

Effective Parking Management System Based On Search and Occupy Algorithm Using Arduino UNO

Robin Chettri^{1*}, Deepak Rasaily², Shyam Chhinal³, Bikash Rai⁴, Gulsan Sharma⁵, Greacy Lepcha⁶

^{1,2,3,4,5,6}Dept. Of electronic and communication engineering, centre for computers and communication technology, Namchi, India

*Corresponding Author: robinchettri200@gmail.com, Tel: 8250213401

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Abstract— This paper describes an approach to overcome a situation of monitoring and managing a parking area using arduino based effective parking management system. With the rapid increasing of cars the need to find available parking space in the most efficient manner, to avoid traffic congestion in a parking area become difficult. This paper aimed at develop a effective car parking management system that is more cost effective and user friendly existing system, confusion free and easy parking. The main purpose of effective parking system is to reduce time to locate the parking areas, hence it reduce fuel consumption. The system counts the number of cars in any parking places and checks if there's any vacancy. The first phase aimed at making cars datable in the parking lot through the use of sensor used for searching the unoccupied parking facility. The discussed system will be able to reduce the problems which are arising due to unavailability of a reliable, efficient and modern parking system, while the economic analysis technique will help in analyzing the project feasibility.

Keywords— Arduino UNO, infrared sensor, LCD display, Servo motor, proteus professional

I. INTRODUCTION

With the advancement in technology the world is trending towards new innovative invention. New autonomous system has been design in a decade out of this effective parking management is a system through which car parking can be done more precisely and easily than manual method. The smart car parking system is a very innovative and effective system which aspiration to reduce vehicles congestion during parking and to descend the vehicles accident happening due to lagging of car availability information in garage. Now a day's effective parking management has become a global issue due to rapid manufactured and increasing of car. To overcome this problem we have design a project which can know the availability of empty slot. This project aims at providing a confusion free and easy parking. This project helps the drivers of the car to park their vehicles with minimum wastage of time with accurate and concise information for the availability of the free parking slot. This system counts the number of cars in any parking area and check if there's any vacancy. There's an entry and exit path. When vehicle enters, the display shows the number of cars engage parking slots. When any vehicle leave the particular parking slots the count decreases and shown on display, the whole process includes the use of Arduino, LCD Display and IR sensor. The sensor detects whether the vehicle is entering or leaving. The report then showed on display. The arduino (microcontroller) board acts as the heart of the entire system. The include of arduino Uno the microcontroller unit to which the servo motor, LCD display infrared sensor are interfaced. Sensor will be

deployed in the parking area, the LCD is attached on the entrance point, and according to the sensor output corresponding LCD will display the present status of the particular parking slots. The LCD display the availability of the space, the infrared sensor keeps frequent check of the number of cars entering and exiting the parking slots.

The idea of creating smart city is related to car parking facility and traffic control management has become the major issue. This is simply design to see and choose the slot for parking before arrival to the destination. Doing this will save time, as well as fuel and also it would not arise the traffic congestion problem.

BLOCK DIAGRAM WITH DESCRIPTION

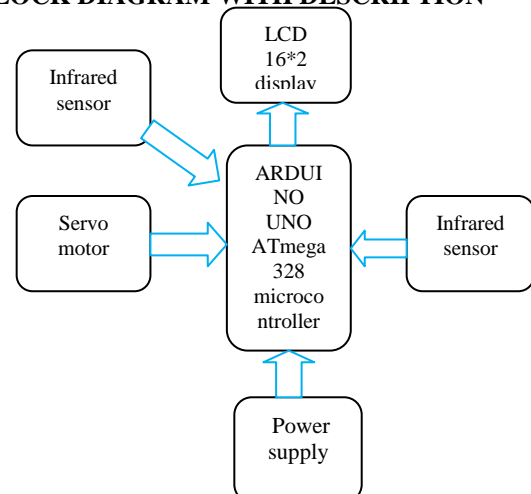


Figure 1. Effective Parking Management System

The above figure 1. Shows the block diagram of effective parking manage system. The diagram consist of arduino UNO, infrared sensor, servo motor and LCD display the arduino UNO which act as a central system. We have programmed an arduino in such a way that it control and governed the entire I/O devices interfaced. The include of two IR sensors, one act as a inner sensor and another act outer sensor.

