DEPARTMENT OF ELECTRONICS AND COMMUNICATIONS ENGINEERING

AUTOMATIC CAR PARKING SYSTEM

UNDER THE GUIDANCE OF:

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ABSTRACT:

In our days, finding an available parking space can be considered as time and fuel consuming. Therefore, it may cause drivers to be frustrated; which will lead to inappropriate parking. This will lead to bad traffic around the parking space and may also lead to accident. That is why this project proposes an Intelligent Parking System that uses various sensors which will be based on Arduino Uno and also an Android Application as interface to help book or view available spaces.This project will help solve problems mentioned by allowing users to view and select available space in the parking; which will prevent users from driving around the parking for long. In this project, the Arduino Ethernet Shield will be used as the link between the Arduino and the android application. By transferring data collected from the Arduino to an online server so as to enable the android application to access those data.As a conclusion, this project will help in reducing the amount of time a driver has to spend around the

parking just to find an available spot,   reducing the amount of traffic around the parking and also reducing the bad parking around the parking space.

Literature Review:

Intelligent Transportation Systems are advanced applications which are developed to improve the quality of transportation and also successfully reach other outcomes based on the transportation system. Intelligent Transportation Systems provides ways to manage traffic and also car parking by using various advanced technologies. Looking at our world today, a lot of advanced systems are developed and also implemented. The use of sensors in addition to their implementation will thoroughly analyzed so as to get a better understanding. That's why the focus is more on the fully-automated parking System.

Parking facilities have always been important by allowing drivers to safely leave their car while they can go on to their   daily activities. Mostly,the information provided together with guidance implemented by the smart   parking system has   been   extremely useful by assisting drivers to find an available space.

Introduction about Title:

This system is capable of finding the empty slots that are available for parking automatically. If the slot is empty in the automated car parking the new vehicles are allowed to enter the parking else the entrance is blocked by using the servo barrier in case no empty slot is found by the system. The visitors can see the status for the availability of the free space outside the parking on a 16×2 LCD.
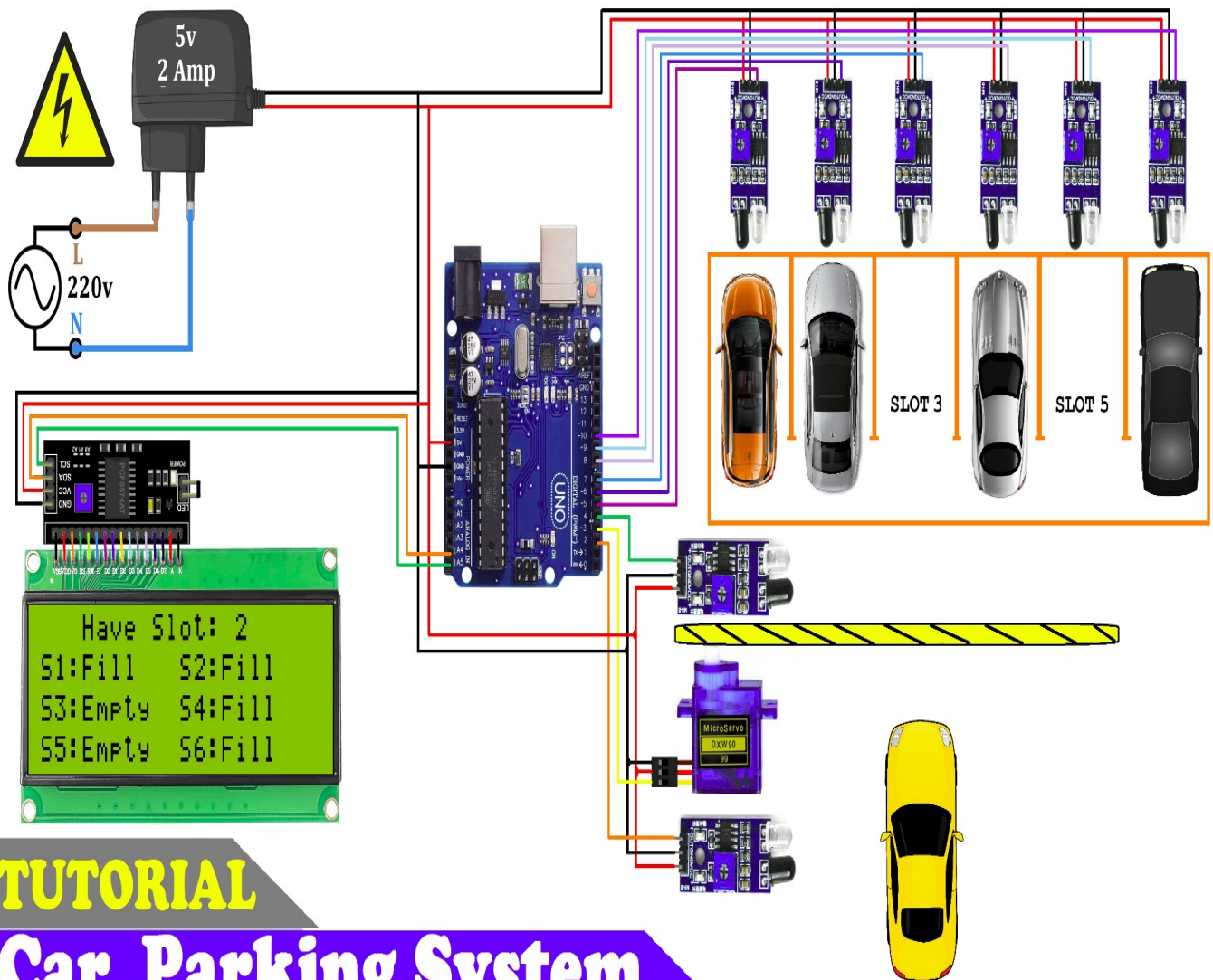
Proposed method:

