

A

Semester Project - II

Report on

Smart Car Parking System

In partial fulfilment of requirement for degree of

Bachelor of Technology

In

Mechanical Engineering

Submitted By

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2022-23



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Acknowledgement

We take this opportunity to express our heartfelt gratitude towards the Department of Mechanical engineering R. C. Patel Institute of Technology, Shirpur that gave us an opportunity for presentation of our project in their esteemed organization.

It is a privilege for us to have been associated with **Prof. S. V. Yeole**, our guide during project work. We have been greatly benefited by his valuable suggestion and ideas. It is with great pleasure that we express our deep sense of gratitude to his for his valuable guidance, constant encouragement and patience throughout this work. We express our gratitude to **Prof. P. L. Sarode** Head of Department, Mechanical Engineering for his constant encouragement, co-operation and support and also thankful to all people who have contributed in their own way in making this project work success.

We are thankful to **Prof. Dr. J. B. Patil**, Director, R. C. Patel Institute of Technology, Shirpur for the support and encouragement. We take this opportunity to thank all the classmates for their company during the course work and for useful discussion we had with them.

Under these responsible and talented personalities we were efficiently able to complete our project report work in time with success.

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The car parking system using Arduino is an innovative solution for efficiently managing parking spaces in a given area. The system uses Arduino microcontroller board and sensors to detect the presence or absence of a car in a parking spot. The sensors communicate with the microcontroller, which processes the information and sends signals to a display unit to indicate the status of each parking spot. The system is designed to be user-friendly and convenient, allowing drivers to quickly locate available parking spots without having to drive around the parking lot. The system can also be customized to include features such as automated payment and reservation systems.

Overall, the car parking system using Arduino is an efficient and cost-effective solution for managing parking spaces, which can help reduce traffic congestion, improve safety and security, and enhance the overall parking experience for drivers.

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Chapter 1

Introduction

In the present scenario around us we see excess vehicles and the ineffectiveness to manage them in the correct order. As the population increases day by day the rate of utilization also increases and coping up with the numbers becomes a task. An omnipresent problem around the world is finding a parking space to park your vehicle. This task looks simple on side roads and interior lanes but the actual problem arises when parking in malls, multistorey parking structures, IT hubs and parking facilities where several hundred cars are parked and it becomes arduous to find a spot. The general approach to finding a parking space is to go around and drive aimlessly until a free space is found. Finding a parking space could be the easiest task or could be the most tedious one when it involves wide acres of distributed space across one level or multiple levels. The time and fuel are consumed unnecessarily because the destination is unknown. The easiest way of approach is to provide a destination specific driving within the parking structure [2].

A smart car parking system gives a visual output indicating an available parking space rather than driving aimlessly. The simply way is at the entrance of the parking lot to IR Proximity Sensor are used one is attached to the initial position to detect the entry of the car and another one is used for the car is passing through the entrance to parking lot ,And with help of Arduinio Uno we mentain the Data how many car are placed and how many space is empty ,The result is show on the entrace point LCD Sreen.this method is very usefull in Todays scenario for the bussy life life of

human being we also modify the project in Advanced level The driver looks up to the row of LED lights and their colour to deduct a result of determining the parking space availability. The two main colours used are red and yellow stating occupied and free respectively. These lights are placed at the ceiling of each parking space and the driver looks up and follows the set of LEDs and searches for a Yellow one. These lights are controlled automatically with sensors and the feedback is provided through the colour of the LED when a vehicle is detected. This system not only makes the accessibility easy but also manages the congestion of vehicles avoiding long search and wait times[6].

