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Smart Car Parking System Using Arduino UNO

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Abstract: ***The idea of smart metropolises has become much more popular in recent years. The suggested smart car parking solution involves the use of a module to cover and announce the availability of a single parking space. By examining the niche vacuity, this design presents a defined frame for an efficient and simple method of parking the automobiles. The study also shows the frame engineering from an abnormal state perspective. The design initially investigates the working framework in the form of an application case that justifies the suggested show.***

I. INTRODUCTION

Over the years, our nation has seen significant development. At this point, there are numerous well-connected highways, commercial structures, and an increasing number of motor vehicles. We employ a DIY parking technique while putting these automobiles in parking spaces. People can park their buses anywhere they want, which leads to chaos because most of the time people do not follow the cue, which is a result of lack of planning and discipline. As a result, there is a significant business snarl there. Due to poor management, buses might collide with each other when parking and reclaiming their vehicles, causing damage. People argue over this as a result. This is also a providential loss because we must fix our damaged car, which uses more energy when parked inside or outside. The problem with traffic jams is that they waste our valuable time. Our valuable time is lost as a result of the commotion in the parking lot. It causes significant harm to students, office workers, and urgent cases. owing to the increased likelihood that people won't visit these locations owing to the parking hazard, it also results in a financial loss to marketable locations like shopping promenades and recreation facilities.

II. COMPONENTS

A. Arduino UNO

Of the many Arduinos, it is the one that is most frequently used. It is newcomers' top preference. It is simple to learn. An ATmega328 regulator powers it. The most significant feature of this type is that the control chip, an ATmega328, is put on the holder of the interwoven circuit's "IC" rather than being fixed to the board. This type contains 14 digital anchorages (I/ O), 6 of which can be utilised as anchorages to control the "PWM labours." As soon as you switch slides, go back, and fix your work on the board. The ATmega328 regulator is similar in design. The ATmega32u4controller, the first-ever model of Arduino motherboard, features a special point that includes an integrated USB connector require the usage of a second processor. The point makes it possible for the panel to instantly look as a keyboard and mouse when it is connected to your device, making it ideal for creating colourful operations that let you operate your PC.

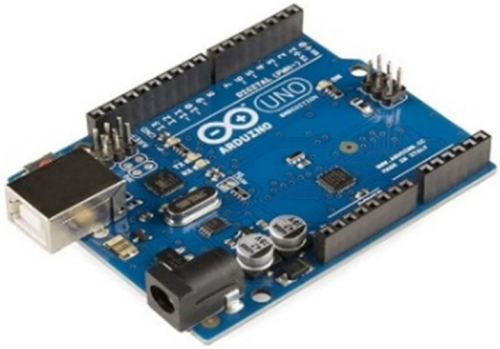


Fig. 2.1 Arduino UNO

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B. IR (INFRARED) Sensor

An IR sensor is a piece of technology that is designed to detect smells in the immediate area. An IR senso senses motion while simultaneously measuring an object's heat. These detectors are referred to as unresistant IR detectors since they do not emit any light; instead, they solely measure infrared radiation. In the infrared spectrum, most items emit some sort of heat radiation. These radiations can be detected by an infrared detector even if they are undetectable to human vision.



Fig. 2.2 IR Sensor

C. Mini Servo Motor

The servo motor is mostly employed in robotization technology and other high-tech artificial processes. It is a tone-contained electrical gadget that perfectly and effectively turns a machine's corridor. Additionally, this motor's affair shaft may be adjusted to a specific angle. Buses, airplanes, toys, home electronics, and a host of other applications heavily utilise servo motors. As a result, this blog describes a servo machine's description, types, medium, principle, operating, controlling, and beginning operations. A servo motor is a type of motor that enables complete control over acceleration, haste, and angular position.



Fig. 2.3 Servo Motor

D. LCD Display

With a 20x4 LCD, there are 4 lines that can each display 20 characters. Each character on this LCD is presented using a 5x7 pixel matrix. The Command and Data registers on this LCD are its two registers. This controller LCD for the HD44780 is typical.



Fig. 2.4 LCD Display

E. I 2C LCD Module

The Inter-Integrated Circuit (I2C) module is a serial communication protocol that is commonly used to communicate between microcontrollers and various sensors, devices, and other integrated circuits. It was developed by Philips Semiconductors (now NXP Semiconductors) and is now widely used in many different types of electronic systems.



Fig. 2.4 I2C LCD Module

F. PIN Headers

A pin header is a connector with 1 or 2 rows of metal pins attached to a plastic base. Pin heads with further than two rows are available from some manufacturers. The pins are spaced in invariant intervals (generally2.54 mm or0.1 inch piecemeal) but numerous lengths are available depending on the operation.

