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Car Parking System using Arduino

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Abstract— Present day vehicle parking is a serious issue and day by day its need is increasing. In our country, we are always facing problems like time and fuel wastage, finding free space for parking around the public area. "Car Parking System Using Arduino" project aims at avoiding confusion and provides a hassle free and easy parking. The main aim of this project is to help the drivers in parking their vehicles within minimized time with precise information on the free space available to park, displayed on a LCD screen at the entry of the parking area or lot. The operator or the management of the parking system can also collect the fee for parking duration efficiently and can be further advanced in booking of parking space and pay using the system. This project includes an Arduino Uno to which the IR sensors, servo motor, LCD and are interfaced. The LCD is used to display the number of spaces available and total spaces in the parking lot. The counter is used to count the vehicles which are entering and leaving the garage or lot. Servo motor acts as a gate for controlling the flow of vehicles coming in and going out of the lot.
Keywords— Parking system, Arduino, counter, LCD & parking fee.

I. INTRODUCTION

Finding a free space for in metropolitan cites is very difficult task for vehicle users. Heavy vehicles may arise due to the unavailability of parking spaces. The smart automatic parking system is a new emerging field and is attracting computer vision researchers to contribute to this area of technology and research. In this paper, we have introduced an Arduino based smart parking system that makes the driver's vows in finding the right parking space. At first, we split the parking lot into blocks. After that, show the details of available parking spaces and control the movement of incoming vehicles according to the available spaces.

II. LITERATURE SURVEY

Guangdong AKE Technology is a leading business with information procurement and management as its centre of innovation. The organization has established an in-house and in-city parking system and parking management. The proposed house parking system uses devices such as a camera and an ultrasonic module as sensors for detecting an object and transmitting the information to the system using an RS485 communication cable. The system then analyses the information obtained, finally the result is displayed in the GREEN and RED signs to the users of the parking lot. A similar concept using a geomagnetic sensor has been implemented in outdoor parking system, that detects changes in the magnetic field in each region and transmits the info related to it remotely to the server storing the status of the user parking. The urban parking system uses the same types of acquisition sensors as an external system to monitor the accessibility of parking in a designated parking area. One difference is the state of the cars and the free space available in the parking lot can be transmitted via LED signals, or sent over the internet, and the parking space can be determined via a web server or mobile app.

The Georgia Institute of Technology has created a similar type of project. The project used technologies such as mobile application, satellite imaging of data acquisition and measurement of future parking management system data. This sensor parking system uses Fiber Braggs Grating sensors. The sensors are integrated into the ground area and the frequency of the wavelength of the nerves is altered when the discovery of a vehicle or vehicle is detected. Adam Riekert and few other authors from University of Waikato, New Zealand developed a sophisticated system containing both the functionality of above two literature surveys that is updating data of fuel information to the server using Internet and also sending SMS messages to the owner of the fuel company. In addition to these two they have used RFID tags for vehicle Identification for additional security leaving no loopholes for fuel theft. They are again to possible ways in which these RFID tags used in the working of the project. One way is a little less secured way where manually the tags are distributed across the drivers of fuel vehicle or to the authorized personnel. This type of system is called Fuel Shield. Another way is where the tags fitted to the vehicle, this type of system is called Blue Tank.

III.HARDWARE COMPONENTS AND SOFTWARE

The proposed system is built using the following components and Software tools.

A. Arduino UNO

Arduino UNO board is a multipurpose circuit which houses a microcontroller and other peripherals. We use Arduino IDE to program this board. Programming is done in embedded C language.

Fig. 1 A view of Arduino IDE

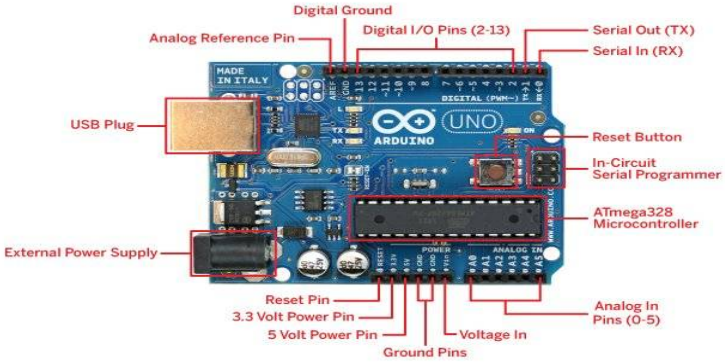

Fig. 2 Pin description of arduino uno

B. LCD Display

A liquid crystal display (LCD) is a combination of liquid and solid states of matter. Liquid crystal which produces an visible image is used in LCD. LCD Display is used in the project to display the total number of parking spaces and available parking spaces in the parking lot for a person entering the parking lot. We use a 16x2 LCD Display.