At the point when IoT is increased with sensors and actuators, the innovation turns into an occurrence of the more broad class of digital physical frameworks, which likewise incorporates advances. For Example, keen networks, virtual power plants, brilliant homes, astute transportation and shrewd urban communities. Among the difficulties that confront in everyday life one of most unavoidable test is parking the car wherever people go. As our need expands our setting out increments however because of extreme increment in utilization of vehicles and increment in populace this project confront the intense assignment of parking car especially amid busiest hours of the day. Amid pinnacle hours the majority of the saved parking zone gets full and this leaves the client to scan for their parking among other parking area which makes more movement and abandons them with no sign on accessibility of parking spot. To defeat this issue there is certainly a requirement for composed parking in business condition. To outline such parking there need to assess reservation of parking space with ideal parking spot which relies upon cost and time. However this project compose the time driven grouping strategy which takes care of the issue of parking utilizing opening assignment technique [4].

Chapter 2

Literature Survey

Aashish Joshi, Arni Tharakaram Hariram, K M Vishall Somaiya, Mubashir Hussain Mechanical Engineering Department, New Horizon College of Engineering, Bangalore, Karnataka, India done one project on similar problem: This project deals with an effective way of finding empty spaces and managing the number of vehicles moving in and out in complex multi storeyed parking structures by detecting a vehicle using IR sensors and thus providing a feedback. The fully automated smart car parking system is rudimental and does not require heavy lines of code nor expensive equipment. It is a simple circuit built for the exact need of purpose. This automated system is used to find the vacancy in parking spaces available and navigate the driver to reach the desired space using visuals and in an effective manner, thus reducing search time. This system is required for malls, multistorey parking structures, IT hubs and parking facilities. This makes sure the requirement of labour is insubstantial.

HemantChaudhary, PrateekBansal, ICACCS [1]:In this paper they explains the architecture and design of Arduino based car parking system. They will give authorization card to each user, which carries the vehicle number or other details. If the user is authorized and space is available in the parking, then the parking gate will open and the user is allowed to park the vehicle in parking place else the user is not allowed even the user is authorized person.It solves the parking issue in urban areas, also provides security to a vehicle and an unauthorized user is not allowed to

enter into a parking place. It helps to park vehicle in multi-floored parking also as it will display which floor has free space.

M Sodiq , H Hasbullah ,ISMEE[2]: . In this paper they introduce one solution to reduce car parking problem is to use a rotary parking system. The rotary parking design uses 6 parking shelves that arranged vertically and rotate. It is an automated parking system that utilizes relatively narrow space using a rotation system. The Arduino Uno module is used as the controller that governs all the devices. The results are done by running the rotary parking system and the system can function properly.

Maher Hassan Kadhim, IJET[3]: In this paper they introduce. a smart parking system based on Arduino components, website and mobile application. The system helps drivers to find an empty park space depending on the number of unoccupied lots in the park. This can increase the economy by reducing fuel consumption and pollution in urban cities. Moreover, it helps to reduce the time of finding car lot. Also, it helps the driver to find his car when he forgets the car location easily. Finally, the system shows the reserved, booked and empty lots in park for staff and drivers.

Mr. Basavaraju S R-2015 has proposed An Carmatic Smart Parking System using Arduinio.It plays a vital role in connecting the surrounding environmental things to the network and made easy to access those un-internet things from any remote location. It's inevitable for the people to update with the growing technology. And generally people are facing problems on parking vehicles in parking slots in a city. In this study we design a Smart Parking System (SPS) which enables the user to find the nearest parking area and gives availability of parking slots in that respective parking area. And it mainly focus on reducing the time in finding the parking lots and also it avoids the unnecessary travelling through filled parking lots in a parking area. Thus it reduces the fuel consumption which in turn reduces carbon footprints in an atmosphere. Our system is a Raspberry pi based parking sensor which contains pi-camera to detect the empty parking spaces and sends this data to server, this stored data is accessed by users

Deepthi. S, Anil A R has proposed A Survey on Smart Parking System Based on Internet of Things. In today life people don't depend on public vehicles. They use their own vehicles to travel. So traffic increases. When people travel through a city the most difficult problem is to park the vehicle. It causes not only a waste of time and fuel for drivers looking for parking but it also leads to additional waste of time and fuel for other drivers as a result of traffic congestion. At first we use PGI (Parking Guidance Information) for better parking management. Parking information may be displayed on VMS (Variable Message Sign) at major roads or streets or it may be disseminated through the internet. In PGI systems e-parking is an innovative platform which allows drivers to obtain parking information before or during a trip and reserve a parking spot.