Various methods are present for development of intelligent parking systems. Many of the existing systems require a little or more human intervention for the functioning. One of the intelligent systems for car parking has been proposed by making use of Infrared Sensor and Servo Motor.In this system, a brown rounded image on the parking slot is captured and processed to detect the free parking slot. The information about the currently available parking slots is displayed on the 7-segment display.
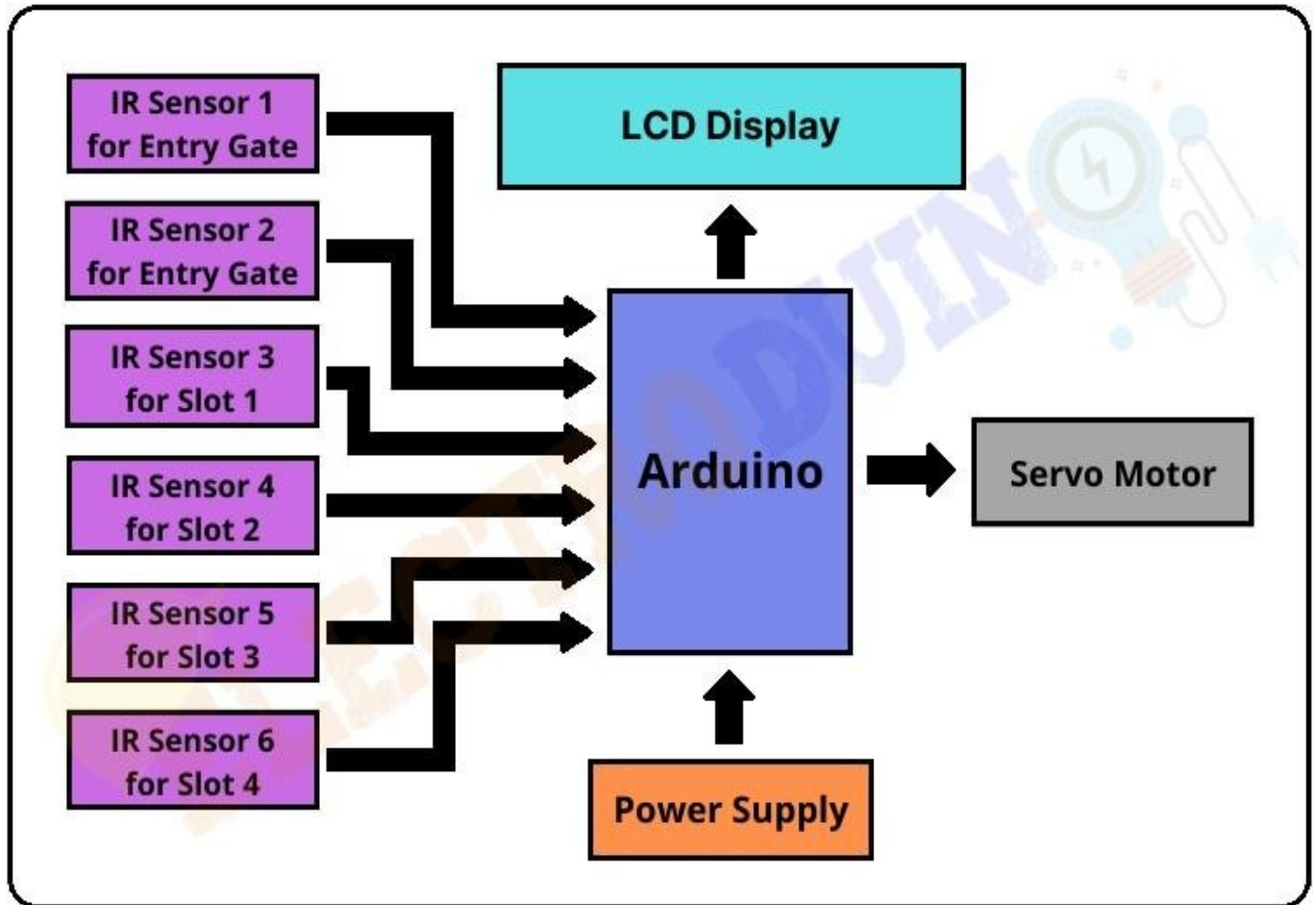
Introduction:

This section will   contain the implementation of   the proposed system. Every user who enter the parking area will be come in-front of IR sensor .When the IR sensor detect the car it will send the message to arduino and arduino will   the check   whether the parking space are free or not,   if the slot has some empty parking space the message will display thanks you and show remaining slots left   and the barrier gate will open the user   can park the car in parking field, and if the slot is not empty the barrier gate will not open and in display the message will occur that "sorry no parking space".