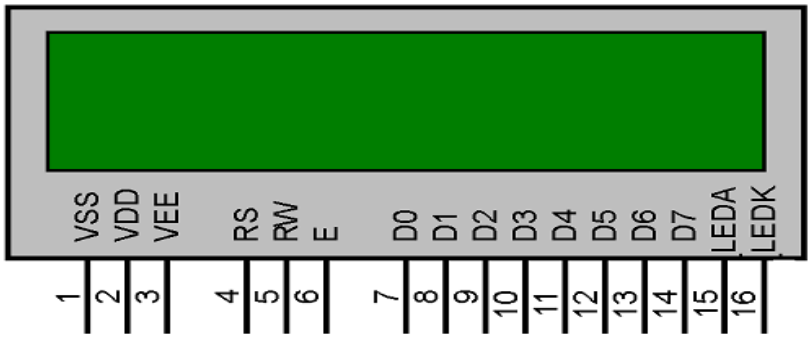

Fig. 3 LCD pin diagram

C. Servo Motor

The servo motor is used wherever high accuracy is required for rotations or spins. Typically, a servo motor consists of two circuits, a control circuit, and a response circuit. The control circuit provides feedback on the current state of the motor shaft. This response helps the servo motor to rotate with greater accuracy. If we want to rotate an object to a certain distance or a certain distance, then we can use a servo motor. Here we use a servo motor to lift the gate so that cars can enter and exit the car park.

Fig. 4 Servo motor

D. IR Sensor

An infrared sensor (IR) is an electronic device, that is used to sense some aspects of the surroundings. The IR sensor can detect the heat and movement of the objects. In our project we use the sensor to detect the cars entering and leaving the parking lot and to update the list of vehicles on LCD.

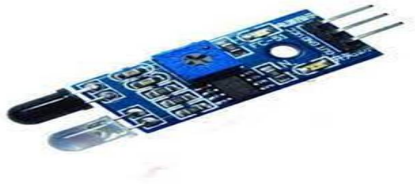

Fig. 5 IR sensor

E. Proteus Design Suite

Proteus Design Suite is a multi-functional software tool used to mimic electrical and electronic circuits. This software is widely used by design engineers to perform schematics and mimic a few electrical circuits. In this project we used this software to emulate Microcontroller. The hex file or debug file is discarded in the microcontroller component in the schematic. Resistors, battery source and connecting wires are used as required.