Abhirup Khanna-2016 has worked on IOT based smart parking system. Recent times the concept of smart cities have gained great popularity. Thanks to the evolution of Internet of things the idea of smart city now seems to be achievable. Consistent efforts are being made in the field of IoT in order to maximize the productivity and reliability of urban infrastructure. Problems such as, traffic congestion, limited car parking facilities and road safety are being addressed by IoT. In this paper, we present an IoT based cloud integrated smart parking system. The proposed Smart Parking system consists of an on-site deployment of an IoT module that is used to monitor and signalize the state of availability of each single parking space. The concept of Smart Cities have always been a dream for humanity. Since the past couple of years large advancements have been made in making smart cities a reality. The growth of Internet of Things and Cloud technologies have give rise to new possibilities in terms of smart cities. Smart parking facilities and traffic management systems have always been at the core of constructing smart cities. In this paper, we address the issue of parking and present an IoT based Cloud integrated smart parking system. The system that we propose provides real time information regarding availability of parking slots in a parking area. Users from remote locations could book a parking slot for them by the use of our mobile application. The efforts made in this paper are indented to improve the parking facilities of a city

and thereby aiming to enhance the quality of life of its people.

Prof. Yashomati R. Dhumal¹, Harshala A. Waghmare², Aishwarya S. Tole², Swati R. Shilimkar²-2016 has proposed Android Based Smart Car Parking System—
—The purpose of this system is to computerize the parking space reservation. Its talk about undertaking which introduces a miniature model of car parking that can direct and manage the number of cars that can be parked in given space at any given time based on availability of parking space after doing the registration by user using android application on his smart phone. Carmated parking is a strategy for parking and leaving cars utilizing detecting device i.e., sensors. The entering to or leaving from parking lot is also commanded by an android based application. This provide users to book parking spaces online in advance for given location and then park the vehicle with minimal fees. We have concentrated on some current systems and it shows that the current systems are not totally carmated and require a certain level of human interference and communication with the system. The difference between our system and existing systems is that we intend to make our system as less human independent by carmating whole parking area.

Vishwanath Y¹, Aishwarya D Kuchalli², Debarupa Rakshit-2016 has proposed A survey paper on smart parking system based on internet of things a Smart Parking system—
— It provides an optimal solution for parking problem in metropolitan cities. Due to rapid increase in vehicle density especially during the peak hours of the day, it is a difficult task for the drivers to find a parking space to park their vehicles. The aim of the paper is to resolve the above mentioned issue which provides the Smart Parking system. This system uses cloud computing and Internet of Things (IOT) technology. A suitable shortest path algorithm is used to find the minimum distance between the user and each car park in the system. Thus, the waiting time of the user is minimized .The paper also introduces the usage of android application using smart phone for the interaction between the Smart Parking system and the user. RFID technology is used in this system to avoid the human intervention which minimizes the cost.Smart Car Parking System—
—The purpose of this system is to computerize the parking space reservation

Concluding Remark on Literature Survey: From Above literature survey we are getting information about the project which have been done from other professor, student . so from that we are decided to make this project which is basedon the IOT system using Ardiuno module and by this we fullfill our project objectivewhich are mention in below. and with this project we also bring one step forward in the concept of smart cities. To simplify the parking in mall, Industries,etc. To use the Advance Technology in Local Areas. To Reduce human waste of time in parking issue and the time usedin their work.

Chapter 3

Problem identification and project objectives

In the present scenario around us we see excess vehicles and the ineffectiveness to manage them in the correct order. As the population increases day by day the rate of utilization also increases and coping up with the numbers becomes a task. From that stage we identify that it was the huge problem in future as well as nowday and we decided to work on it for simplicity of parking in human life .

