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IOT based Smart Car Parking System using Arduino and IR Sensor

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Abstract: ***IOT (Internet of things) based Car Parking System using Arduino and IR Sensor is such type of a system that it will help us to reduce the access of vehicles in the parking area. Normally we know that in shopping malls or pay parking areas or any office building parking area there are only limited space for parking but sometimes there are more vehicles than the parking space provided because of that some people face problems while parking vehicles or to remove their vehicle from the parking. Here we are going to design a system that is called an IOT based Car Parking System using Arduino and IR Sensor which will help in to reduce the access traffic of vehicles in parking area. This system is not much costly. We are going to use an Arduino microcontroller, an IR sensor, a Servo motor and a Display screen.***

I. INTRODUCTION

In the everyday life, because of car parking wastage of time occurs and also the problem of traffic occurs in parking areas. So we are going to design a car parking system which will help to reduce traffic in the car parking areas. With the help of IR sensor we will sense how many vehicles have entered into car parking area that will be displayed on the LED screen and when the parking limit is reached the display will show “No slots available” and the gates will not open.

A. Problem Motivation

In this current era of modern world, almost everyone owns a personal vehicle and it has become a basic need for the humans. Hence, it has been proven statistically that the usage of vehicles is increasing rapidly yearly. Due to the growth, it is very difficult to find parking slots in cities, especially during the peak time. This creates a necessity to introduce an automated system that allows users to find whether there is a space available in the parking slot. This serves to hassle free situation for each and every users. The main motivation behind the Smart Parking. System is to help the drivers to find areas where parking is available in that area.

B. Objective

The main objective of the proposed system is to find the parking space and reserve the particular slot using modern technologies. Infrared sensor is used to detect the parking slot and determine whether the parking slot is vacant or not. This Infrared sensor is connected to the Arduino board.

II. METHODOLOGY

In this project, sensors are connected to Arduino microcontroller. The Arduino microcontroller controls the whole project. For detection of vehicles IR sensor is used and display screen will keep the count of it. According to the sensor that detects the vehicles will send the information to the display screen and it will increment the count. As per the count how many parking slots are available will be displayed on the LED screen.

III. DATA FLOW DIAGRAM

Data Flow diagram (DFD) is a traditional demonstration of the view of information flowing within a system. A clean and clear DFD can clearly show the right amount of system requirement. It can be manual, automatic, or a combination of both. Indicates how data enters and leaves the system, what changes the data, and where the data is stored. The purpose of the DFD is to indicate the size and parameters of the entire system. It can be used as a communication tool between a program analyst and any person who plays a role in an order that serves as the starting point for program rebuilding. DFD is also called data flow graph or bubble chart.