CIRCUIT DIAGRAM

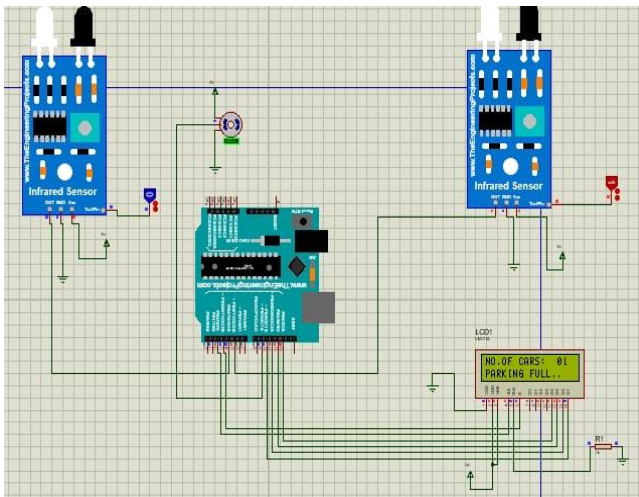


Figure 2. Circuit Diagram

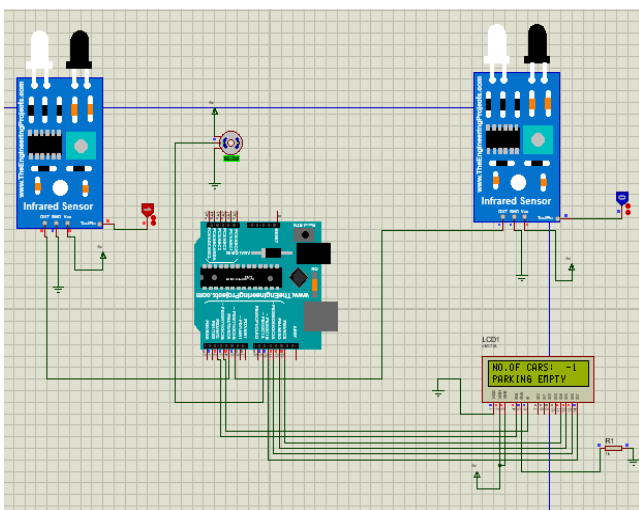


Figure 3. Circuit Diagram

The arduino play a vital role for working the entire circuit. It governed and control all the interfaced devices which include Infrared sensor, servo motor and LCD display. The circuit consist of two infrared sensor, servo motor, 16*2 LCD display and power unit. The two sensor are placed in such a way one act as a outer sensor which is placed over the entering and exiting point, on the other hand the another sensor act as a inner sensor which is placed on the particular parking area such as slot1, slot2 respectively.

To operate the entire circuit we have used 5v DC supply. When the car starts moving towards the outer sensor as

soon as the car reach the entry point instantly the car motion is detected by the outer sensor. the output pin of the infrared sensor goes low, when this pin goes low signal is send to the arduino, now the arduino may know whether the parking slot is empty or full, the parking data start to convey between the microcontroller and LCD display, when the parking is full the counter is incremented and the display print the string or value "parking is full" (refer figure 2.). Similarly when the parking is empty the counter is decremented and the LCD print the string " parking is empty" (refer figure 3.). The same process happens frequent.