Car Parking System Using Arduino UNO Designing, creating and delivering a main edge stopping innovation is called as Smart stopping. It is a vehicle stopping framework that helps drivers locate an empty spot. Utilizing the Ultrasonic sensors in each stopping space, it identifies the nearness or nonattendance of a vehicle. Brilliant Parking framework is demonstrated as a correct, strong and cost effective approach to guarantee that street clients know precisely where empty car parking spots are.

As the populace expanded in the metropolitan urban areas, the utilization of the vehicles has also expanded. It causes issue for stopping which prompts movement clog, driver disappointment, and air contamination. When we visit the different open spots like shopping centres, multiplex film lobby and lodgings amid the celebration time or ends of the week it makes all the more stopping issue. In the current research found that a driver takes almost 8 minutes to stop his vehicle since he invest

more energy in looking the parking area. This seeking prompts 30 to 40 percent of activity blockage. This project perceives how to diminish the stopping issue and to do secured stopping utilizing the shrewd stopping under Slot Allocation strategy with the assistance of Arduino UNO. The primary commitment of our proposed frameworks is to discover status of the stopping territory and give secured stopping. In the course of recent years, movement experts in numerous urban areas have built up a model called Parking Guidance and Information (PGI) framework for good stopping administration. PGI frameworks, tells about the dynamic data of stopping in the controlled region and aides the clients to the empty stopping spaces.

Our project Objectives are:

- To simplify the parking in mall,Industries,etc.**
- To use the Advance Technology in Local Areas.**
- To Reduce human waste of time in parking issue and the time used in their work.**

Chapter 4

Equipments

1. Proximity Sensors:

Proximity sensors include all sensors that perform non-contact detection using infra-red waves. Proximity sensors detect movement or presence of an object and convert them into an electrical signal. There are 2 LEDs, one being the infra-red emitter emits rays and the other infra-red receiver receives these rays and convert them into an electrical signal which creates a potential difference.



2. Arduino UNO : The Uno is one of the most popular Arduino boards. It consists of 14-digital I/O pins, where 6-pins can be used as PWM (pulse width modulation outputs), 6-analog inputs, a reset button, a power jack, a USB connection and more. It includes everything required to hold up the microcontroller; simply attach it to a PC with the help of a USB cable and give the supply to get started with a AC-to-DC adapter or battery. It is an open-source hardware and software company,

project, and user community that designs and manufactures single-board microcontrollers and microcontroller kits for building digital devices. Its hardware products are licensed under a CC BY-SA license, while the software is licensed under the GNU Lesser General Public License (LGPL) or the GNU General Public License (GPL),[1] permitting the manufacture of Arduino boards and software distribution by anyone. Arduino boards are available commercially from the official website or through authorized distributors.

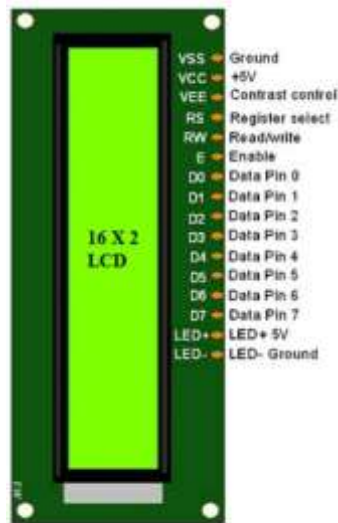


3.Servo Motor :

A servo motor is a type of motor that can rotate with great precision. Normally this type of motor consists of a control circuit that provides feedback on the current position of the motor shaft, this feedback allows the servo motors to rotate with great precision. If you want to rotate an object at some specific angles or distance, then you use a servo motor. It is just made up of a simple motor which runs through a servo mechanism. If motor is powered by a DC power supply then it is called DC servo motor, and if it is AC-powered motor then it is called AC servo motor. For this tutorial, we will be discussing only about the DC servo motor working. Apart from these major classifications, there are many other types of servo motors based on the type of gear arrangement and operating characteristics. A servo motor usually comes with a gear arrangement that allows us to get a very high torque servo motor in small and lightweight packages. Due to these features, they are being used in many applications like toy car, RC helicopters and planes, Robotics, etc.



