iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 8 **Issue:** V **Month of publication:** May 2020

DOI: http://doi.org/10.22214/ijraset.2020.5405

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 8 Issue V May 2020- Available at www.ijraset.com

Smart Car Parking System using IR Sensor

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Abstract: ***This paper is on the Smart car parking system. In which we going to use the IR sensor to detect the vehicle and it will help the owner to find a convenient parking spot. This project will help to resolve the parking problems. Parking spaces are very important in metropolitan cities. Because of the increase in large no. of vehicles, the need for parking spots is a necessity. And hence an urgent need to develop a system that can manage these parking spaces. So, our project's objective is to develop a system to indicate the vacant lane in the parking slots. This involves a system that includes an infrared sensor and Arduino in every lane and a led display outside the car parking gate. Parking slots are monitored by the staff of the concerned authority. The paper includes the details of components that are used and about the working of this system. The paper also contains the future scope of this project which will lead our nation towards the transformation.***
Keywords: Arduino UNO, IR sensor, Smart parking.

I. INTRODUCTION

Due to the rapid increase in the vehicles there exists a problem for parking of vehicles. It leads to traffic congestion and also pollution. So, we need to maintain the vehicle park management to reduce the wastage of time. If we observe in the larger cities when we visit the shopping malls or tourist places or any other commercial areas there arises a problem for parking of our vehicle. we mainly focus on designing a new smart parking system that assists drivers to find vacant parking spaces in a specific parking area. hence to reduce human effort and air pollution. The main motive is to enhance each parking slot so that it reaches the state-of-art technology. For this purpose, each parking slot has been provided a sensor i.e. Infrared sensor that will detect the presence of the car parked in the specific slot. when it will detect the car it will automatically display on LCD that the parking slot is full. The same message or output is provided to the responsible staff. So the staff member will guide the person to the vacant parking spot.

This system has many flexible capabilities, it can use for a small parking slot as well as the big shopping mall's multilevel parking. Parts of this system include IR senor, wifi module, LCD. Instead of using the IR sensor for bigger parking, a bigger ground sensor module can be used. The remaining paper is ordered as section II is about system overview of the proposed system. and the basic details of different modules and components used for the system. Section III is about the block diagram of the proposed system. Section IV will explain the working of the system. Section V will be about the future scope of this project. Section VI will be about the results, the conclusion we get from this project.

II. SYSTEM OVERVIEW

The is consists of Arduino UNO, IR sensor, LCD display, and Wifi module.

A. Arduino Uno

The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced with various development boards (shields) and other circuits. The board has 14 digital I/0 pins (six capable of PWM output), 6 analog I/0 pins, and is programmable with the Arduino IDE (Integrated Development Environment), via a type B USB cable. It can be powered by the USB cable or by an external 9-volt battery. It also has 16 MHz ceramic resonators, a USB connection jack, an external power supply jack, an ICSP (in-circuit serial programmer) header, and a reset button. Its operating voltage is 5v, input voltage 7 to 12v (limit up to 20v).

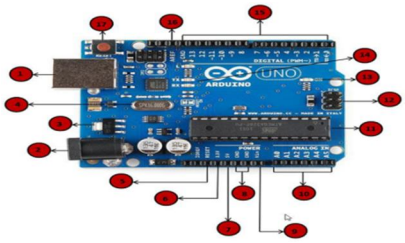

Fig 1: Arduino UNO

1) Specifications Of Arduino

a) Microcontroller: Microchip ATmega328P
b) Operating Voltage: 5 volts
c) Input Voltage: 7 to 20 volts
d) Digital I/O Pins: 14 (of which 6 can provide PWM output)
e) Analog Input Pins: 6
f) DC Current per I/O Pin: 20 mA
g) DC Current for 3.3V Pin: 50 mA
h) Flash Memory: 32 KB of which 0.5 KB used by the boot loader
i) SRAM: 2 KB

B. IR Sensor

An infrared (IR) sensor is an electronic device that measures and detects infrared radiation in its surrounding environment. Infrared radiation was accidentally discovered by an astronomer named William Herchel in 1800. While measuring the temperature of each color of the light (separated by a prism), he noticed that the temperature just beyond the red light was highest. IR is invisible to the human eye, as its wavelength is longer than that of visible light (though it is still on the same electromagnetic spectrum). Anything that emits heat (everything that has a temperature above around five degrees Kelvin) gives off infrared radiation.

Fig 2: IR Sensor

C. LCD Display

A liquid-crystal display is a flat-panel display or another electronically modulated optical device that uses the light-modulating properties of liquid crystals combined with polarizers. Liquid crystals do not emit light directly, instead of using a backlight or reflector to produce images in color or monochrome

Fig 3: LCD display

D. WIFI Module

The ESP8266 WiFi Module is a self-contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your WiFi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. Each ESP8266 module comes pre-programmed with an AT command set firmware, meaning, you can simply hook this up to your Arduino device and get about as much WiFi-ability as a WiFi Shield offers (and that's just out of the box)! The ESP8266 module is an extremely cost-effective board with a huge, and ever-growing, community.