Working:

Have Slot: 2
S1:Fill   S2:Fill
S3:Empty   S4:Fill
S5:Empty   S6:Fill

SLOT 3   SLOT 5

TUTORIAL

Car Parking System

Block Diagram:

Result:

1. It guarantees snappy and computerized parking
   and simple recovery of vehicles.
2. Up to 5 cars can be effectively and securely
parked
   in the outlined model.
3. The surface space required is identical to the
   parking spot of two cars as it were.
4. Most reasonable for parking in workplaces,
   shopping centers and comparable spots.
5. Low support levels are required by the framework.
6. Sensors utilized have high affectability and are
   anything but difficult to deal with.
7. It doesn't require observable pathway operation.
8. Cordial reorientation of cars for driving in and out.
9. Security of vehicle.

Advantages:

While implementing the Smart Parking System, the car owner, the parking operator and also the environment benefits from it. When looking at the parking operator, the future parking pattern can easily be predicted from the information gathered from the Smart Parking System.

The parking price can also be based on the information obtain so as to improve the organization profits. When looking at the environment,the level of pollution can be reduced by decreasing the air pollution in the air. The amount of time spent to find a parking is reduced resulting to the time saving and also fuel consumption. The car owners also benefit from the System because the system automatically indicates parking space available which directly reduces the amount of vehicle travel and the time to search for an available spot.
With information provided by

the system, car drivers can easily avoid parking that is full and locate the parking which is vacant.   The number of illegal parked cars is also reduced.   Also the traffic congestion is reduced.   Other advantages that come with the Smart   Parking System is that   it provides safety, security. These advantages make it easy for the users.   Some more advantages can be economical   and efficiency   in space and friendly environment in the parking .

Safety and Security   While making use of   a car parking system,   drivers don't   have to spend time searching around searching for   an available spot instead they can directly move to an available space which is either shown on the board, indicated by the sensor or shown in their   mobile depending on the type of parking system being implemented.   Driving around searching for   parking can be dangerous because drivers do not have a full concentration on the road because their focus is on seeing an available spot.   Therefore reaching a parking slot definitely makes it easy for drivers and also removes tension and frustration which increases safety

around the car   parking. The parking system also monitors the driver's' vehicles which also increases safety.

1.SECURITY AND SAFETY:

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2. Economical space

In some parking system such as the conveyor belt parking, clients do not have to be worried about how to park or where to park. All they have to do is to leave the car at a certain spot and the car will be carried through the conveyor belt to a free space. This system can contain at least 40% more cars than what a normal car parking would contain. This system removes the need of car owners to move around the parking lot looking for space to park and climbing stairs or the exercise of remembering where they parked their car. Even though this system is known to be costly in term of maintenance, and other expenses, this system just provides efficient space around.

3. Efficiency:

The parking management system doesn't rely on a man to do the job; instead, it deals with software and smartphones, which are less likely to make mistakes. The man at the gate deals with a lot of people at once; he can get tired and even can become ill or absent from work. On the other hand, automated software always works as long as you have your phone on, which is quite often. You get to decide how you want to pay or what you want to do precisely. As a result, the level of efficiency increases, and you get to deal with parking protocols without issues.

4.Faster processes:

Having to stand at the gate and wait for the human guard to finish dealing with one person before going ahead can be daunting and time-wasting? So what if you could handle your parking protocols yourself and be the determinant of when you enter the building without delay? One of the advantages of a parking management system is that you can do this very quickly. Employees can avoid the long queue at the gate every morning and go right ahead to enter the building or make use of the parking space on their own.

5. Provides information :

When the man at the gate is busy, who do you ask questions on the parking protocols? Or in the case of the hardware system, do you talk to the machines? For the modern parking management system, which makes use of software, you can ask various questions through your phone. Questions on spaces, occupancy, overstay, or illegal parking? They can all be answered from wherever you are.

6.Reports:

The modern software-oriented type of parking management system also involves reporting. Not only does it make things easier for users, but managers also enjoy a fair share of having workload reduced for them when it comes to monitoring and managing parking spaces. They receive reports on the vehicles in the building, as well as the time of access. The need for paper and pencil way of recording is no longer necessary, and things are automated. There's even the option of one-on-one counting of vehicles

7. Increased Service:

A company with a parking iot management system can serve its customers, clients, and workers better. This is because they can reduce the magnitude of stress that comes into parking. Visitors no longer have to worry about driving around to look for space. They get to save petrol and even reduce pollution as there is provision for a place to drive into once the vehicles enter into the buildings.

8. Security :

One of the significant advantages of a parking management system is that it provides security. There is a barrier and reservation feature that controls the vehicles which have access to a place. This way, it can lock out some at certain times, if programmed to do so. There's also a surveillance camera (CCTV) which monitors vehicles and can even be used for reference, in the case that there's a need.

9. Map information:

Other than general information or question and answer, the software is also able to provide information that will help with locating places. It has map support for people who may be new in the area or people who are yet to get familiar with things.

10 .Decrease in Cost:

Installing the parking management system incurs a one-time cost.   But when you have to deal   with other systems, there is the need to pay or   fund regularly. An organization that opts for this system is one that is sure to have its costs reduced, compared to others.

Implementation:

Proteus:

The Proteus Design Suite is a proprietary software tool suite used primarily for electronic design automation. The software is used mainly by electronic design engineers and technicians to create schematics and electronic prints for manufacturing printed circuit boards.