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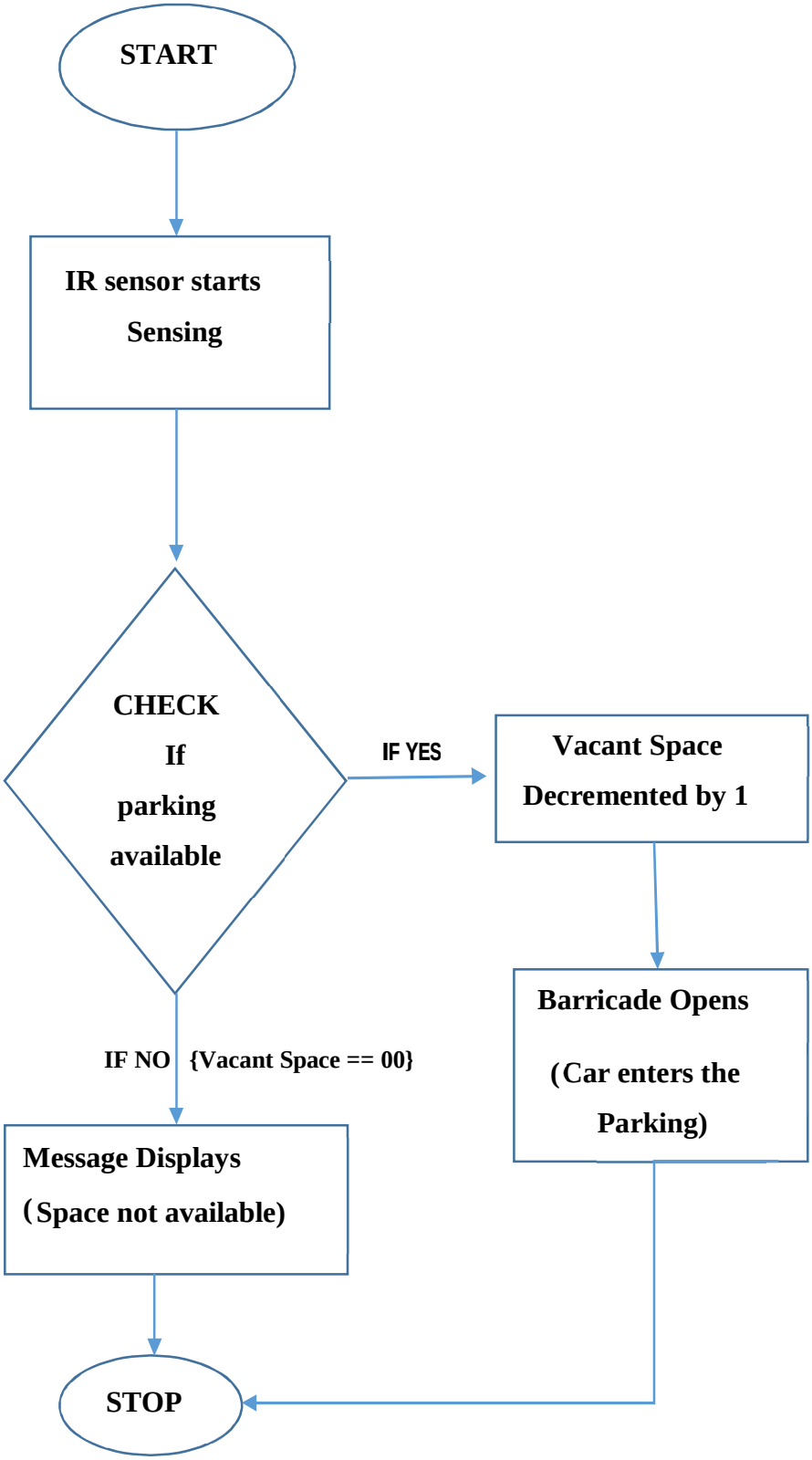

Fig1.1 Flow Chart for entry point

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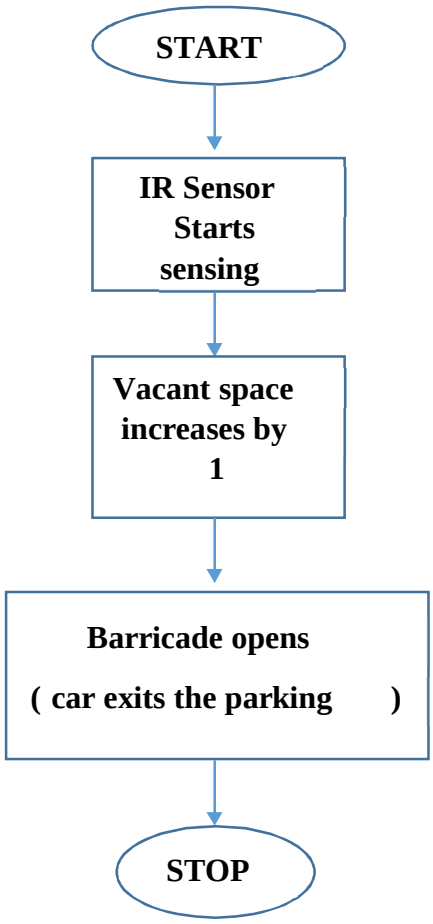

Fig1.2 Flow Chart for exit point

IV. SYSTEM ARCHITECTURE

System design defines its main components, their relationships (structures), and how they work together. Software design and construction incorporates a number of contributing factors such as Business strategy, quality attributes, human capabilities, design, and IT environment. System Architecture serves as a blueprint for a system.