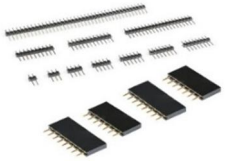


Fig. 2.6 Pin Headers

The female counterpart is occasionally appertained to as a female socket header. The original pin head title was manufactured by Berg Electronics Corporation (now part of Amphenol) and, as a result, pin heads are occasionally called Berg connectors.

G. Adaptor and Jack

5V/ 2A dc adaptor, used for the system which provides an input of 5v and 2a of dc power to charge the battery. 5V/ 2A coliseum, which could charge a phone up to 40 fasters than conventional 5V, 1A chargers.



Fig. 5v Adaptor and DC Jack

DC- 005 womanish DC Power Jack Supply Socket5.5 ×2.1 mm is a good quality power connector compatible with all5.5 virile power jack from different sources. It's2.1 ×5.5 mm PCB mountable jack considerably used in DIY hobby systems as well as in multitudinous robotics operations for DC force voltage connection up to 30V.

III. BLOCK DIAGRAM

The Block diagram of smart parking system will as be shown below:

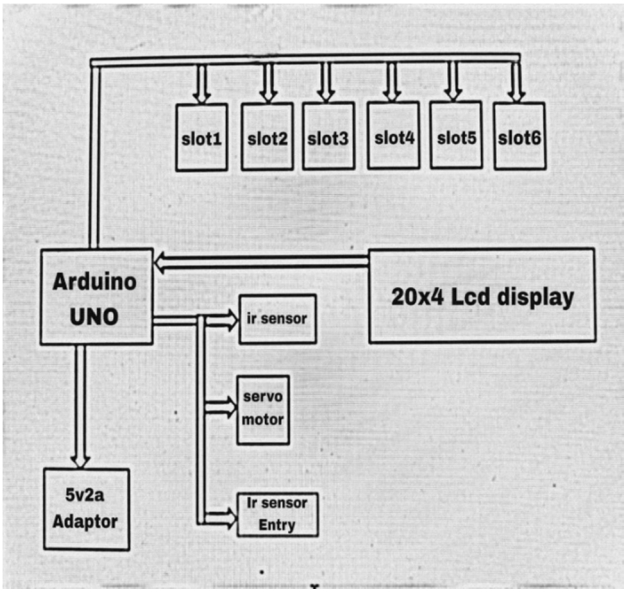


Fig. 3.1 Block Diagram

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IV. FLOWCHART

The flowchart of smart parking system is as shown below:

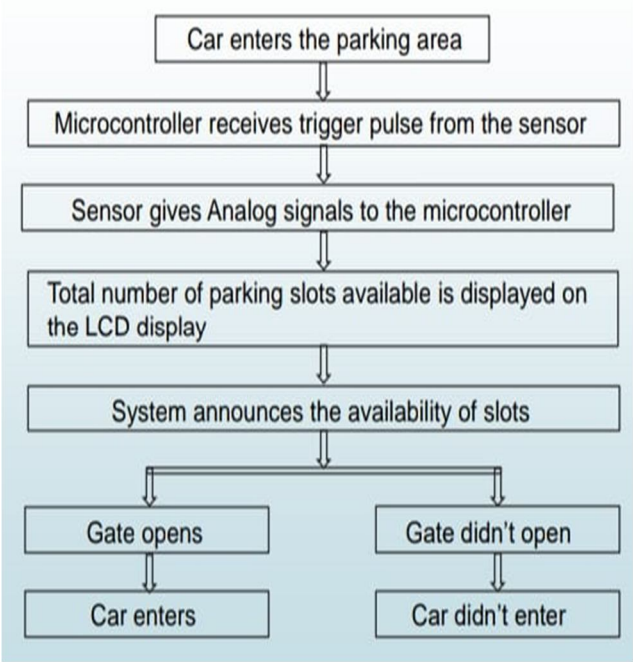


Fig. 4.1 Flowchart

V. CIRCUIT DIAGRAM

The circuit diagram of smart parking system is as shown below:

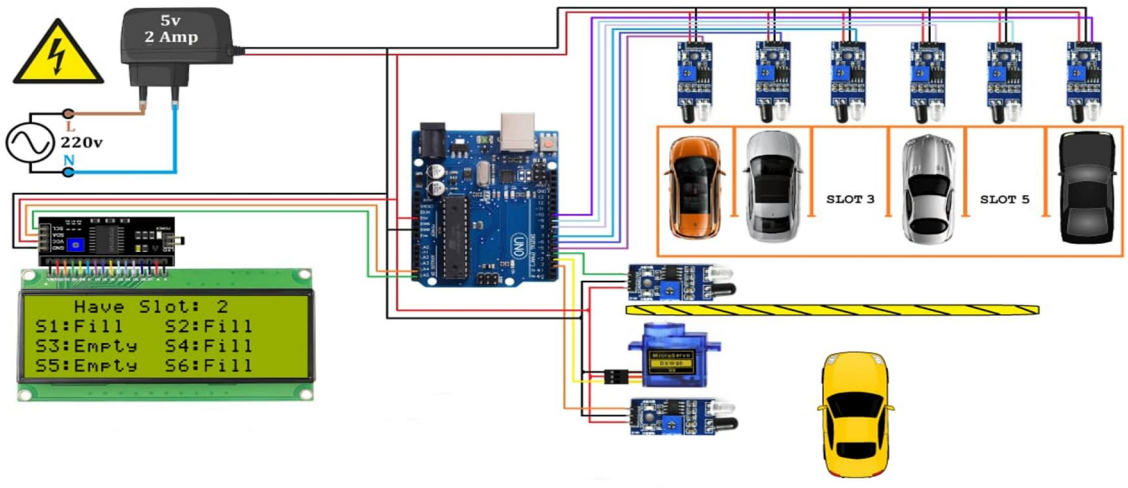


Fig. 5.1 Circuit Diagram

VI. WORKING PRINCIPLE

When car enters the parking area, IR sensor detects the passing vehicle, which is arranged before the IN gate and sends a signal to the Arduino microcontroller. The Arduino collects the data from the sensors arranged inside the parking area and manages the availability of slots. The information of the slot availability will be displayed on the LCD display of the system. If there is any availability of slots, on the command of the Arduino microcontroller the servo motor rotates at an angle of 90^0, allowing car to enter the arena. If there are no available parking slots in the area then the system did not allow a vehicle to enter the arena. Whenever a car leaves the area through the OUT gate the information will be shared with the microcontroller to increase the availability of slots.

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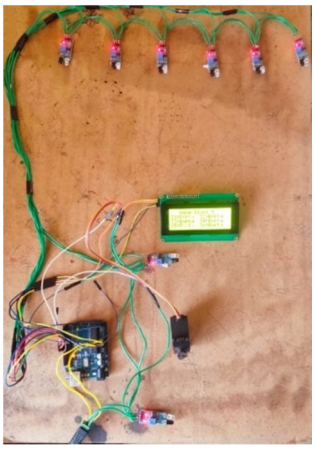


Fig. 6.1 Smart Parking System

VII. CODE ALGORITHM

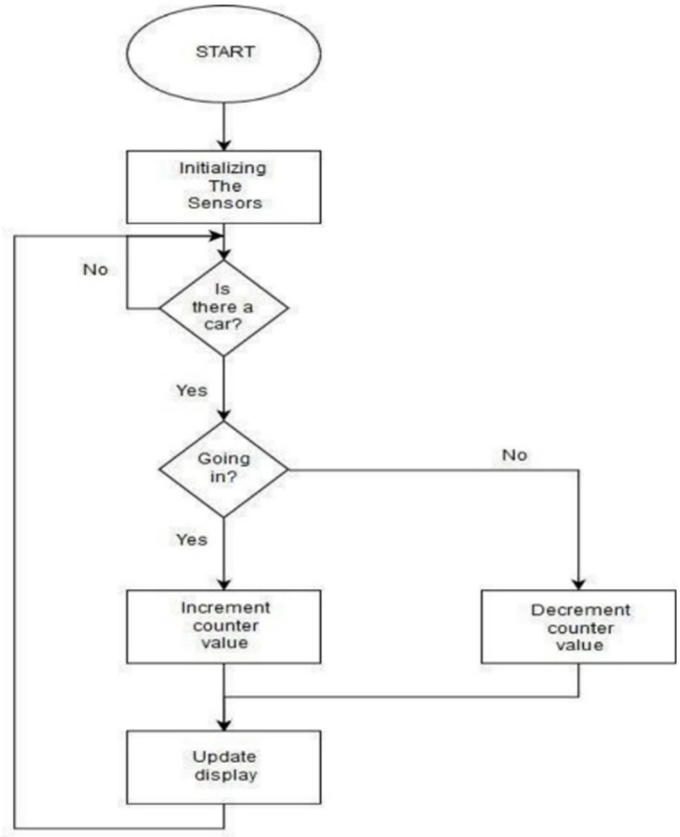


Fig. 8.1 Code Algorithm

VIII. ADVANTAGES

1) Optimized Parking
2) Reduced Traffic
3) Safer than manual parking.
4) Data in real-time and trend analytics
5) Enhanced reputation and Service

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IX. FUTURE WORKS

1) This project helps making a beginning in the broader projects of Smart Cities and Artificially Intelligent Systems.
2) Integrating the same with IoT helps making a much more automated and controllable system.
3) An App linked to a Wi-Fi Module will help bring the entire system to our mobiles.