It was developed in Yorkshire, England by Labcenter Electronics Ltd and is available in English, French, Spanish and Chinese languages.

Schematic capture in the Proteus Design Suite is used for both the simulation of designs and as the design phase of a PCB layout project. It is therefore a core component and is included with all product configurations.

Microcontroller Simulation:

The microcontroller simulation in Proteus works by applying either a hex file or a debug file to the microcontroller part on the schematic. It is then co-simulated along with any analog and digital electronics connected to it. This enables its use in a broad spectrum of project prototyping in areas such as motor control,temperature control and user interface design.It also finds use in the general hobbyist community and, since no hardware is required, is convenient to use as a training or teaching tool.

Components Used

- ***Arduino UNO***
- ***Two IR sensors***
- ***Proteus***
- ***Servo motor***
- ***Arduino IDE***
- ***16×2 LCD and an I2C module***
- ***USB cable for uploading the code***
- ***Resistors-1k,10k***
- ***Power Supply-5v***

ARDUINO UNO:
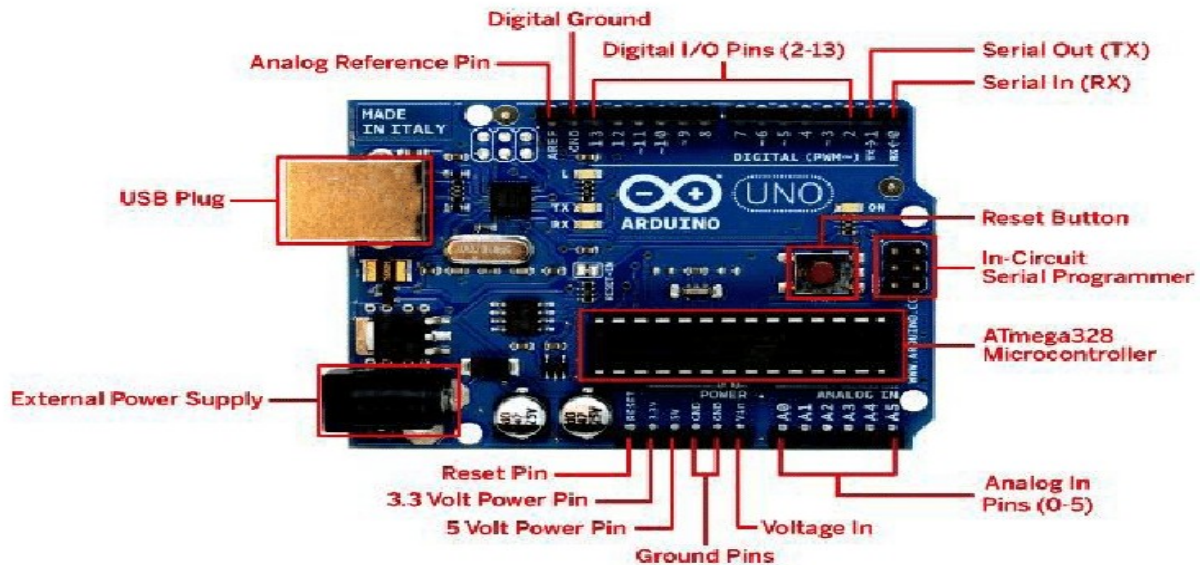
Arduino/Genuino Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.. You can tinker with your UNO without worrying too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again.

"Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0. The Uno board and version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases.

FEATURES OF ARDUINO UNO:

- ❖ Operating Voltage=5v.
- ❖ Input Voltage ranges from 6v to 20v.
- ❖ 14 Digital I/O pins.
- ❖ 6 Analog input pins
- ❖ Flash memory is 32 KB.
- ❖ SRAM is 2KB.

IR SENSOR:

   IR sensor is an electronic device, that emits the light in order to sense some object of the surroundings.   An **IR sensor** can measure the heat   of an object   as well   as detects the motion.   IR sensors are now widely used in motion detectors,which are used in building services to switch on lamps or in alarm systems to detect unwelcome guests.