Fig 4: Wifi Module

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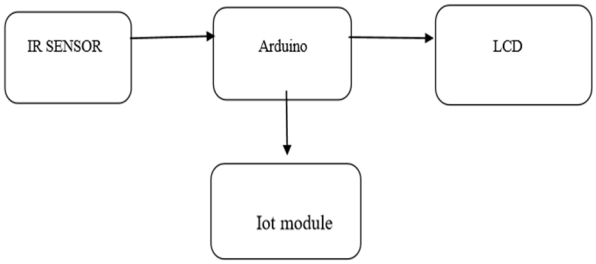
III. BLOCK DIAGRAM



IV. WORKING

In this circuit IR sensors are used for each parking slot. These IR sensors are connected to the Arduino pins The LEDs are connected at the Digital I/O pins which give color RED and GREEN. The reading will be displayed on the LCD which will inform the visitors about the free space available inside the parking. When the slot will be vacant then the IR receiver will not receive any signal. Hence GREEN light will glow. If any signal is received by the IR receiver then it will be compared to the threshold value and if it is more than the threshold value then the RED light will glow. This process will be similar to all other slots, and whenever a car enters or leaves the parking area, the data is continuously updated. When a car enters or leaves the parking slot, the respective led will glow immediately. If any the parking slots are occupied then a text message will be displayed on LCD and your mobile about how much more space is vacant.

V. FUTURE SCOPE

This project will prevent rush for parking slots in the future. Thus it can be widely used in malls and business buildings or crowded areas where a large number of people can share a parking area. This Smart Car Parking system will reduce time-wastage, long queues, tension, and increase the efficiency of the parking system. In addition to this it increases safety and provides a hustle-free environment. It reduces time consumption. So by implementing our smart car parking system using IR Sensors we can manage our time and vehicles can be parked easily.

VI. CONCLUSION

In this paper we brought out how the parking problem in crowded places can be tackled in a well-devised manner. It is a very time-efficient method, it helps the visitors to find out the availability of a parking slot. It also enables cities to develop a fully advanced and intelligent transportation system for easy access to the parking. This system will avoid wastage of fuel, hence less pollution and traffic congestion can be reduced. It helps drivers find vacant parking spots close to them.

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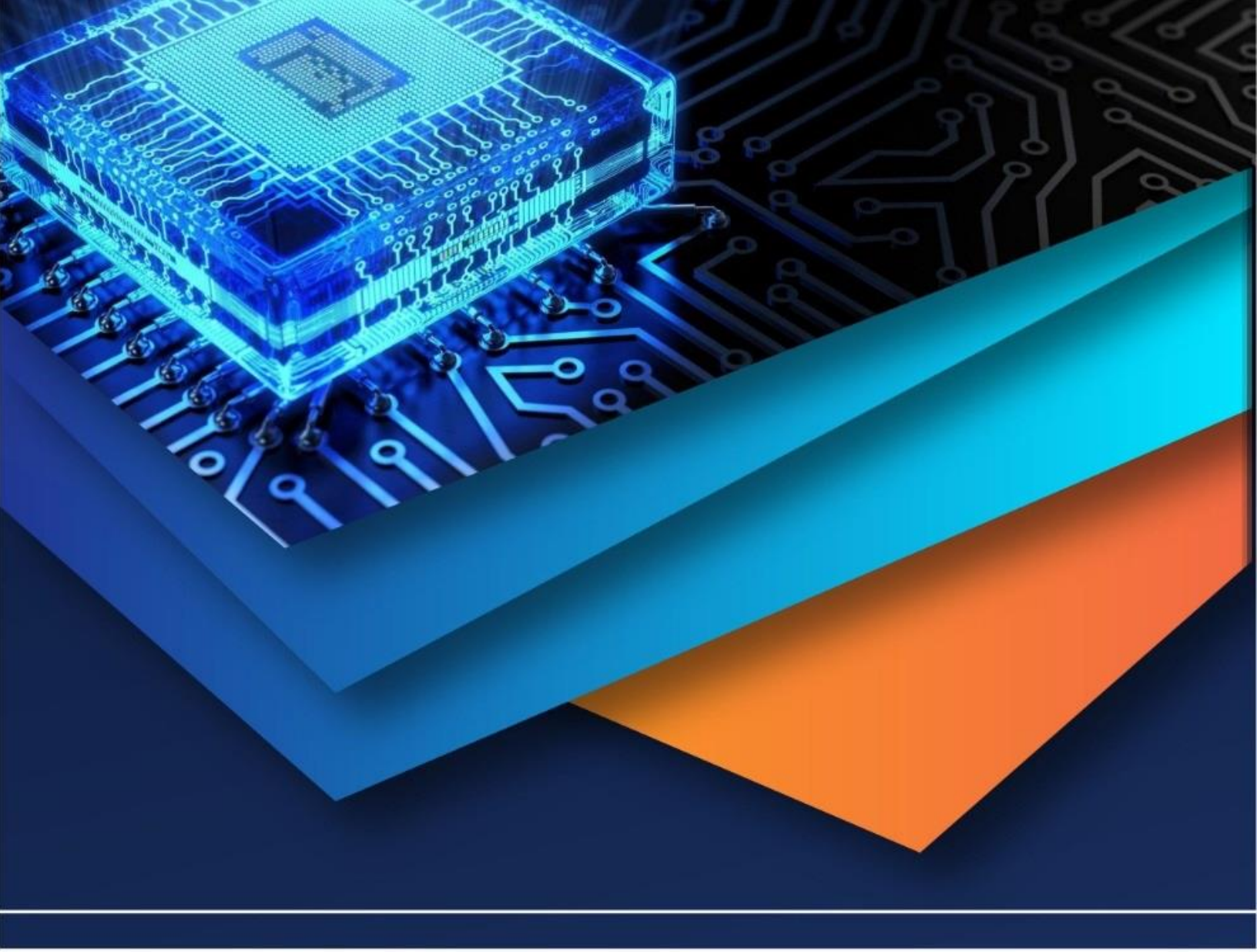

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