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CHAPTER 1
Introduction

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 .

1.1 Purpose

The payment of the parking has also been made easier with the implementation of the new technology. Sensors are used to help detect the presence of the car. This is absolutely necessary when it comes to the development of the smart parking system because information of the parked vehicle is required. From the sensor, the information can easily be gathered so as the system can use it and the same information will also be sent to the driver.

This report starts by introducing the automated car parking system and also how it is a huge benefit to drivers and administrators.

1.2 Scope

Smart car parking 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. It includes an Arduino Uno as the microcontroller unit to which the servo motors, LCD display infrared sensors are interfaced.

CHAPTER 2

Design/Implementation

2.1 Introduction

Smart car parking system can be implemented in

- Shopping malls
- Restaurants
- Theatres
- It can also be implemented in a toll gate which will automatically scan the car number plate and generate the receipt.
- It can automate the entire system from entry to exit and eliminates all manual processes - a task that requires a high level of cooperation and coordination.

2.2 Design Approach

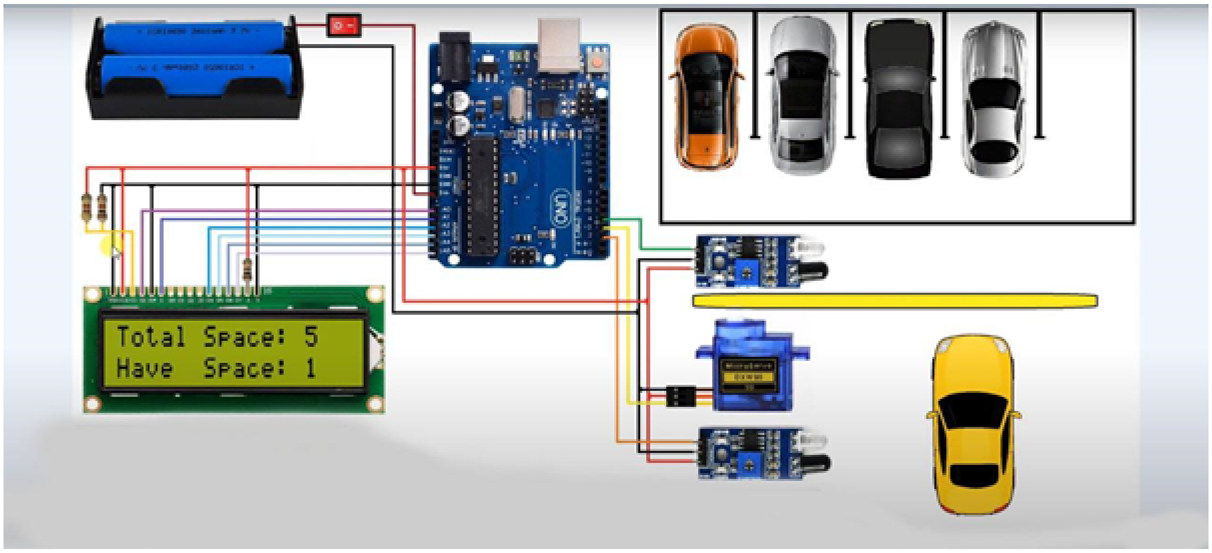

Figure. 1. Schematic Diagram

2.3 Proposed System

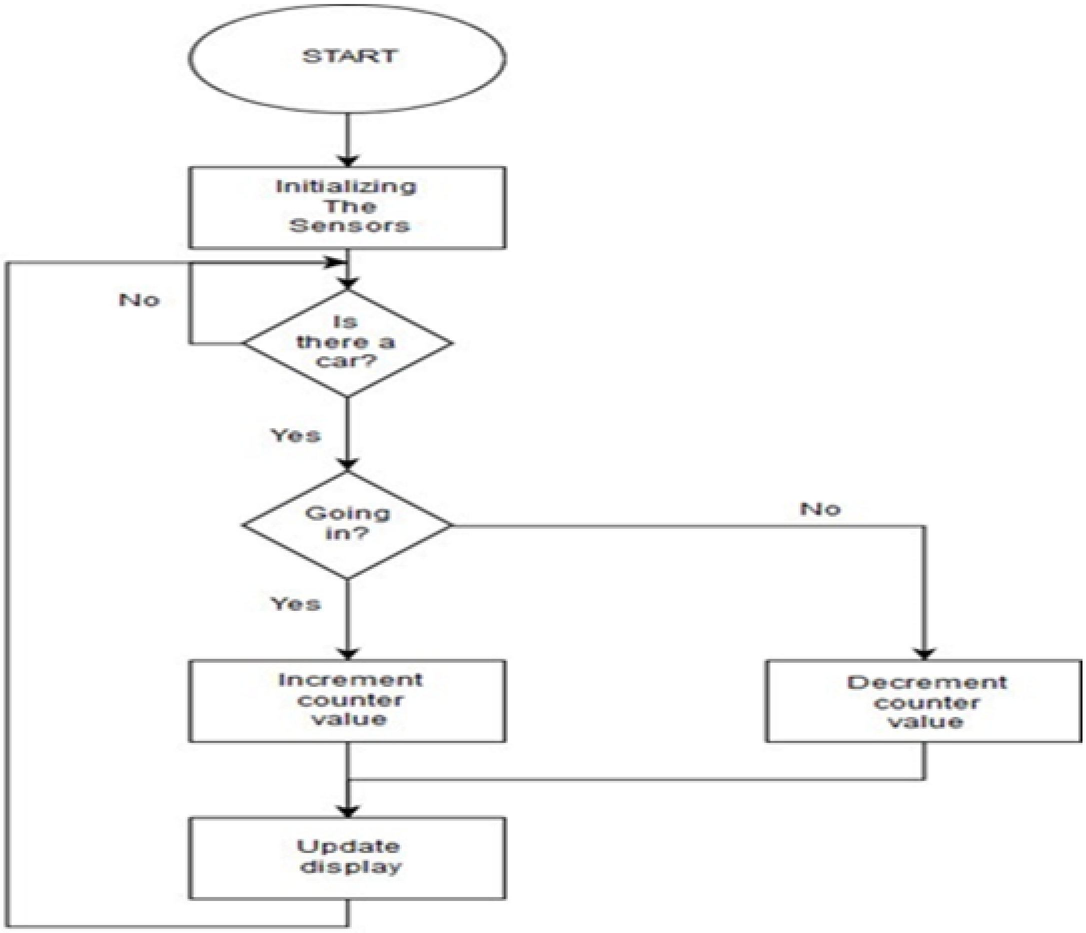

Figure. 2. Block Diagram

Arduino Uno

This is a microcontroller board that is based on the ATmega328P. This device has fourteen digital inputs and outputs pins. This is one of the best device to use when dealing with robotics or artificial intelligence because it provides us with facilities on how to link different other component together and also make them communicate.

SG90 Micro Servo

These are wires mixed with a component that act as the engine. They are connected to the Arduino so that they can used as the gate controller. For this project, their main function will be to receive information from the Arduino so as the gate should be open or closed depending on the status they get.

Active infrared Sensors

This is one type of sensor commonly used around to help detect vehicles. They have a lower frequency compared to the microwave radar sensor. They are very sensitive to the environmental conditions like fog, snow and heavy wind. This type of sensor is good because it can emit multiple beams so as to detect the position and velocity of the passing vehicle.

LCD 16×2

The term LCD stands for liquid crystal display. It is one kind of electronic display module used in an extensive range of applications like various circuits & devices like mobile phones, calculators, computers, TV sets, etc. These displays are mainly preferred for multi-segment light-emitting diodes and seven segments.

2.3.1 Economic Feasibility

The operation cost of the complete system is very low , since it is built using basic sensors such as IR SENSOR and Arduino Uno.The operation cost of the whole system is very low since it requires very less power and has very low or no maintenance. Software upgradation is also very easy and can be be done by a single click with the help of Arduino.With these considerations, this paper aimed to investigate the feasibility of using arduino and IR sensor in smart car parking system.
This study developed a procedure to help people in parking their vehicles in big mall, offices and theatres.

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2.3.2 Technical feasibility:

Accurate designing and operation of Arduino and IR sensors is necessary for safety, parking efficiency and economy. In urban areas, a slight problem can affect car parking on the busy urban roads. Car parking is a major problem in metropolitan and urban cities , and hence technology and the use of sensors must be incorporated to ease the problem.Hence to solve this we are using some basic elecltrical components which are readily available in the market anc can be configured without any advance knowledge and together they can be very useful.

2.3.3 Operational feasibility

Smart Car Parking systems requires very less maintenance and caring from time to time. Our system uses infrared sensors and it also requires less maintenance charge. LEDs are also energy efficient and can run on very low power and can be turned off if not required.The system is very easy to implement and use. This technology needs no behind the screen operators. Fully automatic and reliable.