16*2 LCD Display : The 16×2 LCD pinout is shown below. Pin1 (Ground/Source Pin): This is a GND pin of display, used to connect the GND terminal of the microcontroller unit or power source. Pin2 (VCC/Source Pin): This is the voltage supply pin of the display, used to connect the supply pin of the power source. Pin3 (VO/VEE/Control Pin): This pin regulates the difference of the display, used to connect a changeable POT that can supply 0 to 5V. Pin4 (Register Select/Control Pin): This pin toggles among command or data register, used to connect a microcontroller unit pin and obtains either 0 or 1 (0 = data mode, and 1 = command mode). Pin5 (Read/Write/Control Pin): This pin toggles the display among the read or writes operation, and it is connected to a microcontroller unit pin to get either 0 or 1 (0 = Write Operation, and 1 = Read Operation). Pin 6 (Enable/Control Pin): This pin should be held high to execute Read/Write process, and it is connected to the microcontroller unit constantly held high. Pins 7-14 (Data Pins): These pins are used to send data to the display. These pins are connected in two-wire modes like 4-wire mode and 8-wire mode. In 4-wire mode, only four pins are connected to the microcontroller unit like 0 to 3, whereas in 8-wire mode, 8-pins are connected to microcontroller unit like 0 to 7. Pin15 (+ve pin of the LED): This pin is connected to +5V Pin 16 (-ve pin of the LED): This pin is connected to GND.



LCD-16×2-pin-diagram

Thus, this is all about LCD 16×2 datasheet, which includes what is a 16X2 LCD, pin configuration, working principle, and its applications. The main advantages of this LCD device include power consumption is less and low cost. The main disadvantages of this LCD device include it occupies a large area, slow devices and also lifespan of these devices will be reduced due to direct current. So these LCDs use AC supply with less than 500Hz frequency. Here is a question for you, what are the applications of LCD?



I2C Module for LCD : I2C LCD is an easy-to-use display module, It can make display easier. Using it can reduce the difficulty of make, so that makers can focus on the core of the work.

We developed the Arduino library for I2C LCD, user just need a few lines of the code can achieve complex graphics and text display features. It can replace the serial monitor of Arduino in some place, you can get running informations without a computer.

More than that, we also develop the dedicated picture data convert software (bitmap converter) now is available to support PC platform of windows, Linux, Mac OS. Through the bitmap convert software you can get your favorite picture displayed on I2C LCD, without the need for complex programming.

Chapter 5

Methodology /Working

5.1 Methodology

The parts which are going to be used in these projects are 3D modelled and drafted in Solid works software according to the dimensions. This gives us the overview of how the model will look after assembling all the components by using selected dimensions.

The schematic is designed using Eagle software and it gives us an overview of the position of components in the circuit. The Infra-Red rays are inconsistent and are present everywhere. To stabilize this inconsistency, an IR Emitter is used to project the radiation light. The light waves which are emitted cannot be seen in the visible spectrum. Once the emission becomes consistent the IR receiver receives these radiations and converts them into an electrical signal thus creating a potential difference. As the radiations increase, the voltage increases causing more current to flow. To obtain this the distance of reflection of waves must decrease. To summarize this the voltage of the circuit increases when any object comes closer. The prototype will be run in the required conditions and will be tested accordingly.

5.2 Working

The smart car parking system works on the simple principle of detecting obstacle and sending a visual feedback. The proximity sensor is mounted on the ceiling of the parking lot which consists of an Infra-Red emitter and a receiver. The IR emitter emits infra-red rays and these rays generally bounce off objects. The IR receiver receives these rays and converts them into an electrical signal creating a potential difference. The resulting potential difference helps complete the circuit. The LEDs are placed along the driveway and switch on based on the input received by the sensor. A threshold distance is calibrated using the potentiometer to fix a

particular distance based on the average height of vehicles for sending and receiving the radiations. Resistors are provided to ensure the safe working of LEDs and IR sensors. For this project based on size a 12V battery is used to power all the components.

