INTELLIGENT CAR PARKING MONITORING SYSTEM

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Abstract- Intelligent car parking monitoring system deals with the ever growing problem of parking management and the misassumptions made by the driver in the attempt to park the car. It aims at implementing smarter and better parking guidance mechanism which reduces vehicle travel and parking time. In this system all the Infrared sensors sense the status and the position of the car which is being parked or removed from the slot and accordingly transfers the information to the Microcontroller AT89S51. Accordingly IR sensor sense the status of the car parking space and displays the information on the LCD screen for the user, thereby reducing the time for the driver to find vacant space and almost reduce the chances of entering into the unusual space which might lead into a traffic jam.

***Keywords*-AT89S51,AstableMultivibrator, IR Sensor, LCD Display, TSOP**

I. INTRODUCTION

As the technology is developing, vehicles have become an integral part of the working class. According to the latest statistics, there has been a steep rise in the number of vehicles per kilometer. Keeping this in mind our governmentnow has a mammoth task of building and maintaining roadways. We as daily commuters cannot overlook the fact that building roadways is not enough; there is an urgent need of a solution to large scale parking problems. In public places such as malls cinemas and airports, a lot of human workforce is wasted behind managing the incoming traffic, which otherwise could have been channelized into managing more difficult avenues.This paper suggests a convenient and efficient way in which our parking management problems can be reduced to much greater levels.

There are numerous slotsin a parking lot, thus for parking, the driver puts in a lot of effort to search for empty slots. Efforts like these can be reduced, when an intelligent car parking monitoring system is introduced. When a car enters the slot, the infrared communication is disrupted this disables the LED above the slot indicating that the slot is now occupied and not available for use. Now in case the slot is empty, infrared communication is active which enables the LED above the slot, this indicates that the slot is now ready for use. Thus making it clear for the car that has to look for the all lanes. So the project objective is to develop a system to indicate the vacant lane. The project involves a systemincluding infrared transmitter and receiver in every lane and a led display outside the car parking gate. Display unit is installed on entrance of parking lot which will show LEDs for all Parking slot and for all parking lanes. Empty slot is indicated by the respective glowing LED.

II. SYSTEM ARCHITECTURE

The figure below (fig 1) shows the functional block diagram of the Intelligent Car Parking Monitoring System. The red dots signify no space is available, whereas the black dots signify that there is an empty space for the user. As shown infigure (fig2) in entrance of the car park there is control board, it shows the status of parking slot. From this control board customer can select his preferred location if its free. The status of slots is shown using Light Emitting Diode (LED). There are two LEDs for one slot which are Green and Red. If the Green LED blinks, slot is free and they can park a vehicle and if it is Red there is a vehicle in that slot.

