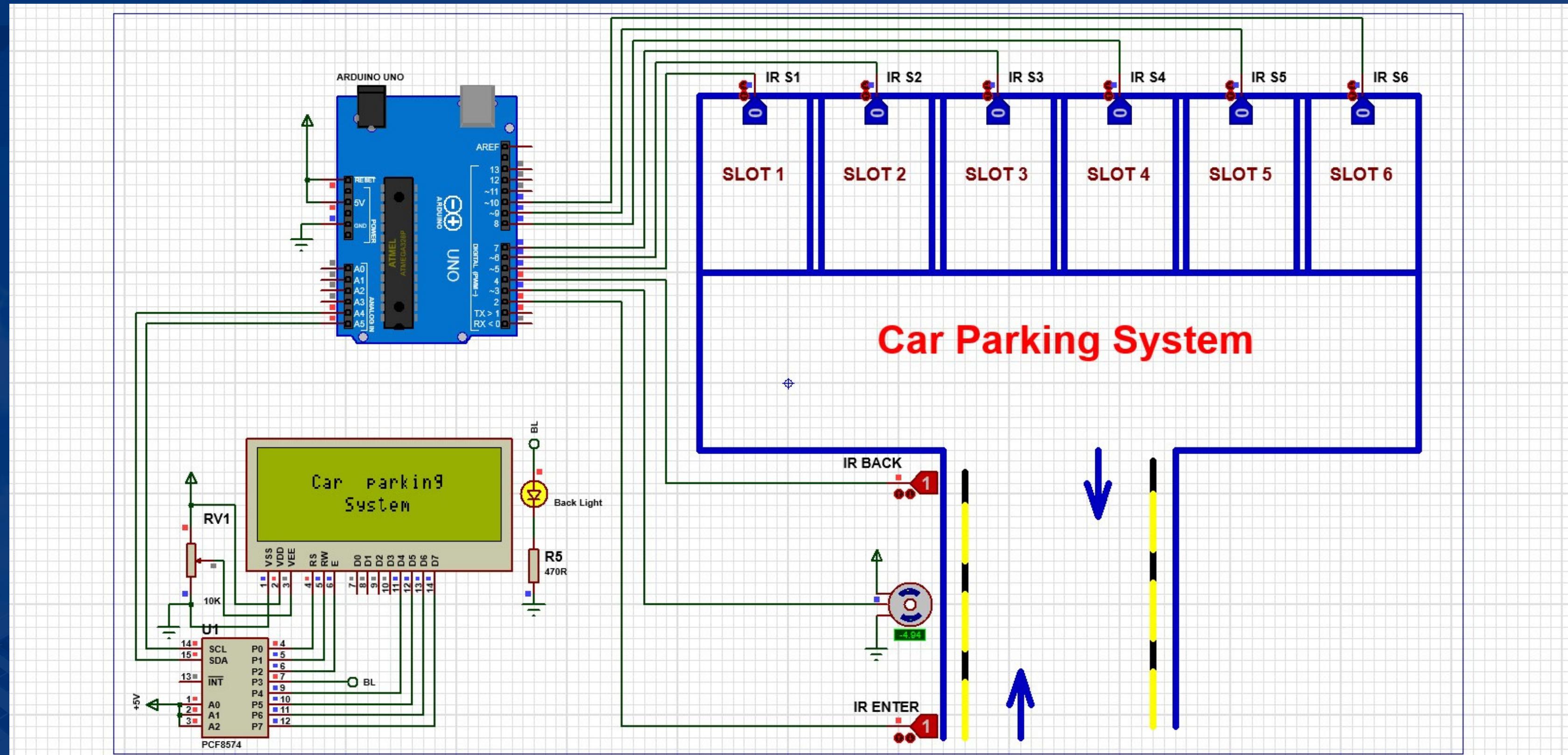


# Results

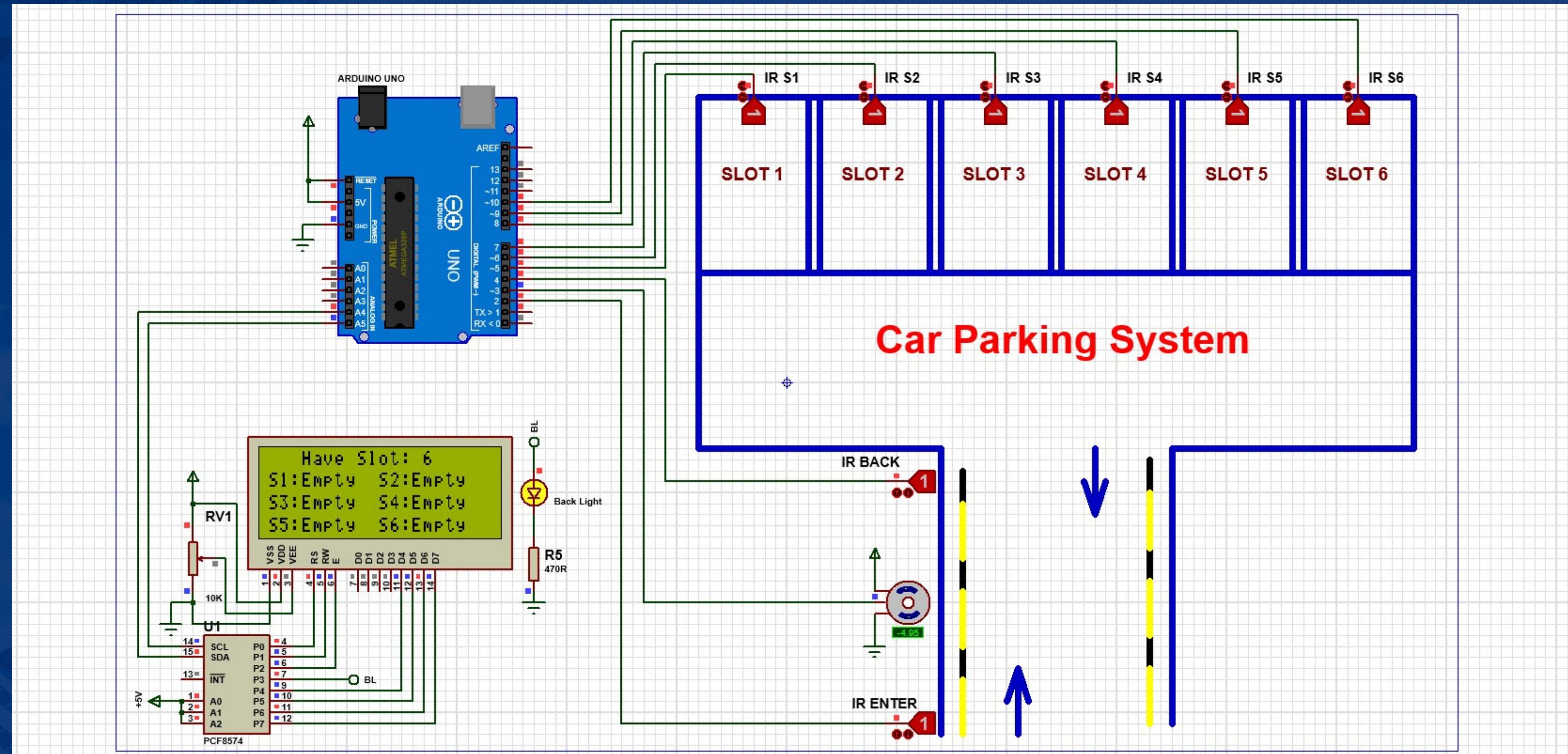
In this project, we have done the software simulation of the model and have also built the prototype. This model contains Arduino UNO, 20x4 LCD Display with I2C module, servo motor and IR proximity sensors. The first two IR sensors which are adjacent to the servo motor are used to maintain the count of available slots in the parking lot. Whenever any vehicle passes through these two IR sensors from out to in direction then the available slot count will decrease by one and whenever any vehicle passes from in to out direction then the available slot will be increased by one. Other sensors which are placed at the slot in the parking lot will provide information about which slot is available and which one is full. When slots are available and the vehicle tries to enter in the parking lot then by the use of a servo motor the gate will be opened. The LCD screen will be fixed at the main gate to provide full information about the parking lot.