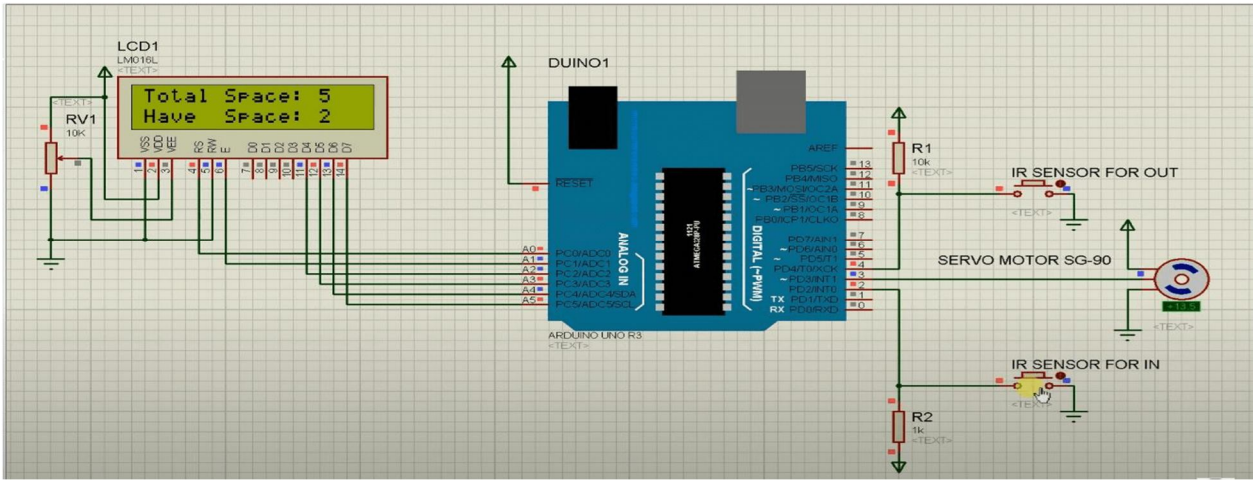

Fig 4.1- System Architecture

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V. HARDWARE REQUIREMENT

1) *Arduino:* Arduino is a single-board microcontroller that is widely used to create various types of digital devices, block diagram shown in Figure. You can control and interact with various electronics components such as sensors, actuators and much more. It has its own fixed RAM and stores data quickly memory and EEPROM. It uses languages such as C, C ++, and Java.

Fig-Arduino

2) *IR Sensor:* An infrared sensor is an electronic device, which emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. Usually in the infrared spectrum, all the objects radiate some form of thermal radiations. These types of radiations are invisible to our eyes, which can be detected by an infrared sensor. Its operating voltage is 3V to 6V. Its operating range is 2cm to 30cm with an operating angle of 35°.

Fig- IR Sensor

3) *LCD Display:* A 16*2 LCD is a basic module where 2 represents lines and 16 represents characters where each character is displayed in 5*7 pixel matrix. This LCD has two registers namely command and data. The command register is used for storing command instructions given to the LCD to do predefined tasks like clearing and controlling the display, initializing and so on. The data register is used for storing data which is given by the user. LCDs are available to display arbitrary images. It displays preset words, digits, and 7-segment displays. It has a wide range of applications including computer monitors, televisions, instrument panels, aircraft cockpit displays.

Fig- LCD Display

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4) 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. Servo can rotate approximately 180o. It has an operating voltage of 5V and operating speed of 0.12sec/60o with torque of 1.8 Kg-cm.

Fig- Servo motor

VI. FUTURE SCOPE

A variety of future scope are available in this project. We can add an android app from which we can locate all the nearby parking facilities and through the app we can book a parking spot with the help of online booking.