ISSN: 2278 – 7798

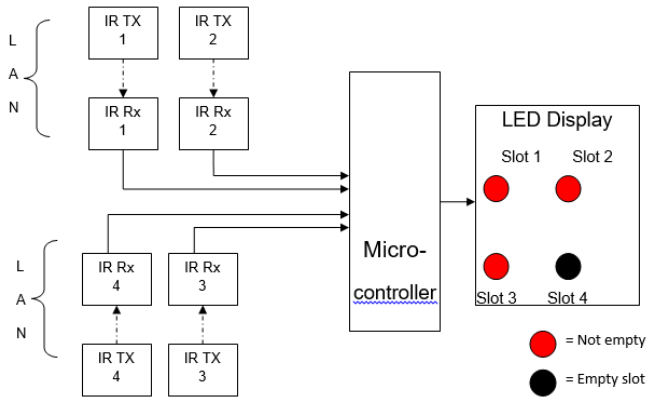

Fig.1 Block Diagram

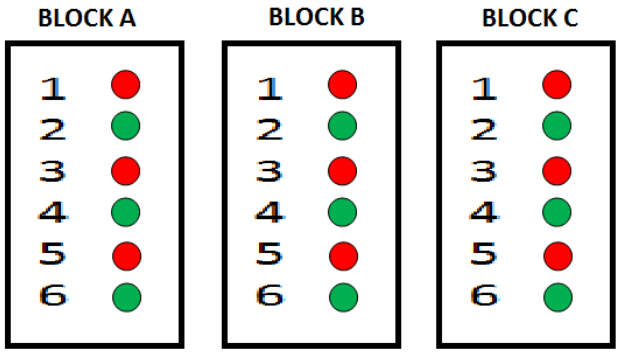

Fig 2: Display Board

III. FUNCTIONING OF THE SYSTEM

The working of the system is divided among fivesections-

A. *SENSING UNIT (IR TRANSMITTER & RECIEVER)*

We are going to implement the Car Parking monitoring system module using 4 transmitters and 4 receivers. We are going to use Infra-Red transmitters because infrared beams are not visible to human eyes. Transmitters used are IR LEDs .IR LED (Transmitter): Light Emitting Diode which is commonly known as LED is used asIR transmitter. We have used TIL 38 as an IR transmitter.We are also going to use an Infrared receiver. It is an active low device which means it gives low output when it receives the Infrared rays. These are the basic components for the automatic A.C. supply switching. Here we have used 38 kHz infrared IR receiver for detecting if a car has entered or left the slot in which we intend to switch the supply. These detector modules need to have infrared rays of 38 kHz which we have given through the IR LEDs via a 555 timer.We are going to use two sensors for car counter. Each will consist of two transmitters and one receiver. Transmitter will be placed at the one side of the door while receiver is at the other side. The other alternative for infrared trans-receiver is optical sensor i.e. IR but the disadvantage is that it can be affected easily by the sun light or other lights. So there is possibility of false triggering. Also the disadvantage of using special color sensors like LASER beam is that it is visible to normal human eyes. To overcome all these points we have used infra-red sensor for the purpose of car counter module. IR Receiver: We have used TSOP 1738 as an IR Receiver. This receiver requires a square wave of frequency 38 KHz at the input. It is an active low device i.e. it gives low output when it receives IR rays at the input.

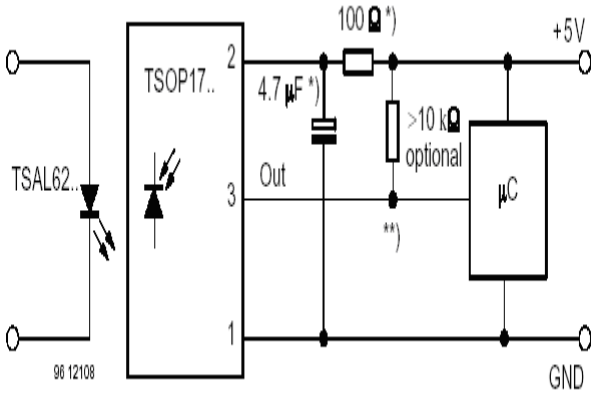

Fig 3: IR RECIEVER

B. *MICROCONTROLLER*

UPA (UnParking Allowed): - Whenever parking is possible, this LED glows. It means that any vehicle can be parked if no new vehicle is parked or entering into the parking area. If vehicle is entering into the Parking area then the signal is sent by IR Sensor to the AVR Controller. AVR Controller sends information to the IR Sensors located at the parking slots so that no vehicle can be parked during the parking of other vehicle and hence collision is avoided between two vehicles.

ISSN: 2278 – 7798

PNA (Parking Not Allowed): - Whenever all the parking slots are full with the vehicles then this LED glows which shows that Parking is not allowed.

FPS1(Free Parking Slot 1): - If Parking lot No. 1 is free, then this LED glows to show that Parking lot No. 1 is free and Parking can be possible at lot No. 1.

FPS2 (Free Parking Slot 2): - If Parking lot No. 2 is free, then this LED glows to show that Parking lot No. 2 is free and Parking can be possible at lot No. 2.

FPS3 (Free Parking Slot 3): - If Parking lot No. 3 is free, then this LED glows to show that Parking lot No. 3 is free and Parking can be possible at lot No. 3.

Whenever any vehicle arrives at the entrance of the Parking lot central processor receives the signal from the IR Sensor nodes and shows the status of Parking at the. It also communicates with the IR Sensors located at the Parking lots so that no vehicle can be un-parked during the arrival of the new vehicle at the Parking area and collision of two vehicles can be avoided. The Microcontroller we selected is AT89S51. It has 8-bit CPU, memory, timers, counters, interrupt controller and serial I/O are highly integrated on single chip. It is a 40-pin IC. It has 4 byte input-output port, EEPROM of 4KB and RAM of 128 bytes.