HARDWARE REQUIREMENT

Arduino UNO-An arduino is an open source electronic prototyping platform enabling user to create interactive hardware and software based project. It has 14 digital input/output pins (of which 6 can be used as PWM outputs). It also have 6 analog inputs which is used to provide input in the range of 0-5v, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It is the most widely used and user friendly microcontroller. The name arduino came from a bar in Ivrea. The controller can be programmed using C and C++ programming languages .the arduino provides an integrated development environment (IDE) software for processing the language (based on wiring) the below figure 4. Shows the image of arduino UNO.



Figure 4. Arduino UNO

Infrared sensor- Basically the infrared sensor is used for obstacle detection. It consists of infrared transmitters and infrared receivers. The infrared transmitter transmit an infrared radiation when this radiation hit any obstacle it bounce back, thus reflected infrared signal is receive by the infrared receiver. When any obstacle is detected by the infrared sensor the led pin will blink indicated that the object is detected. The device itself has two led indicator, one is for obstacle indicator led and the other one is power indicator led. Whenever the motion is detected by the infrared sensor the output pin goes low. It has three pin namely output pin, vcc pin and the ground pin. The below figure 5. Shows the image of infrared sensor.

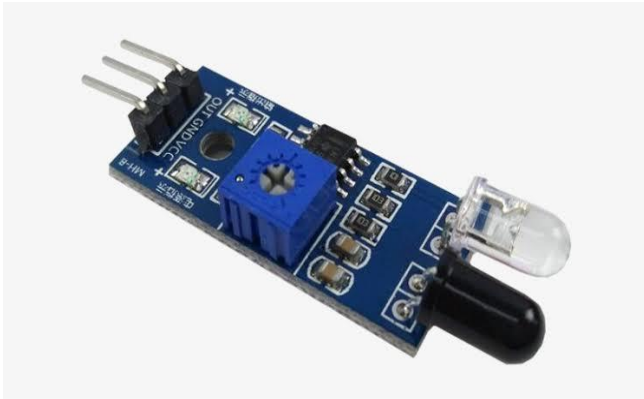


Figure 5. Infrared Sensor

Servo motor- Basically servo motor is made up of DC motor which is controlled by the variable resistor (potentiometer) and some gears. Basically it work on the principle of pulse width modulation,(PWM) which means the angle of rotations is controlled by the duration of pulse applied to it control or signal pin. The function of servo motor is to receive a control signal that represents a desired output position. It has three pins namely signal pin, vcc pin, ground pin. The signal pin is used to control the servo motor turning it shaft or torque to any desired angle. The below figure 6. Shows the image of servo motor. The servo motor is an assembly of four things; a normal DC motor, a gear reduction unit, position-sense devices, and a control circuit. The DC motor connected with the gear mechanism that provides feedback to apposition sensor which is mostly a potentiometer.



Figure 6. Servo Motor.

LCD Display- LCD screen is a flat-panel display, electronic visual display that display that uses the light-modulation properties of liquid crystal and the liquid crystal and the display arbitrary images. It displays preset words, digit, and 7-segment display. It has a wide range of application including computer monitors, television instrument panels, aircraft cockpit display. LCD is a type of flat panel display which uses liquid crystal in its primary form operation LCDs consumes much less power than LED and gas-display because they work on the principle of blocking light rather than emitting it. The below figure 7. shows the image of LCD.

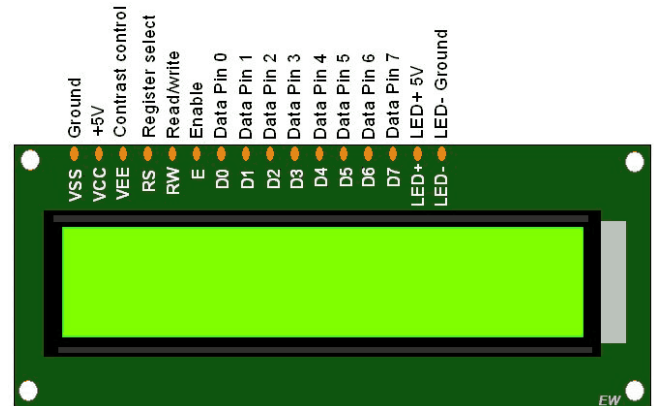


Figure 7. LCD display

II. RELATED WORK

The paper proposes an effective car parking management system that will assist user to solve the issue of finding a parking space and to minimise the time spent in searching for the nearest available car park.