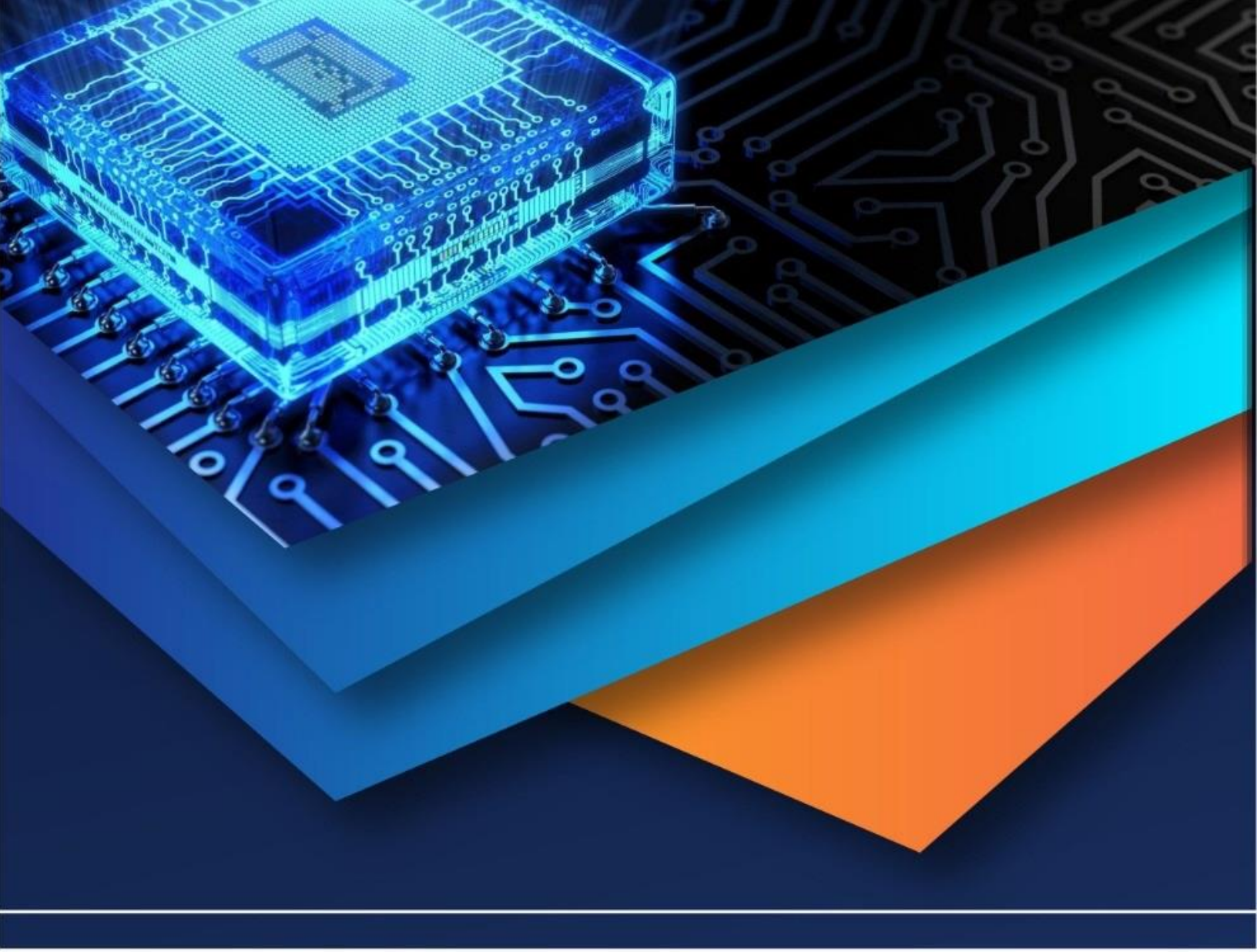
X. CONCLUSION

The smart car parking system is now available in India and was created for the local climate. Time and energy savings are the key advantages. It can also provide environmentally efficient, sustainable parking operations. Since there will be a decrease in the amount of GHG emigration and The environment will be spotless. This technique has a lower cost of conservation, which aids the property inventor in cost savings. The parking area is secure thanks to it. Smart car parking solutions lessen traffic congestion and trouble in parking lots. The property creator stands to gain if their earnings rise, as this will boost tax revenue. By increasing tariff profit, it so indirectly aids the government. Additionally, it will promote robotization engineering in our nation, advancing the addition of technological operation. Consequently, we should implement Smart Car Parking systems and reap the rewards.

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