C. *DISPLAY SECTION*

The LCD is used for the display purpose. It is a 16char × 2 line LCD. It has a viewing Area of 66 x 16mm, character size of 2.96 x 5.56mm, character pitch of 3.55 x 5.94mm, character font of 5x7 dots and dot size of 0.56 x 0.66mm. It has 96 inbuilt ASCII characters, 92 special characters and 8 custom characters .we can also use 16char × 4 line LCD, but since our requirement is of 2 lines only hence we have used this LCD.Here an array of resistor is used with 8 resistors of 4.7K each used as pull up resistors. These are standard values of the pull-up resistor. A pot of 4.7K is also used for contrast adjustment. We can also use any other value pot. Display of parameters is important part of system as we can monitor real time parameters. This happens by sending data by AT89S51 (port1) to LCD (pin 7-14).The data to be read or to be written is decided by control lines (pin 4, 5, 6) of LCD which gets its signal from software instructions of AT89S51. This interface diagram shown in figure 6 shows us the connection of an LCD to microcontroller. LCD consists of 8 data lines which can be either a command or a data. An entire port is used for sending data to the LCD by microcontroller. 3 other pins are also used for handshaking purposes.

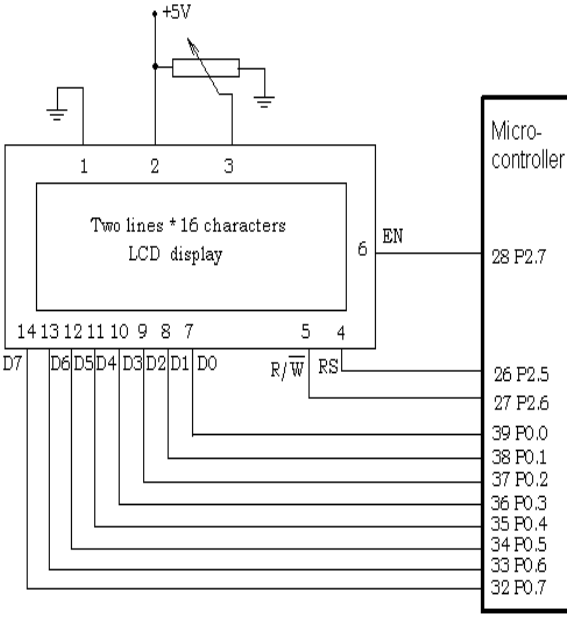

Fig 4: LCD INTERFACE

Fig.5 FINAL OUTPUT AT DISPLAY

ISSN: 2278 – 7798

D. IC555 CONFIGURATION

In this project IC555 is connected as an AstableMultivibrator. The threshold input is connected to trigger input. 2 external resistances Ra, Rb and capacitor C is used in the circuit. The circuit has no stable state. The circuit changes its state alternately. Hence the operation is called free running non sinusoidal oscillator.

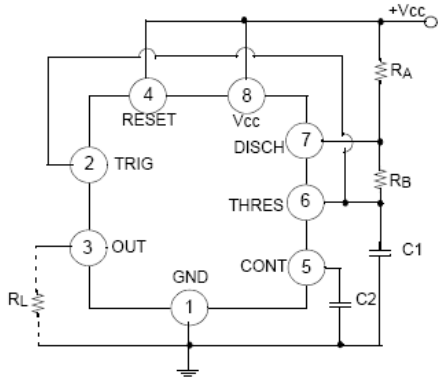

Fig 6: ASTABLE MULTIVIBRATOR

When the flip flop is set, Q is high which drives the transistor Qd in saturation into saturation and the capacitor gets discharged. Now the capacitor voltage is nothing but the trigger voltage. So while discharging, when it becomes less than 1/3 VCC, comparator 2 output goes high. This resets the flip flop hence Q goes low Q goes high. The low Q makes the transistor off. Thus capacitor starts charging through the resistances Ra, Rb and VCC. As total resistance in the charging path is = (Ra+Rb). The charging time constant is (Ra+Rb)*C. Now the capacitor voltage is also a threshold voltage. While charging threshold voltage increases. When it increases 2/3VCC, then the comparator 1 output goes high which sets the flip-flop. The flip flop output Q becomes high and output at pin 3 i.e. Q bar becomes low. High Q drives transistor Qd into saturation and capacitor starts discharging through resistance Rb and transistor Qd. Thus the discharging time constant is Rbc when capacitor voltage becomes less than 1/3 VCC, comparator 2 output goes high resetting the flip flop. This cycle repeats. Thus while capacitor is charging output is high while when it is discharging output is low. Here we are designing for 200 KHz frequency.

IV. CONCLUSION

• The customer can plan for their transit to public transportation with such smart parking systems employed at Park and Rides.

• The parking operator can use this system data to predict future parking patterns and trends.

• The parking operator can use this system data to prevent vehicle thefts.

• The parking operator can reduce the staffing requirements for traffic control within the facility.

• The system significantly reduces traffic–and the resulting vehicle emissions– by decreasing the time required for customers to locate open spaces.

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ISSN: 2278 – 7798