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## PARKING MANAGEMENT SYSTEM

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**Abstract:** This parking management system solves the matter of unnecessary time consumption in finding parking spots in parking areas. Sensors like IR (infrared) are used in order to detect the entrance or exit of the car at the parking slot and also detect the empty slot. This system clearly displays the total parking slots available and indicates the occupied slots and unoccupied slots on LCD display so that users can check the slots before entering the parking area and can park their vehicle in that slot within no time without wasting their time. The parking slots are continuously monitored and therefore the data is continuously updated on LCD display. The demonstration has proven the capability of the system to eliminate the effort of searching empty parking lots.

**Index Terms - Buzzer, Infrared sensors, LCD display, Parking Management System.**

### I. INTRODUCTION

A parking management system is employed for managing the parking slots or vehicles in a parking area. An efficient parking management system is the one that permits easier management of parking slots in parking areas. There are mainly two factors involved within the scene: the visitor, who is driving the vehicle and also the parking official, who manages the parking lot. Thus, an efficient parking management system makes the work of both the vehicle parkers and the parking management officials easier. Because of the increasing size of parking areas, vehicle owners find it difficult to seek out an empty parking spot for their vehicles. During this paper we have design and developed an IR sensor based Parking system clearly displays the total parking slots available and indicates the occupied slots and unoccupied slots on LCD display so that users can check the slots before entering the parking area and can park their vehicle in that slot within no time without wasting their time. The parking slots are continuously monitored and also the data is continuously updated on LCD display.

MUHAMAD MUZHAFAR ABD KADIR, MOHD NIZAM OSMAN, NOR ARZAMI OTHMAN AND KHAIRUL ANWAR SEDEK (2020) PROPOSED A SYSTEM USING IR SENSOR DETECTS THE PRESENCE OR ABSENCE OF A CAR, DISPLAY THE STATUS OF PARKING SLOT ON LCD SCREEN AND STORE THE DATA OF IR SENSOR INTO THE DATABASE [1]. LOMAT HAIDER CHOWDHURY, Z.N.M ZARIF MAHMUD, INTISHAR-UL ISLAM, ISHRAT JAHAN AND SALEKUL ISLAM (2019) DEVELOPED A SYSTEM USING RFID CARDS, RFID CARD IS EMPLOYED FOR EVERY VEHICLE TO STORE THE INFORMATION OF THE ENTRANCE. TIME IS AUTOMATICALLY CALCULATED FROM THE ENTRY TIME TO EXIT TIME, AND THUS FARE IS SHOWN TO THE CLIENT. THERE'LL BE AN LED DISPLAY THAT WILL SHOW THE NUMBER OF AVAILABLE PARKING SLOTS [2]. S D PRASHANTH, SUNEETH SATHYANATHAN, VAISHAK N MAKAM, NAGARATHNA N (2016) PROPOSED A PAPER WHICH PROVIDES OVERALL INFORMATION ABOUT THE SENSOR SYSTEM, THE PC SYSTEM AND THE DATABASE SYSTEM [3]. JIHOON YANG, JORGE PORTILLA AND TERESA RIESGO (2012) PRESENT THE PLANNING AND IMPLEMENTATION OF A PROTOTYPE SYSTEM OF SMART PARKING SERVICES BASED ON WIRELESS SENSOR NETWORKS (WSNs) THAT ALLOWS DRIVERS TO EASILY FIND EMPTY PARKING SLOTS.

### II. RESEARCH METHODOLOGY

In this paper, the IR sensors are utilized in the management system, which consists of IR sensors for detection of presence or absence of vehicles at parking slots as well as at the entrance and LEDs at each parking slot to indicate empty slots. This object detection technique for assigning parking slots to the vehicles. When a vehicle approaches the IR sensor, the signal is sent to Arduino UNO through which it is connected to the IR sensors. The Arduino UNO is used for connecting multiple IR sensors where each IR signal corresponds to their respective parking slot. The LCD will display the number of vacant slots and occupied slots.

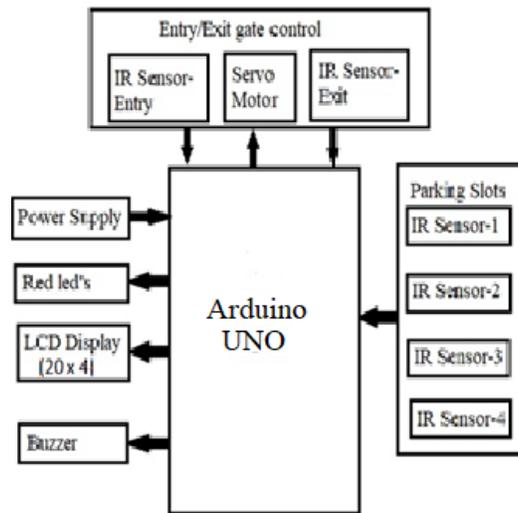


Fig1.Block Diagram

### 3.1 Components

#### 3.1.1. IR Sensor

Infrared sensors are specific sorts of sensors that use infrared radiations. In this parking management system we have used an active infrared sensor. Active infrared sensors work with radar technology which they both emit and receive infrared radiation. This radiation hits nearby objects and is reflected back to the device's receiver. Through this technology, the sensor can't only detect movement in an environment but also how far the article is from the device

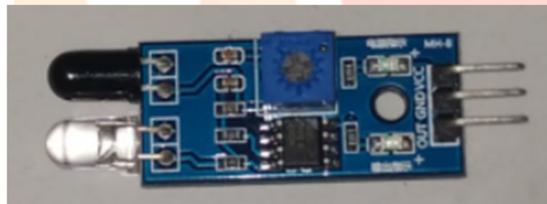


Fig.2. IR Sensor

The emitter is an Infrared LED and hence the detector is an Infrared photodiode. Infrared Photodiodes are sensitive to infrared rays emitted by infrared LEDs. The photodiode's output resistance and voltage change in proportion to the received infrared.