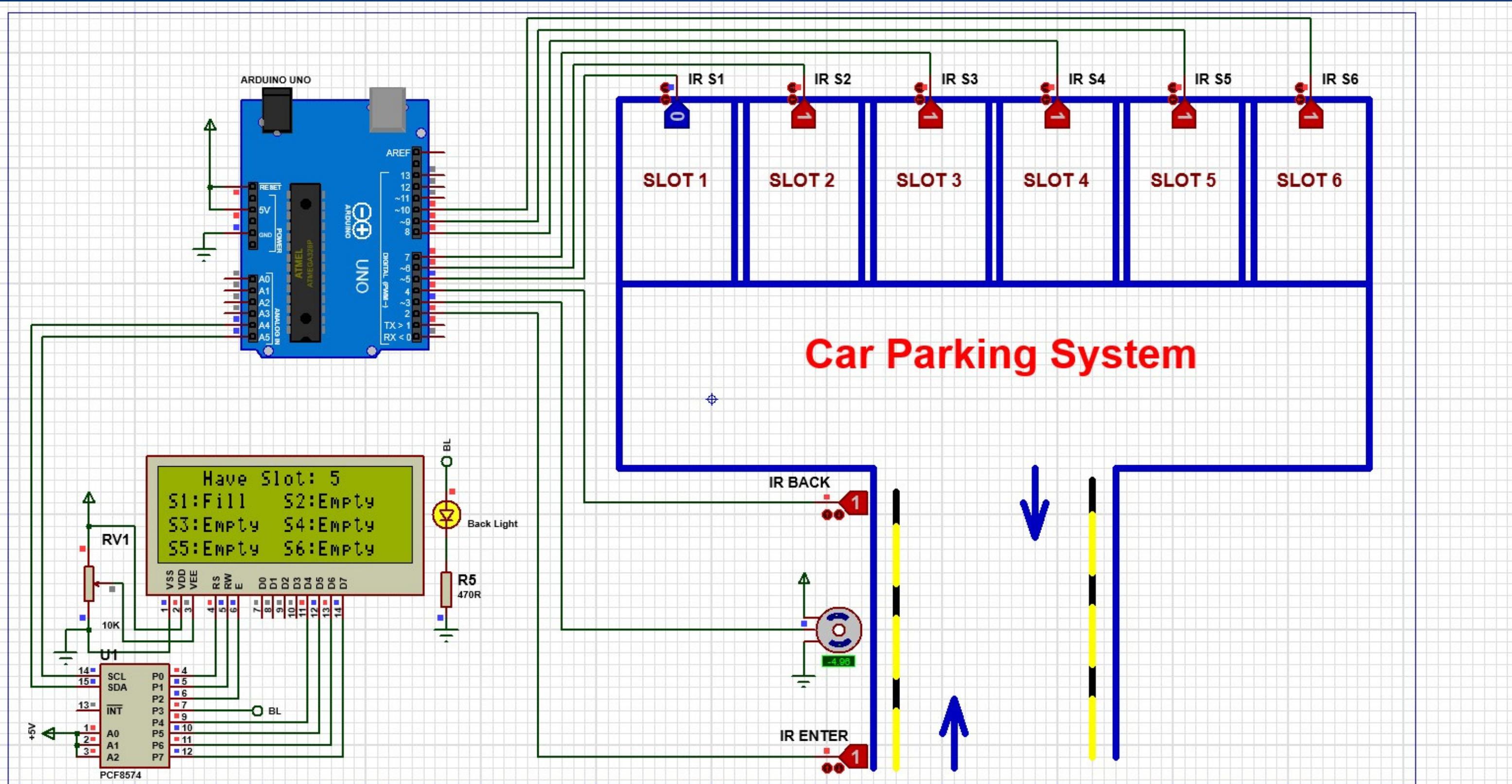
# Proteus Simulation



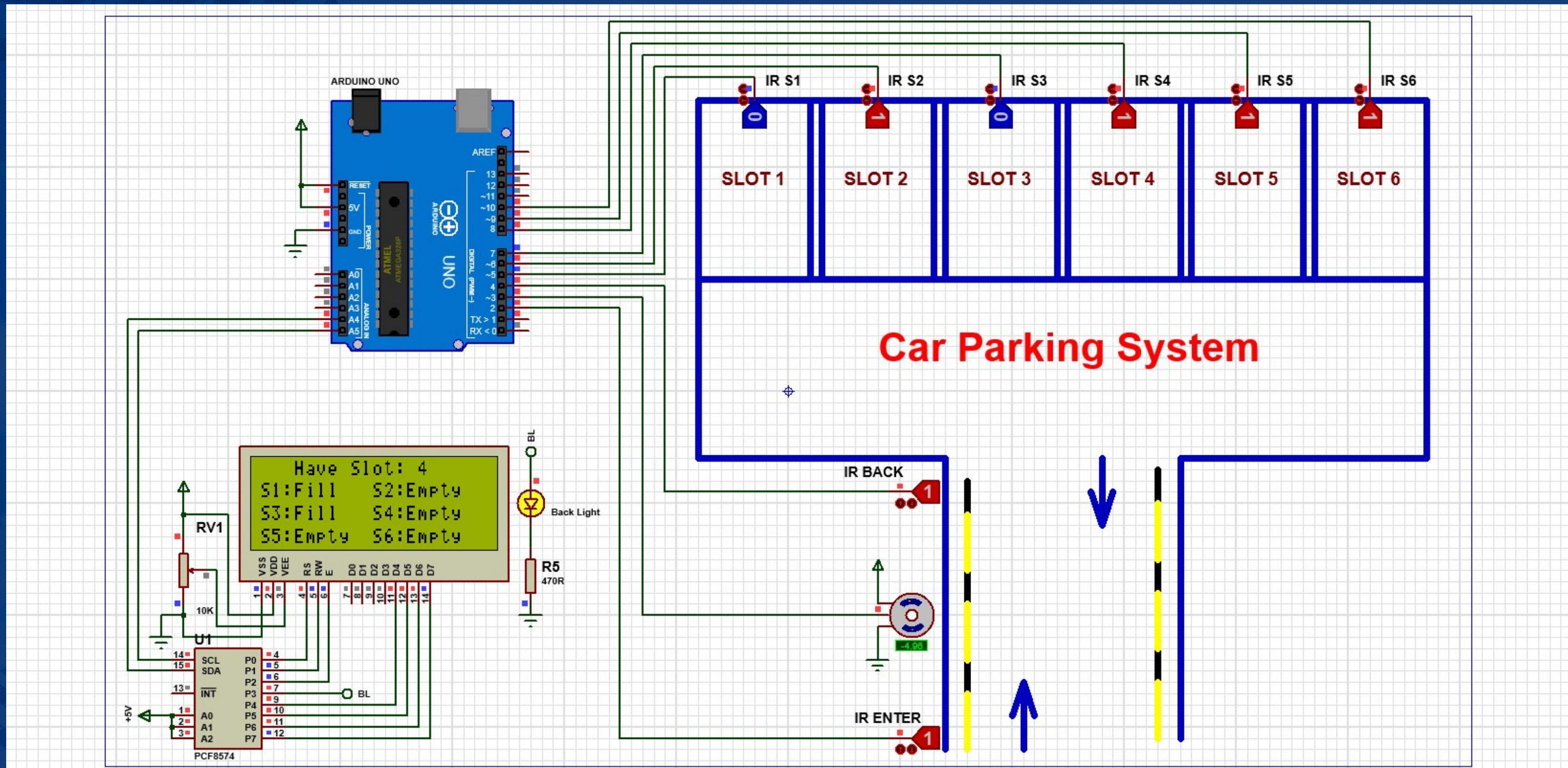
# Proteus Simulation



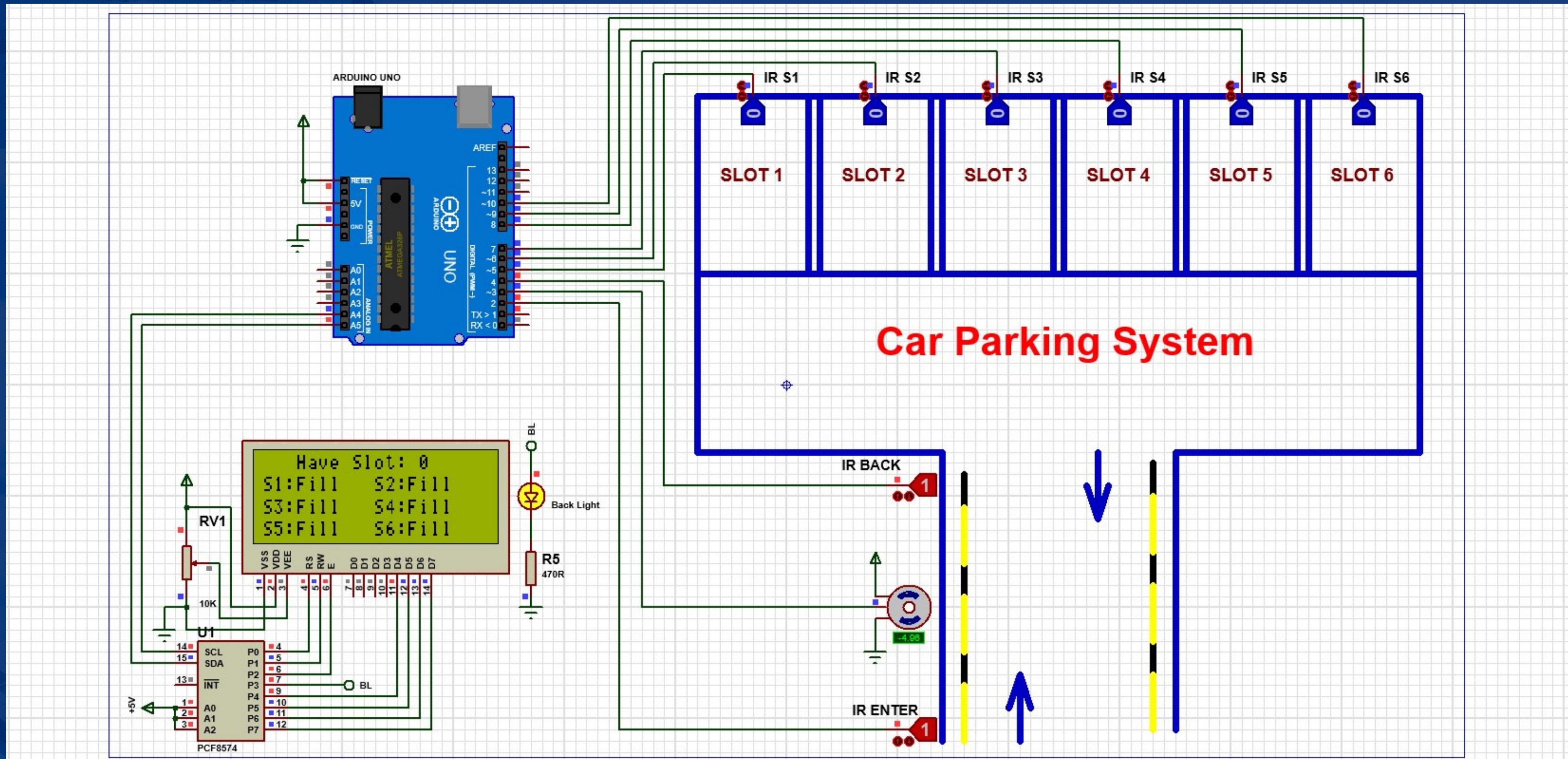
# Proteus Simulation



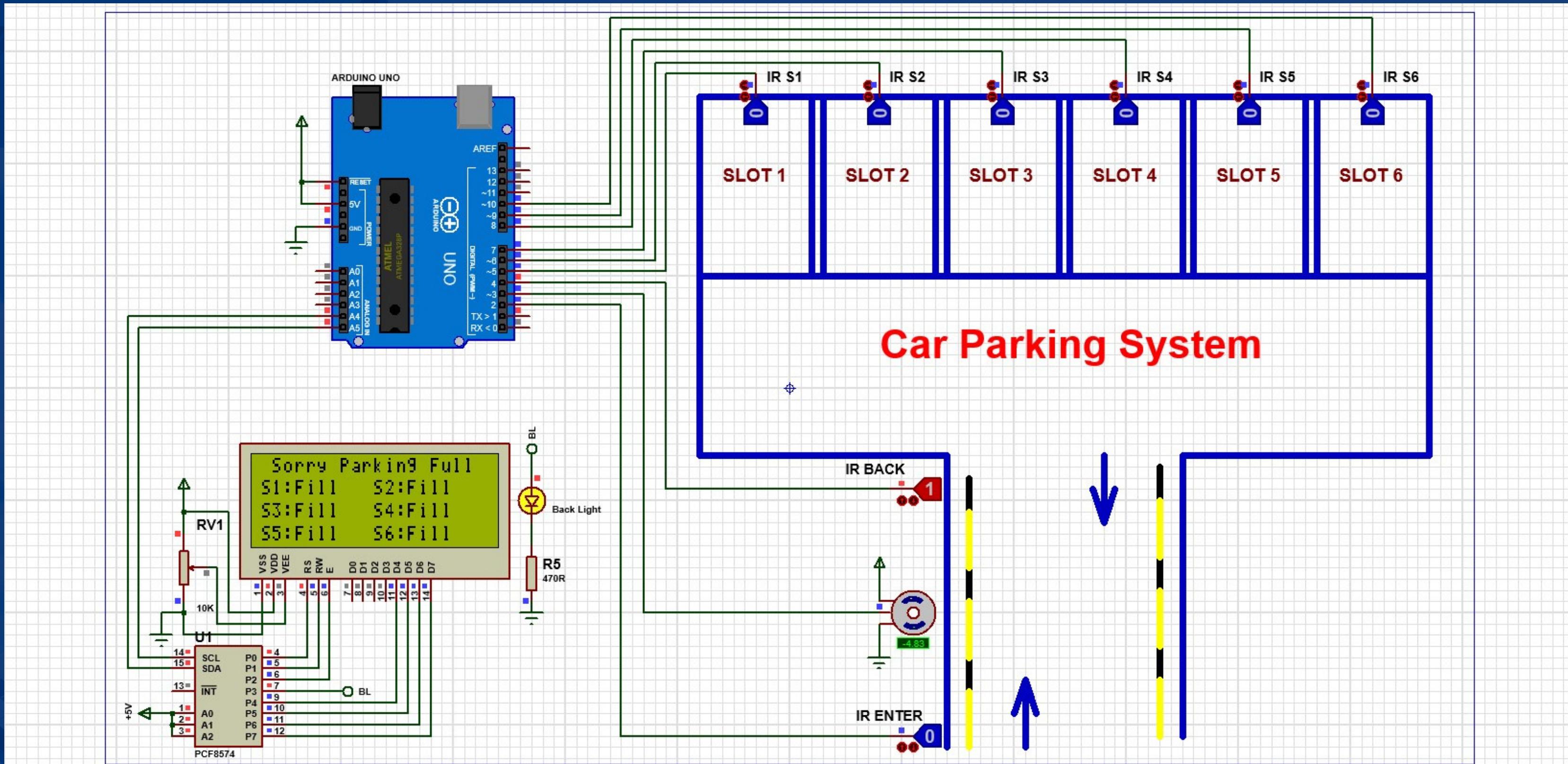
# Proteus Simulation



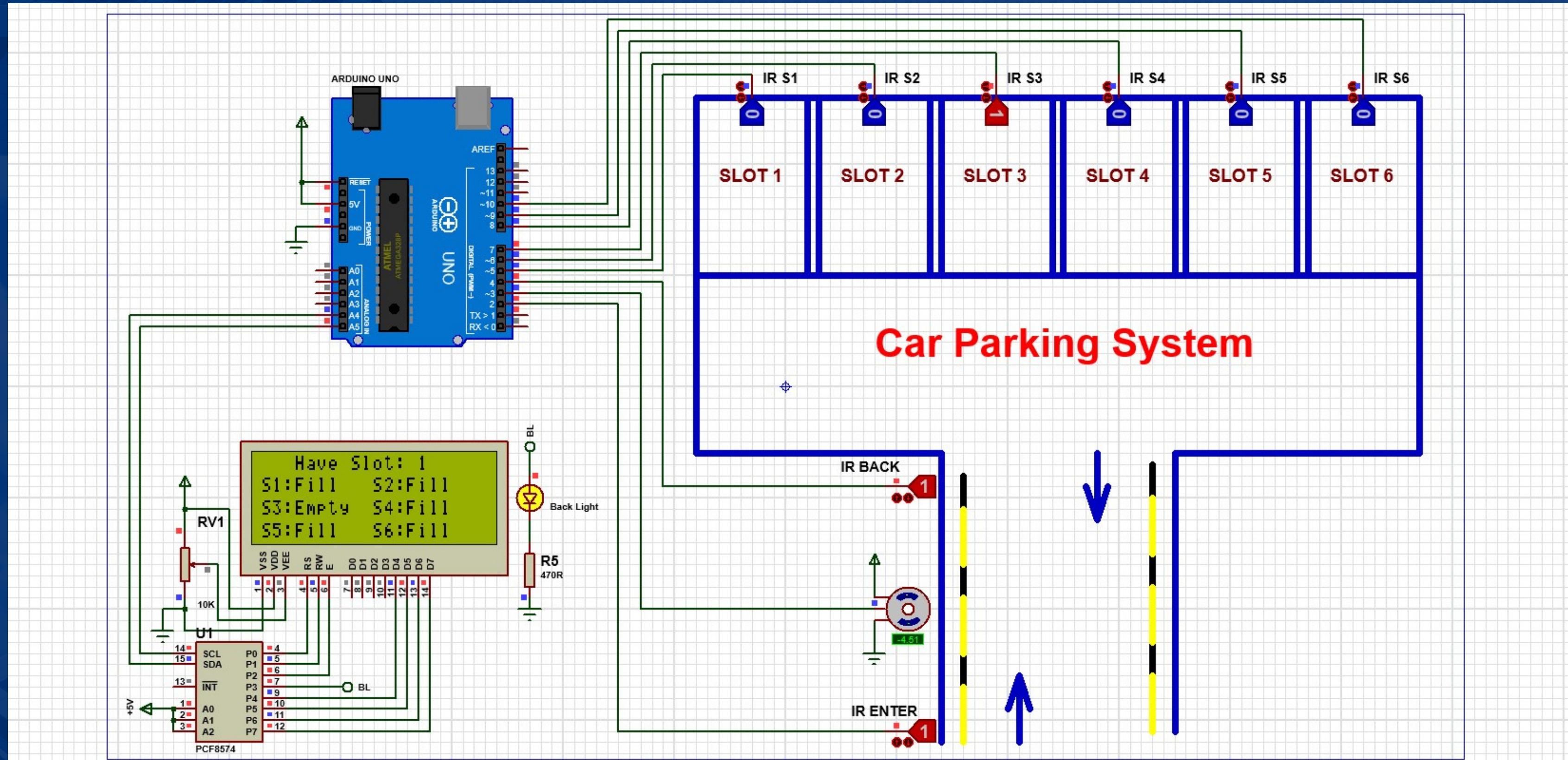
# Proteus Simulation



# Proteus Simulation



# Proteus Simulation



# Conclusion and Future scope Problem

This system gives solution to the problem of traffic congestion in front of the parking lot. Conventionally there is no such automated system for allocating spaces for parking vehicles. So, this will make parking allocation simple and well organized with a systematic first come first serve basis. Directing people to empty parking slots and indicating exact locations adds more credibility to this system. In case of no space in the parking garage, it will display a message that the parking lot is full and will not allow vehicles to enter the parking lot. These were some of the merits of the system.

In future, audio enabled directing procedures are to be incorporated in this system. Therefore, this will give information to the driver if he fails to see the LCD display. Applications of IoTs in this field will open more channels and address many shortcomings. Different ways for incoming and outgoing are to be added to reduce further congestion.