Case 1: When the parking space is empty, the IR emitter emitting the rays will not bounce back an object (vehicle) is not detected. The rays will not strike the IR receiver and hence there will be no rise in potential difference. The feedback of this result makes the LCD screen on indicating the availability of a parking space.

Case 2: When the parking space is occupied, the IR rays emitted by the emitter is bounced back as the vehicle height is within the threshold distance and the rays strike the receiver and these waves are converted into an electrical signal creating a potential difference. The feedback of this result is indicated by the LCD on and thus specifying the driver that the particular parking space is filled. There is continuous emission of IR waves so the feedback is instantaneous. As soon as the vehicle exits the parking space, after any car is arrive from parking their will bew the empty scape is occer on the lcd sreen display.


```
Arduino Car Parking System

// Arduino Car Parking System

#include <Wire.h>
#include <LiquidCrystal_I2C.h>
LiquidCrystal_I2C lcd(0x3F, 16, 2); //Change the HEX address
#include <Servo.h>

Servo myservo1;

int IR1 = 2;
int IR2 = 4;

int Slot = 4; //Enter Total number of parking Slots

int flag1 = 0;
int flag2 = 0;

void setup() {
  lcd.init();
  lcd.backlight();
  pinMode(IR1, INPUT);
  pinMode(IR2, INPUT);

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

  lcd.setCursor(0, 0);
  lcd.print("    ARDUINO    ");
  lcd.setCursor(0, 1);
  lcd.print(" SMART PARKING ");
  delay(2000);
  lcd.clear();
}

void loop() {
```

```
Arduino Car Parking System

}

if (digitalRead(IR2) == LOW && flag2 == 0) {
    flag2 = 1;
    if (flag1 == 0) {
        myservo1.write(0);
        Slot = Slot + 1;
    }
}

if (flag1 == 1 && flag2 == 1) {
    delay(1000);
    myservo1.write(100);
    flag1 = 0, flag2 = 0;
}

lcd.setCursor(0, 0);
lcd.print("    WELCOME!    ");
lcd.setCursor(0, 1);
lcd.print("Slot Left: ");
lcd.print(Slot);
}
```

A**Semester Project - II**

Report on

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Parking Lots**Entry**

Chapter 6

Conclusion

Automation is a step in the right direction for a future fulfilled in the world of transportation. This design provides an effective solution to the common problem discussed. The smart car parking system was designed, fabricated and tested which provided accurate results when the threshold distance was calibrated and the obstruction was detected. The switching of LEDs based on the vehicle in the parking space was instantaneous based on no vehicle and vehicle detected. The design is flexible and can be altered based on the space available and can be installed even in tight and constrained space. Based on the number of Yellow LEDs detected a common information board is displayed indicating the count of parking spaces available. It can be concluded that with correct connection of some simple electrical components, it is possible to create an automatic smart car parking system, thus decreasing aimless driving, fuel and time, as well as making the process of parking considerably simpler.

Future Scope :

In future the project is made on advanced level in that the light indication is also included in the project because of that you see the change in color is the empty space or vacay for the vehicle.

Chapter 7

Project Management and Bill of Material

7.1 Bill of Material

It contains cost table for each parts required in the project.
if any table wants to add in any chapter use following

Table 7.1: Initial Testing Without Samples

Sr. No.	Title	Quantity	price
1	Ardunio	01	650
2	Sensor	02	140
3	Servo motor	01	180
4	Display	01	150
5	Breadboard mini	01	35
6	Jumper	-	100
7	breadbord	01	90
8	Ardunio cable	01	70
9	I2C Module	01	200
10	Total		1615

Chapter 8

References

We would like to thank these authors for their help in making this project come to life. Without their papers and insight into this field, it would've been difficult to progress through this project. The only way I can thank these authors is by adding them as my reference.

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