Infrared Sensor

Voltage Out to Arduino

Voltage In from Arduino

Ground
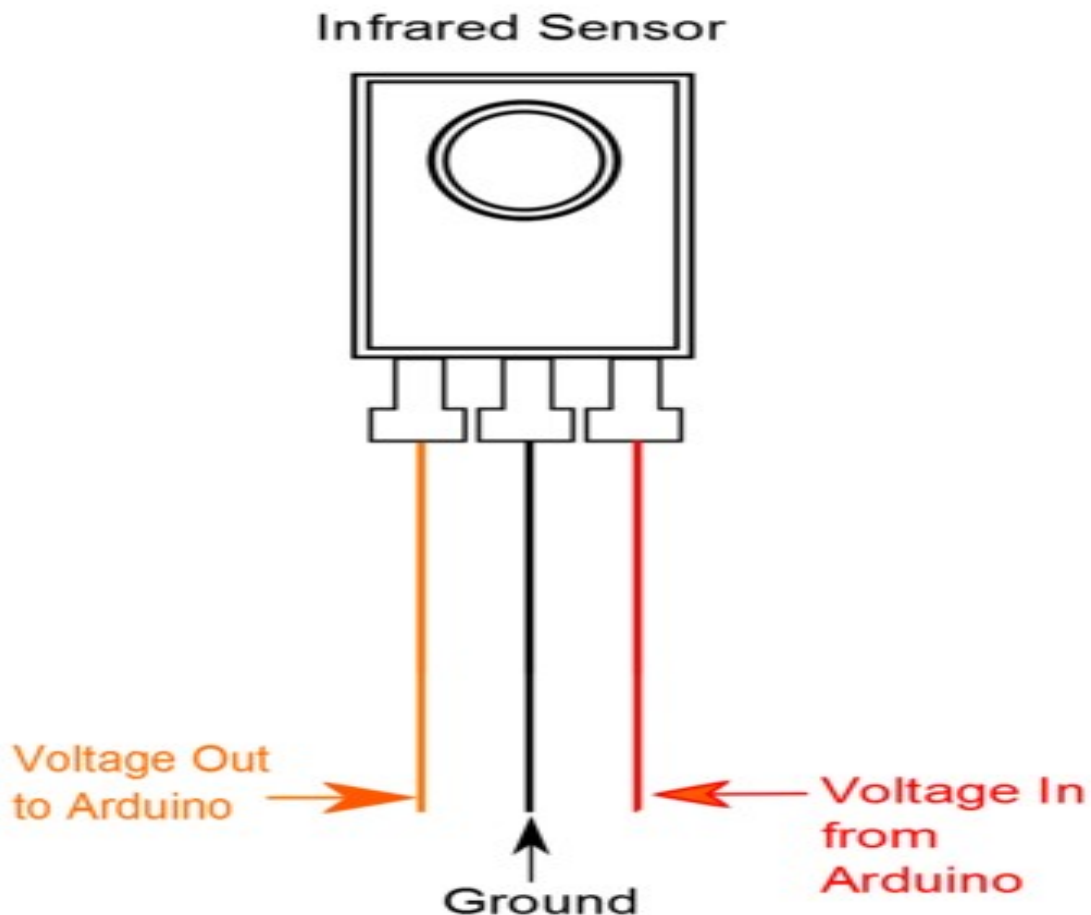
Servo Motor:

A **servo motor** (or servo motor) is a simple electric motor, controlled with the help of servomechanism.It is a linear actuator or rotary actuator that allows for precise control of linear or angular position, acceleration, and velocity. It consists of a motor coupled to a sensor for position feedback.
The servo motor is usually a simple DC motor controlled for specific angular rotation with the help of additional servomechanism (a typical closed-loop feedback control system). Nowadays, servo systems are used widely in industrial applications.

Servo motor applications are also commonly seen in remote-controlled toy cars for controlling the direction of motion, and it is also very widely used as the motor which moves the tray of a CD or DVD player. Besides these, there are hundreds of servo motor applications we see in our daily life.

The main reason behind using a servo is that it provides angular precision, i.e. it will only rotate as much we want and then stop and wait for the next signal to take further action. The servo motor is unlike a standard electric motor which starts turning as when we apply power to it, and the rotation continues until we switch off the power. We cannot

control the rotational progress of electrical motor, but we can only control   the speed of   rotation and can turn it ON and OFF. Small servo motors are included many beginner Arduino starter kits, as they are easy to operate as part of a small electronics projects.
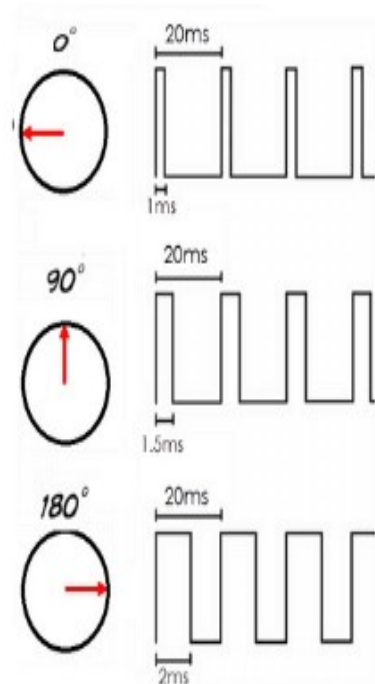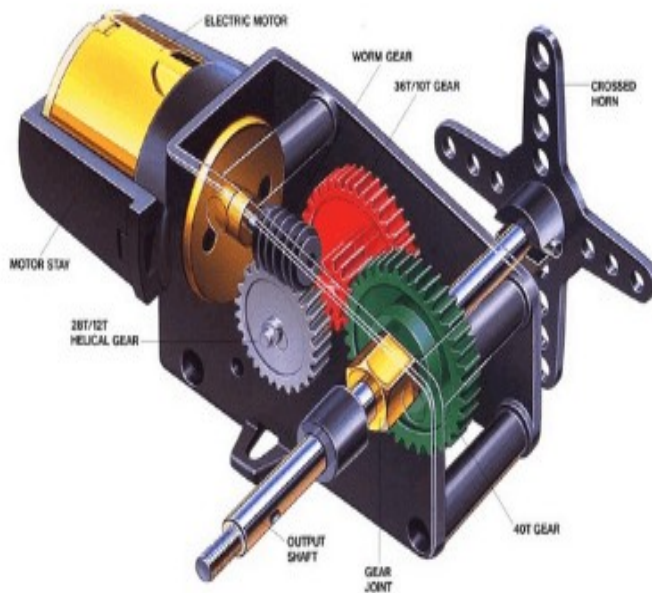
LCD:

❖ LCD (Liquid Crystal Display) is a type of flat panel display which uses liquid crystals in its primary form of operation**.**

❖ LCD uses a liquid crystal to **produce a visible image**. Liquid crystal displays are super-thin technology display screens that are generally used in laptop computer screens, TVs, cell phones, and portable video games.