IV. METHODOLOGY

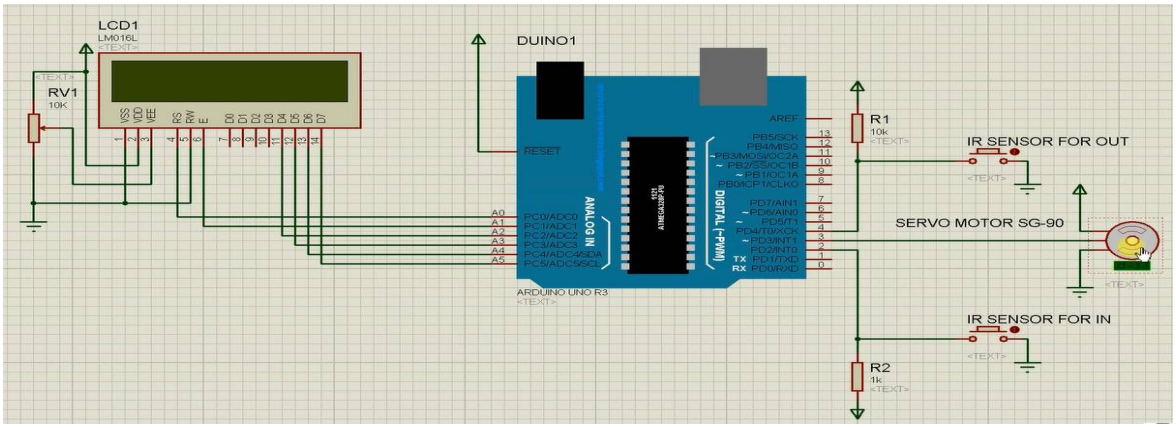

Fig. 6 Circuit diagram

Initially, we built the circuit according to the circuit diagram. We connect the IR sensors to the appropriate Arduino pins using resistors. Servo Motor was then connected to the Arduino UNO Board. Thereafter the LCD display is disconnected from the board and finally the Board is connected to the power supply.
Application code works successfully in Arduino IDE and HEX file is generated. The code is thrown into the Arduino board by connecting it to a computer using USB.

V. WORKING

The number of available parking spaces and total areas in the parking lot is pre-specified. When the car enters the parking lot, the IR sensor detects the car, and the number of available parking spaces are decremented on the LCD screen and the car is allowed to enter by raising the entrance gate with the help of the Servo motor.
Similarly, when a car wants to leave the parking lot, the IR sensor detects the car at the exit and the servo motor raises the gate. The number of available parking slots is incremented in the LCD display. If there are no parking slots available, then LCD display shows "No parking slots available."

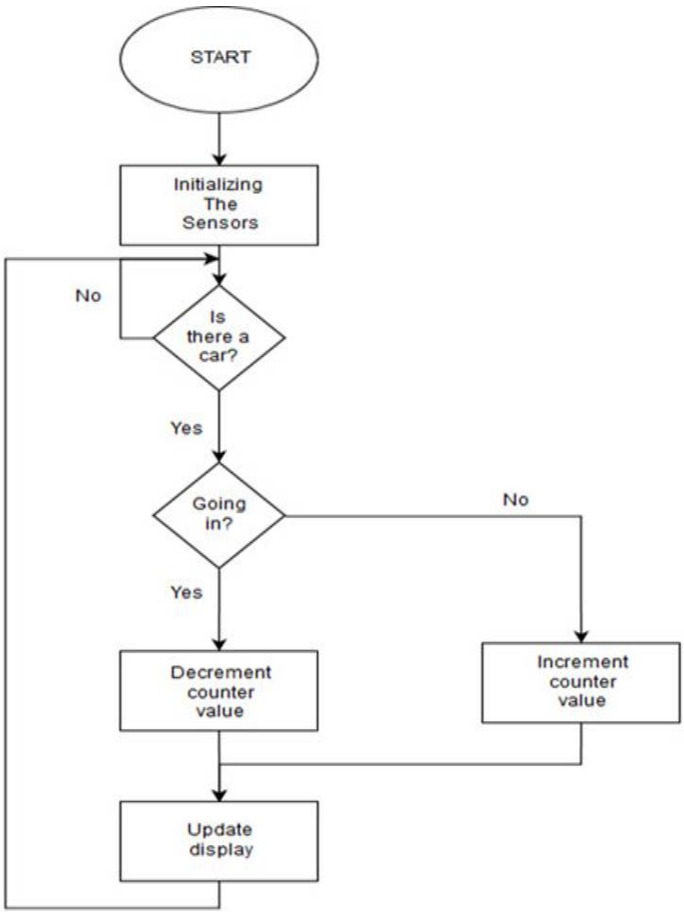

Fig. 7 Flow chart

VI. RESULTS

The Arduino parking system has been successfully developed and implemented; inspections were performed on all known cases in connection with the implementation of the project. The interface is easy to use and works well in a general environment.

VII. CONCLUSION AND FUTURE ENHANCEMENTS

A major contribution of this study is to increase the identification of available parking spaces to reduce traffic congestion. Due to advances in machine learning technology and basic technology, automatic parking costs make it easier for drivers to find available spaces in the parking lot. In our day, we are in a world of automation, artificial intelligence, and robots. Intentionally or by accident, we were using a variety of robots in our daily lives. The purpose of this exercise is to advance the development of private parking systems. We see straight parking spaces as big buildings in large municipal cities that are easily accessible.

This may be due to the recent advances in robots. Arduino world is important and supports understanding of embedded framework, IR sensors, microcontroller and we too can see how we can make more advanced systems using Arduino.