VII. CONCLUSION

Automatic car parking system is very important factor in the traffic areas. It can be automated without human being. It reduces the time consumption. So by implementing our automatic car parking system using IR Sensors we can manage our time and vehicles can be parked easily.

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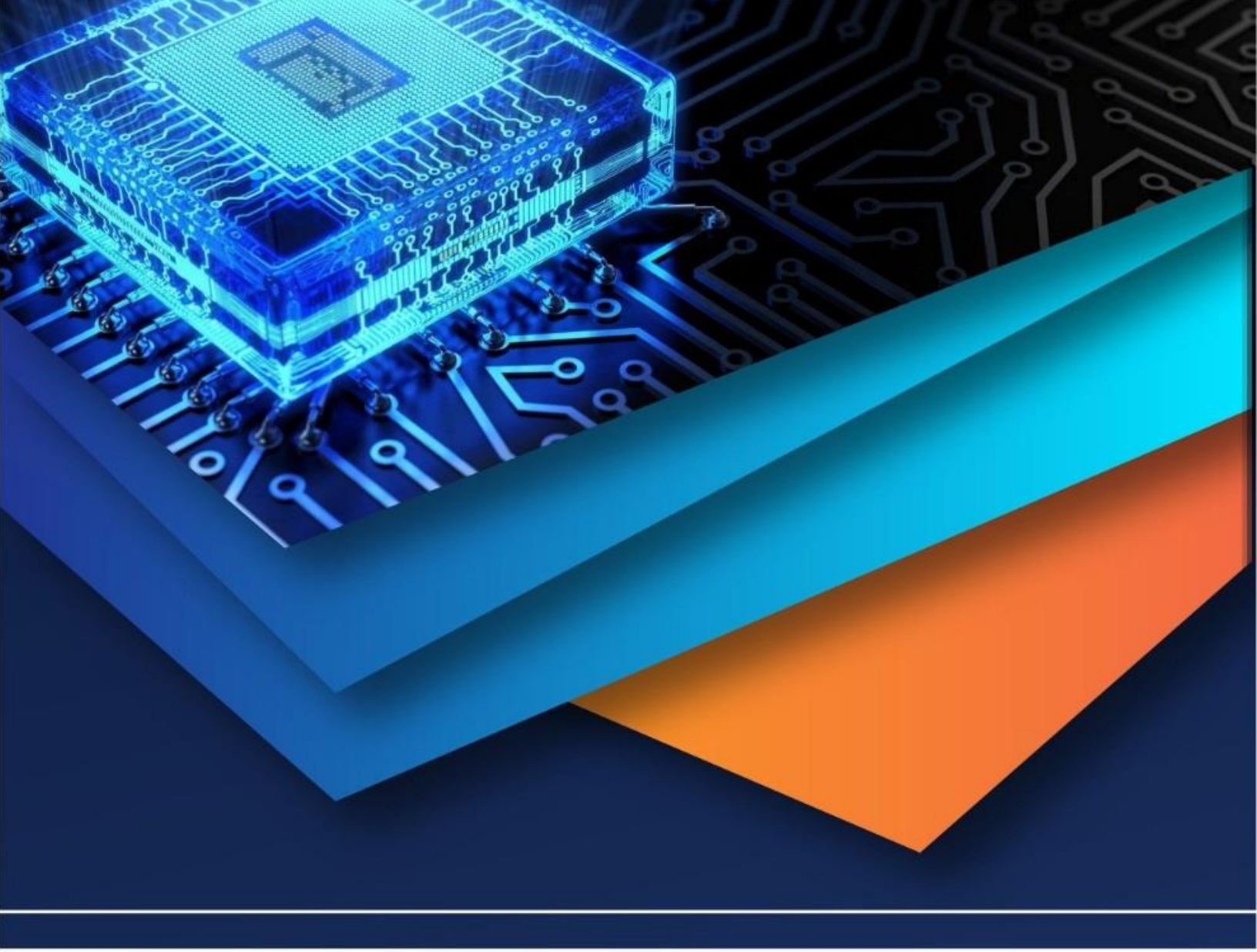

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