Features of LCD16x2:

The features of this LCD mainly include the following.

● The operating voltage of this LCD is 4.7V-5.3V
● It includes two rows where each row can produce 16-characters.
● The utilization of current is 1mA with no backlight
● Every character can be built with a 5×8 pixel box
● The alphanumeric LCDs alphabets & numbers
● Is display can work on two modes like 4-bit & 8-bit
● These are obtainable in Blue & Green Backlight
● It displays a few custom generated characters
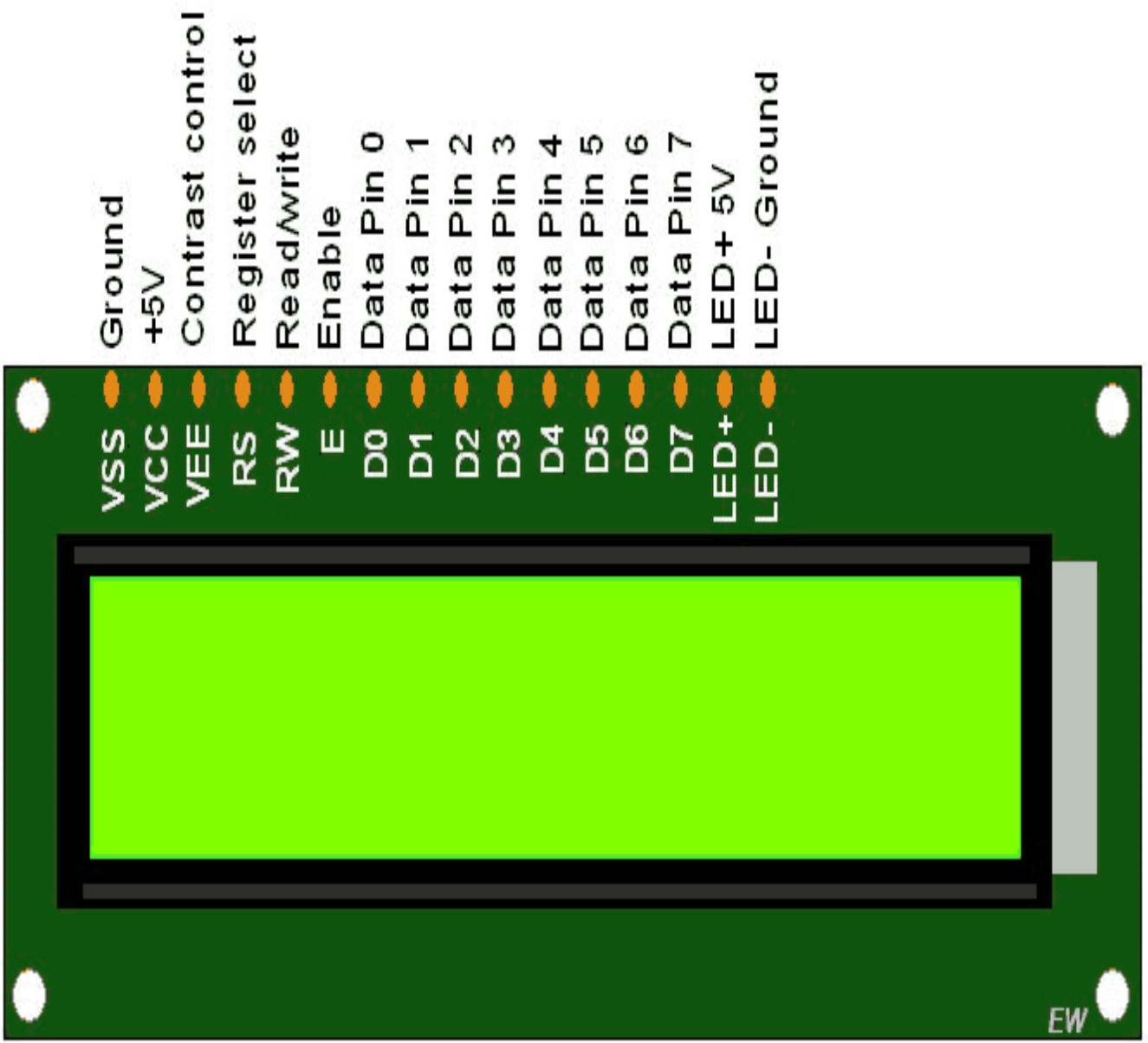
RESISTOR:

A **resistor** is a passive two-terminal electrical component that implements electrical resistance as a circuit element. In electronic circuits, resistors are used to reduce current flow, adjust signal levels, to divide voltages, bias active elements, and terminate transmission lines, among other uses. High-power resistors that can dissipate many watts of electrical power as heat may be used as part of motor controls, in power distribution systems, or as test loads for generators. Fixed resistors have resistances that only change slightly with temperature, time or operating voltage. Variable resistors can be used to adjust circuit elements (such as a volume control or a lamp dimmer), or as sensing devices for heat, light, humidity, force, or chemical

Resistors are common elements of electrical networks and electronic circuits and are ubiquitous in electronic equipment. Practical resistors as discrete components can be composed of various compounds and forms. Resistors are also

implemented within integrated circuits.