Future investigators may focus on providing customers with a specific parking space, which can register for a dedicated parking area in an online parking management system. The project can go further and by introducing new sensors and software, security systems can be upgraded for use in public places, where people can only access them. The system can be upgraded with a password entry for private parking. Available parking space can be displayed which makes it easy for cars. Automatic parking fees can be calculated according to the time of entry and exit of the vehicle.

VIII. ACKNOWLEDGEMENTS

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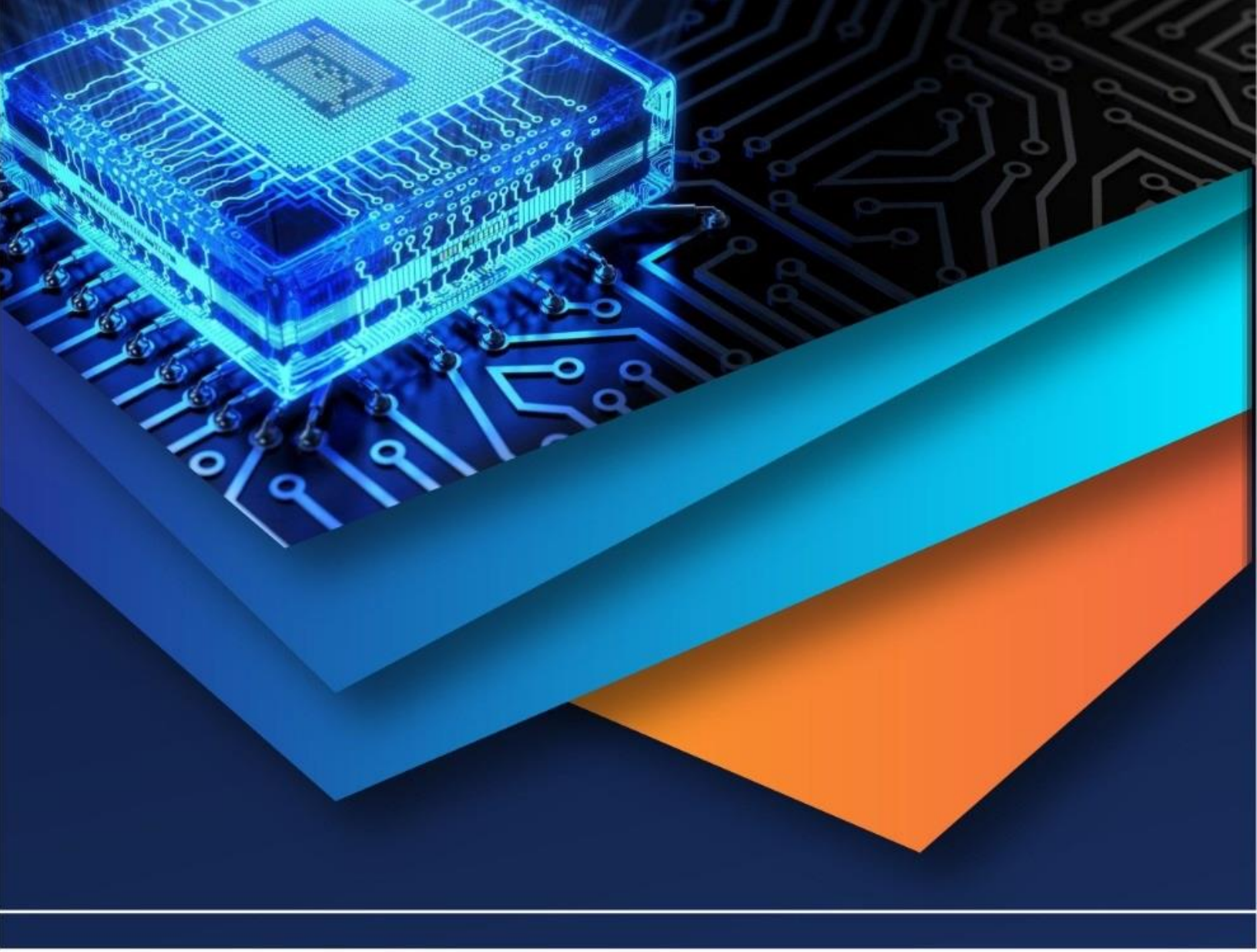

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