The comparison of work with [1].

The analysis of the project is based on smart car parking system, the major drawback itself to provide precise and concise information regarding the number of car in any parking area. In this system they are using ultrasonic sensor to check the availability or parking status of the car in any car park area. Most of the time it seems that it failed to update the information regarding the parking availability because the ultrasonic sensor have certain sensing range .But in our project we are using the infrared sensor to check the parking status and also programmed the arduino in such a way that it perform instant and frequent operation without lagging. It work well in both the condition i.e. hardware and software simulation moreover the failure to update the car vacancy in any parking places is less as compare to other system.

III. APPLICATIONS

There are numerous and diverse application of effective parking management system, some of the widely uses are as follows:

- The smart car parking system can be implemented in Shopping malls.
- Restaurants.
- It is used in market place cinema theaters, hotels hospital, in crowd cities etc.

IV. RESULTS

The concept behind the designing of effective parking management system is to make the parking area connected with world as well as reduces time and can be cost effective for the user. The system overall reduces fuel energy of the vehicles which is consumed in search of the car. The system helps in tracking the number of cars entered in the parking area and the amount of payment

collected which reduces human effort. The project has been tested in proteus professional and also in breadboard. It successfully fulfils all the criteria that should exist in modern parking system. The running simulation are shown in figure 3. and figure 2. The project is made for demo concern, now it can be implemented as real time effective parking management system.

V. CONCLUSION AND FUTURE SCOPE

Effective car parking management system aims to provide efficient way of parking for drivers without any hesitation. The cars entering and exiting the parking slots can be tracked with minimum errors. The amount of parking payment can be redeemed by the administrator efficiently. The concept made more efficient as vehicle travel time and search time are significantly reduced with the help of effective parking management system. The information provided by the system, help drivers to avoid car park that are fully occupied and locate vacant parking spaces with ease elsewhere. With the advancement in technology the demand for effective parking will continue to increase in the upcoming years. The aspiration of making the project is for cost effective and user friendly though the effective parking management already exist.

It is implemented for today's scenario for better parking facility management and gives an insight into the economic analysis of such projects. The discussed system will be able to reduce the problem which is arising due to unavailability of a reliable, efficient and modern parking system. For further prosperity it can be implemented as real time parking management system through which we can achieve the information of parking status. Basically this system count the number of cars in any parking places like garage, malls restaurant etc and update the information with regards. For further enhancement instead of using electricity, we can directly apply solar power to operate arduino to save energy. With advancement in technology by adding additional features in system we can enhance the performance of system.

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AUTHORS PROFILES

Mr. Robin Chettri final year student of centre for computers and communication technology, (CCCT) polytechnic college, chisopani, south Sikkim. Currently pursuing diploma in electronics and communication engineering. Completed matriculation from govt Sec. School kabrey (south Sikkim) in 2017



Mr. Gulsan Sharma final year student of centre for computers and communication technology (CCCT), polytechnic engineering college, chisopani south sikkim. Currently pursuing diploma in electronics and communication engineering. Completed matriculation from newlight academy school (south sikkim) in 2017



Mr. Bikash Rai final year student of centre for computers and communication technology (CCCT), polytechnic college, chisopani, south sikkim. Currently pursuing diploma in electronics and communication engineering. Completed matriculation from rolep Sr. Sec. school (east sikkim) in 2015



Ms. Greacy Lepcha final year student of centre for computers and communication technology (CCCT), polytechnic college, chisopani south sikkim. Currently pursuing diploma in electronics and communication engineering. Completed matriculation from kamling Sr. Sec. school (sikkim) in 2017.