The electrical function of a resistor is specified by its resistance: common commercial resistors are manufactured over a range of more than nine orders of magnitude. The nominal value of the resistance falls within the manufacturing tolerance, indicated on the component.

Resistor   Resistor Symbol
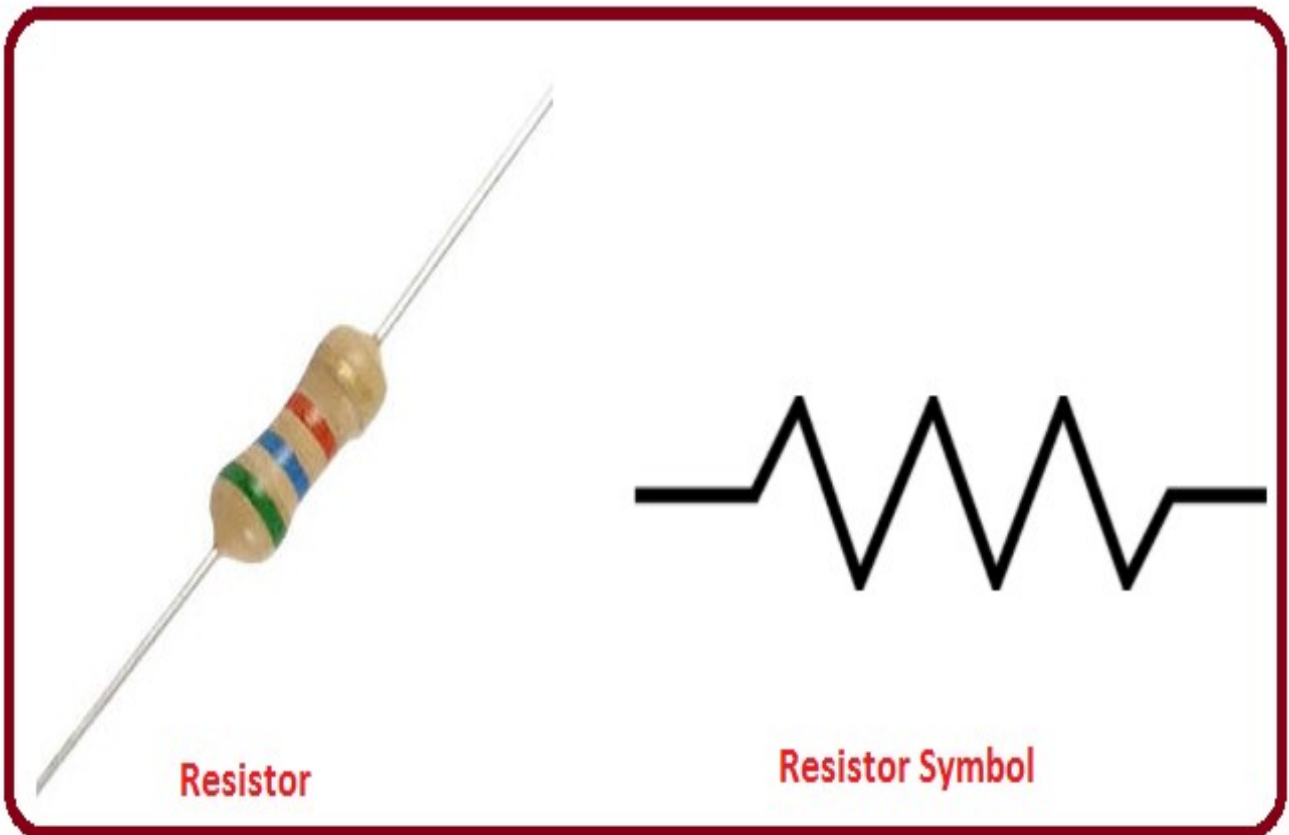
Coding:

```
#include <LiquidCrystal.h>
LiquidCrystal lcd(A0,A1,A2,A3,A4,A5);
#include <Servo.h>
Servo myservo1;
int ir_s1=2;
int ir_s2=4;
int Total = 5;
int Space;
int flag1=0;
int flag2=0;
void setup(){
  pinMode(ir_s1,INPUT);
  pinMode(ir_s2,INPUT);

  myservo1.attach(3);
  myservo1.write(100);

  lcd.begin(16,2);
  lcd.setCursor(0,0);
  lcd.print("CAR PARKING");
  lcd.setCursor(0,1);
  lcd.print("System");
  delay(2000);
  lcd.clear();
}
void loop(){
```

```
if(digitalRead (ir_s1)==LOW && flag1==0){
 if(Space>0 && Space<5){flag1=1;
 if(flag2==0){myservo1.write(0);Space=Space-1;}
 }else
 {
  if(Space==0){
  lcd.setCursor(0,0);
  lcd.print("sorry no space");}
  else{lcd.setCursor(0,1);
  lcd.print(" Space is Available");}
  delay(1000);
  lcd.clear();
 }
}
if(digitalRead(ir_s2)==LOW && flag2==0){flag2=1;
if(flag1==0){myservo1.write(0);Space=Space+1;}
}
if(flag1==1 && flag2==1){
  delay(1000);
  myservo1.write(100);
  flag1=0, flag2=0;
}
  lcd.setCursor(0,0);
  lcd.print("Total space");
  lcd.print(Total);
  lcd.setCursor(0,1);
  lcd.print(" Have Space");
  lcd.print(Space);
}
```