2.5 Hardware Specification

The system will provide the user better services. The system counts the number of cars in the garage and checks if there's any vacancy. There's an entry and exit path. When a vehicle enters, the display shows the number of cars inside. When any vehicle leaves, the count decreases and is shown on display. If the garage is full. The display will show a message regarding that. This whole process includes the use of Arduino, Display and infrared sensor. The infrared sensor detects whether the vehicle is entering or leaving. The report then showed on display.

Tools Required for this project are -

Arduino UNO

- Solderless Breadboard

- IR Sensor x 2

- Servo Motor SG-90

- 16x2 LCD Display
- 100R Resistor,4.7k Resistor,1k Resistor
- Male to Male Jumper Wires
- 18650 Battery Holder - 2 Cell
- 18650 Battery Cell 3.7V x 2
- Power on off switch

2.6 Software Requirements

The software used for this project are:

1.ARDUINO
2. PROTEUS PROFESSIONAL 8

CODE:

```
#include <LiquidCrystal.h>// initialize the library with the numbers of the interface pins
LiquidCrystal lcd(A0, A1, A2, A3, A4, A5);
#include <Servo.h> //includes the servo library
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();

Space = Total;
}
void loop(){
if(digitalRead (ir_s1) == LOW && flag1==0){
if(Space>0){flag1=1;
if(flag2==0){myservo1.write(0); Space = Space-1;}
}else{
lcd.setCursor (0,0);
lcd.print(" Sorry not Space ");
lcd.setCursor (0,1);
lcd.print("   Available   ");
delay (1000);
lcd.clear();
}
}
mif(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);
}
lcd.setCursor (0,0);
lcd.print("Total Space: ");
lcd.print(Total);


lcd.setCursor (0,1);
lcd.print("Have  Space: ");
lcd.print(Space);
}
```

CHAPTER 3

Result and Analysis / Testing

The complete system was completely tested and verified using Proteus Professional 8 software using the hex file generated from the ARDUINO.

Below are the Screenshots of functional output:

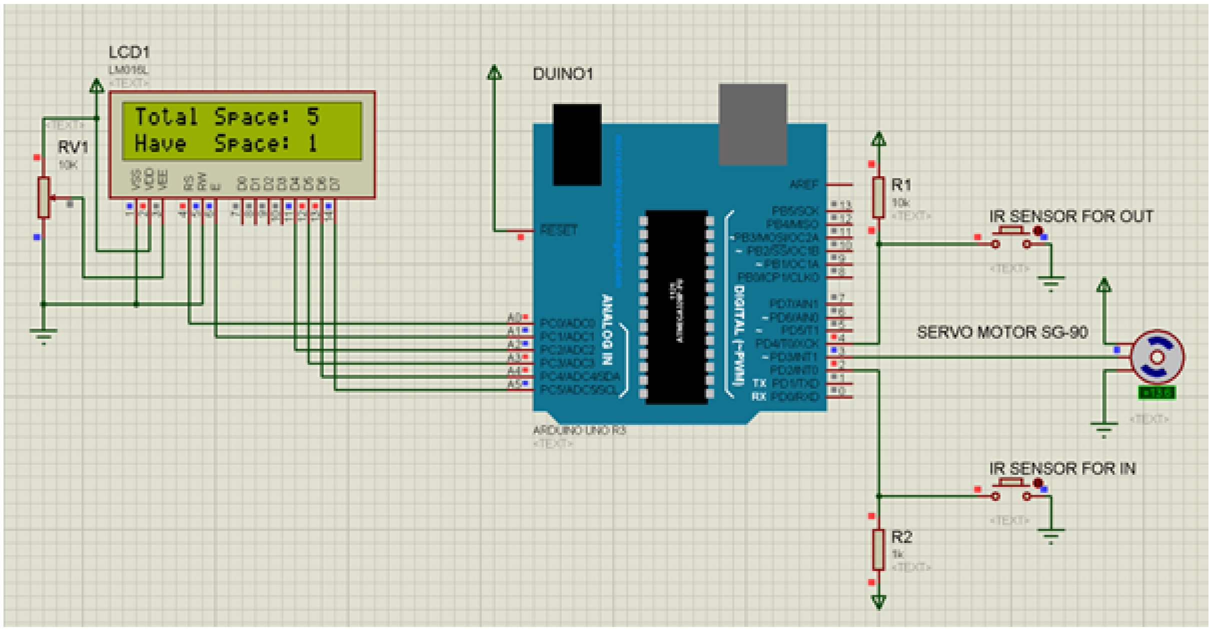
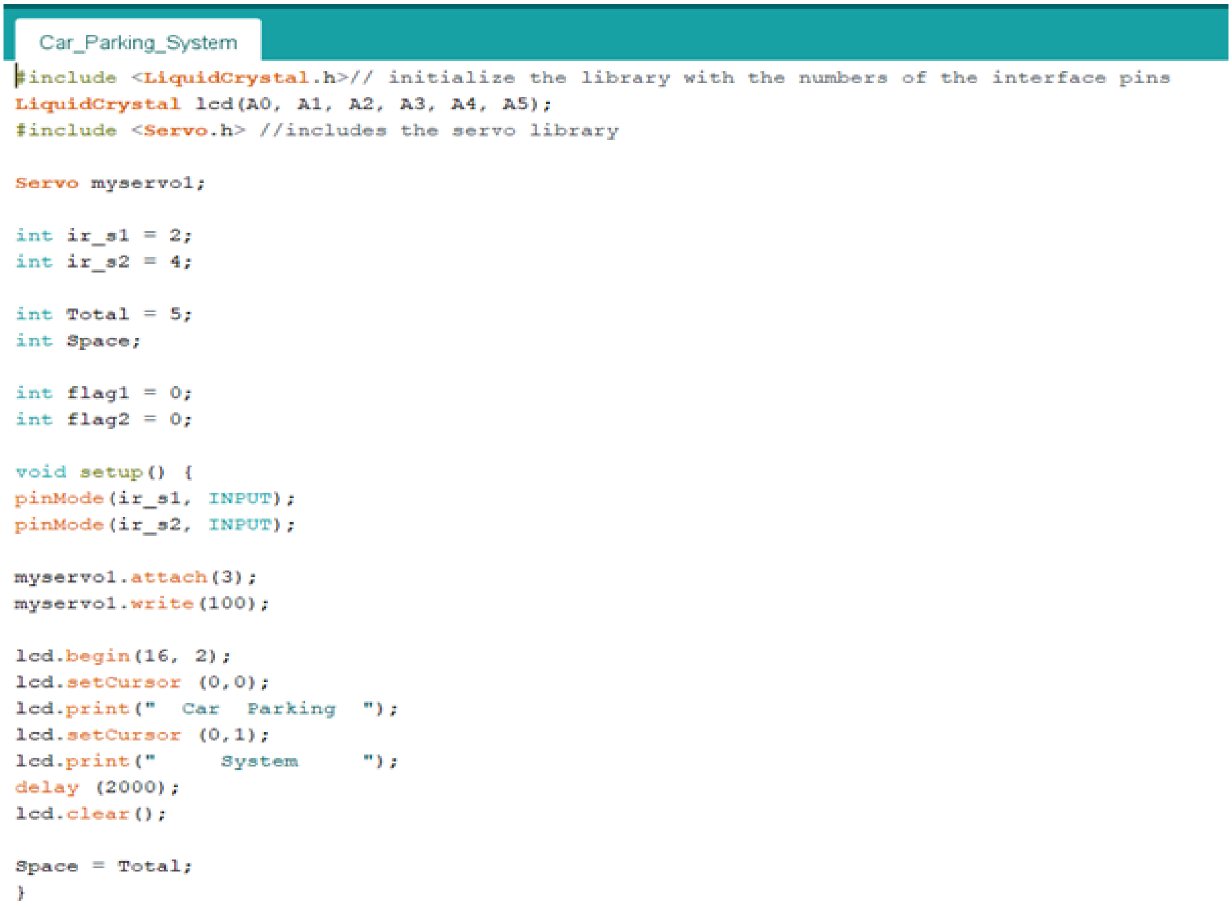