#### 3.1.2. Servo Motor

The Servo Motor employed in our project is SG90, Which features a maximum rotation of 180 degrees. It has a high torque of 2.5Kg per cm and operates at a voltage of 4.8v to 6v.



Fig.3. Servo Motor

#### 3.1.3. Arduino UNO

The Arduino Uno has the ATmega328 microcontroller. The Board has 14 digital I/O pins out of which there are 6 PWM pins, 6 analog input pins, a 16 MHz oscillator and a USB connection. To use Arduino Uno we just need to connect it with the pc and upload the code using Arduino IDE. Once the code is uploaded, it can run the code just by powering via AC to DC adapter.



Fig.4. Arduino UNO and USB Cable

### 3.1.4. I2C Module

I2C stands for inter integrated circuit. It has Synchronous Serial Communication with half Duplex. Since LCD uses parallel communication, there were no pins available for other components. I2C module can convert parallel communication to Serial and vice versa. So Instead of 16 only 4 pins were required (including VCC and GND).

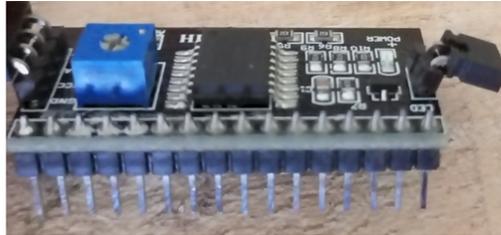


Fig.5. I2C Module

### 3.1.5. LCD Display (20 x 4):

LCD Display (20 x 4): The LCD stands for liquid crystal display that works on the light modulation features of liquid crystals. In a 20x4 LCD module, there are four rows in display and in one row twenty characters can be displayed and in one display eighty characters can be shown. We required an I2C module to interface LCD with the Arduino. The input supply for this module is three volts or five volts, with that module other components like Arduino.



Fig.6 LCD Display

## 3.2 Working

There are two IR sensors for opening and closing the barrier. There are 4 sensors for 4 parking spaces. When the car will come it will be sensed by the first IR sensor fixed before the gate, and if any one of the 4 parking slots is vacant the barrier will open, a buzzer will produce a sound and after the car goes inside and crosses the second sensor which is fixed after the barrier, the barrier will get closed and the buzzer will stop.

There are red LEDs mounted at every parking slot. When slots are vacant LEDs will turn ON, indicating that the parking space is vacant and when the car is parked at any of the parking slots the respective red led will turn off. When the car leaves the parking space the red led is turned off and the sensor from inside of the barrier will sense the vehicle, the barrier will open and after the car goes outside and crosses the second sensor which is fixed after the barrier, the barrier will get closed.

When any of the Parking space is occupied, the Vacancy and Occupancy of the parking Spaces is displayed on the LCD. When all the spaces are occupied, the LCD shows a message of "NO ENTRY, ALL SLOTS ARE FULL".

## 3.3 Future-Scope

1. Pre-booking of the parking slot according to the date and time.
2. Giving the maximum delay time beforehand for the booked slot so that if the vehicle does not reach before that time, the slot will be used for another vehicle.
3. At places like hospitals or big business companies' special parking slots for the staff can be kept so that only staff vehicles can be parked in these slots.
4. Discount features can be added for regular customers.
5. OTP feature can be added for security purpose so that the driver will have to type OTP at the parking slot then only the barricade will open.

## III. IV. RESULTS AND DISCUSSION

Parking Management System using an IR sensor can perform its function such as detecting the absence or presence of a vehicle and turning on/off LEDs in parking slots respectively. The proposed parking system can reduce the problem for parking of vehicles, especially the time being wasted in searching for available parking slots.

**Case I:** When the first car enters to the parking slot 1 (P1), the LCD screen displays the updated status of the vacancy and occupancy of the parking as shown in Figure 6. The next car will go to either P2, P3 or P4 parking slot.



Fig.7. LCD screen status

**Case 2:** Whenever the parking slot is full, the LCD screen status displays the message 'NO ENTRY' and 'ALL Slots Are Full' as shown in Figure 7.



FIG.8. LCD SCREEN STATUS

#### IV. ACKNOWLEDGMENT

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#### REFERENCES

- [1]. ABD KADIR, MUHAMAD MUZHAFAR, ET AL. "IOT BASED CAR PARKING MANAGEMENT SYSTEM USING IR SENSOR." JOURNAL OF COMPUTING RESEARCH AND INNOVATION (JCRINC) 5.2 (2020): 75-84.
- [2]. CHOWDHURY, LOMAT HAIDER, ET AL. "SMART CAR PARKING MANAGEMENT SYSTEM." 2019 IEEE INTERNATIONAL CONFERENCE ON ROBOTICS, AUTOMATION, ARTIFICIAL-INTELLIGENCE AND INTERNET-OF-THINGS (RAAICON). IEEE, 2019.
- [3]. S D PRASHANTH , SUNEETH SATHYANATHAN , VAISHAK N MAKAM , NAGARATHNA N. "PARKING MANAGEMENT SYSTEMS AND THEIR TECHNOLOGIES - A REVIEW " INTERNATIONAL JOURNAL FOR RESEARCH IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY (IJRASET),APRIL 2016
- [4]. YANG, JIHOON, JORGE PORTILLA, AND TERESA RIESGO. "SMART PARKING SERVICE BASED ON WIRELESS SENSOR NETWORKS." IECON 2012-38TH ANNUAL CONFERENCE ON IEEE INDUSTRIAL ELECTRONICS SOCIETY. IEEE, 2012.