Proteus Simulation:
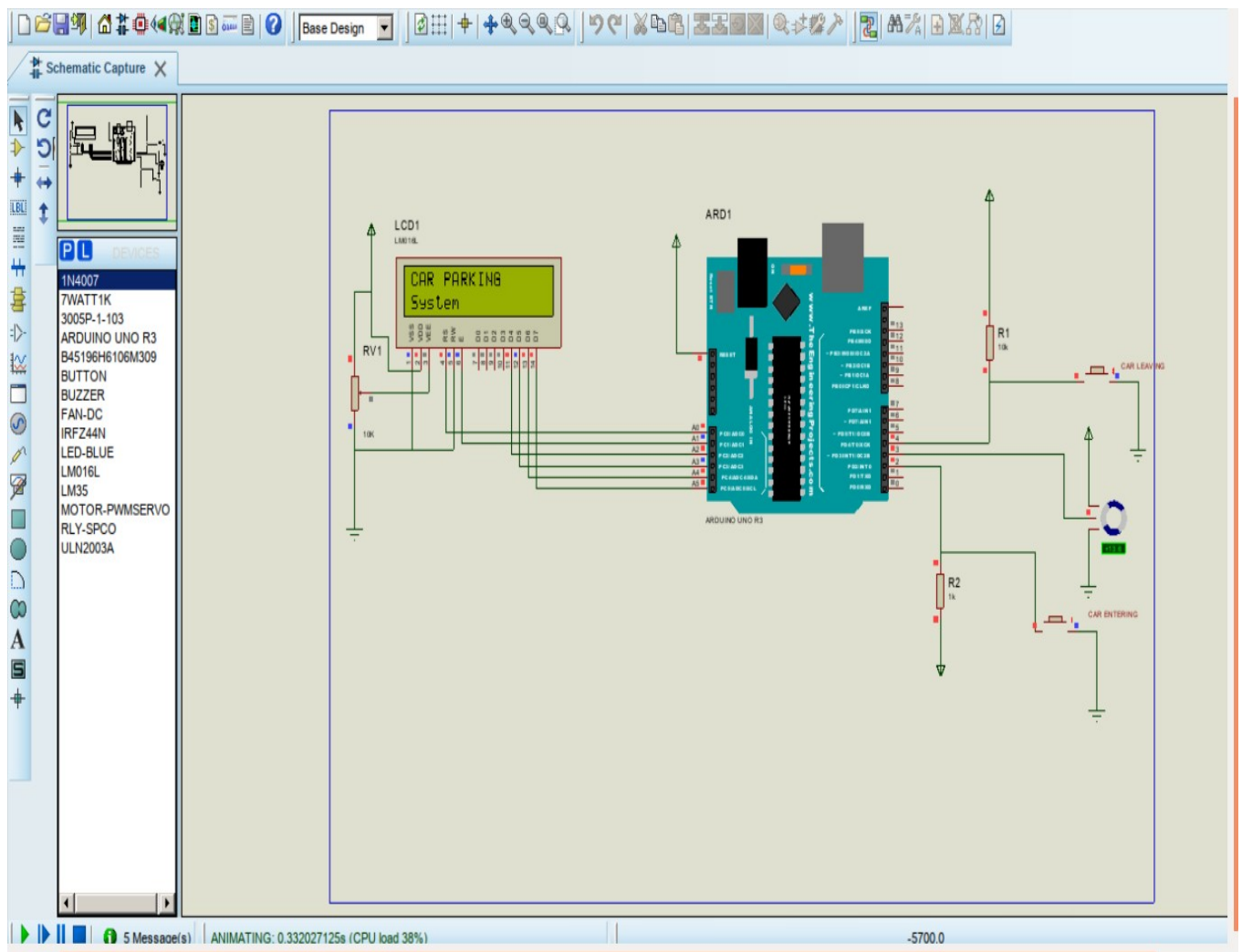
Conclusion:

The various types of smart parking system and has been presented. From the various examples of the implementation of the smart park-ing system being presented, its efficiency in alleviating the traffic problem that arises especially in the city area where traffic conges-tion and the insufficient parking spaces are undeniable. It does so by directing patrons and optimizing the use of parking spaces. With the study on all the sensor technologies used in detecting vehicles, which are one of the most crucial parts of the smart parking sys-tem, the pros and cons of each sensor technologies can be analyzed. Although, there are certain disadvantages in the implementation of visual based system in vehicle detection as described earlier, the advantages far outweighs its disadvantages.

Future Scope:

Parking spaces are hard to find in the university. Most of the time, students will have to roam around for sometimes before they can be able to find an available space. Therefore with this research, students can easily know if there is an available parking and also where the space is. An Arduino Uno equipped with sensors will be used as the backbone to successfully build the automated car parking system.

Reference:

- A Research Report of the school of Mathematical and Computer Science Of Heriot Watt University
- https://create.arduino.cc/projecthub/embeddedlab786/automatic-car-parking-system-95a9dc.
- International Journal of Research Publication and Reviews Vol (2) Issue (8) (2021) Page 721-724