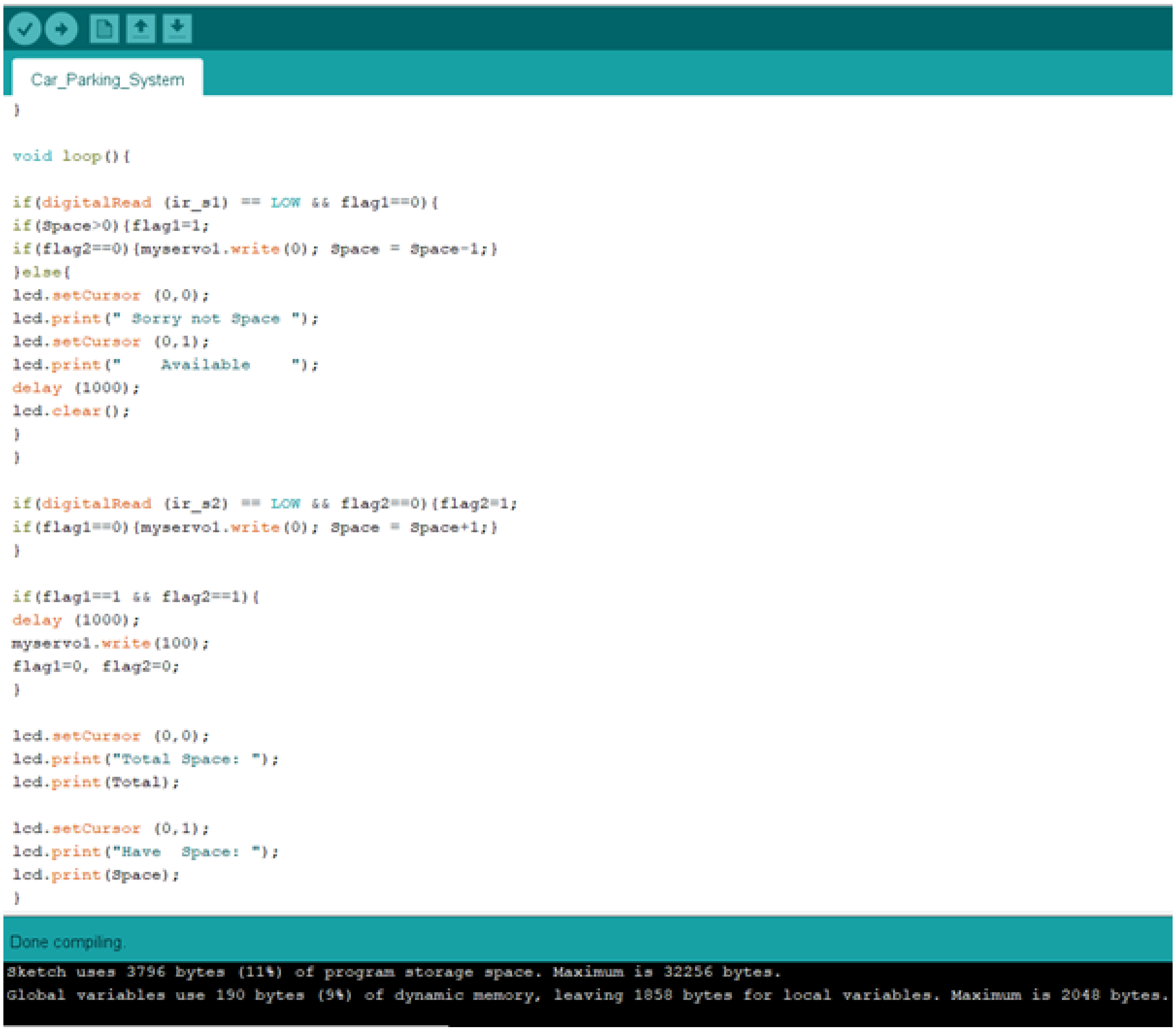


Figure. 3. Software Simulation



```
#include <LiquidCrystal.h>// initialize the library with the numbers of the interface pins
LiquidCrystal lcd(A0, A1, A2, A3, A4, A5);
#include <Servo.h> //includes the servo library

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();

Space = Total;
}
```

Figure 4 CODE SNIPPET



```
}

void loop(){

if(digitalRead (ir_s1) == LOW && flag1==0){
if(Space>0){flag1=1;
if(flag2==0){myservo1.write(0); Space = Space-1;}
}else{
lcd.setCursor (0,0);
lcd.print(" Sorry not Space ");
lcd.setCursor (0,1);
lcd.print("    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);
}
```

```
Done compiling.
Sketch uses 3796 bytes (11%) of program storage space. Maximum is 32256 bytes.
Global variables use 190 bytes (9%) of dynamic memory, leaving 1858 bytes for local variables. Maximum is 2048 bytes.
```

Figure CODE SNIPPET

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CHAPTER 4

CONCLUSION AND FUTURE ENHANCEMENT

By using this mechanism the parking system in mall and multistory parking lots would be improved. Due to this, vehicles will not have to wait in long queues for getting parking tickets.

In the future an automatic parking slot allotment system will be added in which when the car enters the parking lot an automation using ultrasonic sensor search algorithm will run that will find a free slot in the lot for the current car and then that slot will be reserved for that particular vehicle and the vehicle will have to compulsorily park in that slot as it is pre decided.

This will help to manage the parking system in a more organised way and will reduce chaos.

It will help to reduce the fuel consumption as the cars will n longer be waiting in the queue.

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