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Design and Implementation of Intelligent parking System

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ABSTRACT: Parking is an ever-growing challenge in any city around the world as the number of travellers/passers is uninterruptedly increasing. Parking availability is one of the most noteworthy challenges that traffic/ private officials are trying to address. The main issue in the parking area is to find the empty parking lot to park the vehicle. Intelligent Parking has found a broad audience from airports, shopping malls, convention centers, and universities. Intelligent Parking is a revolutionary new system that turns the existing parking applications into a world class facility.This paper describes a parking helper usingultrasound sensors, mounted on the car, to monitor both sidesof the street for a suitable parking space, and when a largeenough parking space is detected, the helper instructs the driverto stop the car and guides him/her via a display screen and buzzers when in case of wrong parking which will ultimately result in the carbeing properly parked in the given parking space.

KEYWORDS: Parking, sensor, ultrasound, vehicle parking, SRF04, LCD

I. INTRODUCTION

As the population increased in metropolitan cities, theusage of vehicles got increased. When we visit the variouspublic places like shopping malls, multiplex cinema hallsand hotels during the festival time or weekends, it createsmore parking problems which leads to traffic congestion,driver's frustration and time consuming. In the existingparking systems, searching for vacant parking spaces isalways been a difficult process. It is not easy for car driversto know which parking slot is vacant or not. In multi storeyparking, the drivers need to know the availability of parkingspaces in each floor in order to save their time. They canfeel comfortable in knowing available parking places beforereaching to the parking area. The smart parking system willdiscover the slots for parking cars in parking zones. Arecent survey that during rush hour in most metropolitanareas, the traffic generated by vehicles searching foravailable parking spaces takes up to 40% of the totaltraffic[1]. A few existing solutions focus on parking lotapplications using sensor technologies, such asmagnetometers, ultrasonic sensors and video cameras.However, magnetometers are very sensitive onenvironmental factors, as a result of which their directionsare not always accurate. Video camera sensors areexpensive which is used to collect parking information invehicle parking field can generate a large amount of datathat can be difficult to transmit in wireless network. [1]Ultrasonic sensors use the reflected energy to analyze anddetect the status of a parking space. Despite the low costand easy installation of ultrasonic sensors, they do havesome disadvantages.

II. RELATED WORK

Recently in Malaysia, there are various methods used inparking lot to detect the presence of car as in [6], the authorsproposed a Secure Parking Reservation System where GSMtechnology is used to send the data-base password to thosedrivers enquiry for a reservation of parking lot. The passwordis needed in order for the drivers to enter and exit the parkinglot. Other than that, image processing technique is applied inparking to detect the presence of vehicles rather than usingsensor [7]. Moreover, infrared sensor is used in Smart ParkingSystem (SPS) [9] to detect the presence of

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vehicles in parkinglot and shows a green LED if there is no vehicles detected andred if there is occupancy of vehicles in that certain parking lot.The LED is installed at the top of every parking lot.

III. SYSTEM ARCHITECTURE

Our parking helper contains of three main circuits (Fig. 1): The sensors controlling circuit, buzzer and distance measuring circuit. The sensors controlling circuit, as the name implies, is used to control and process inputs coming from ultrasound sensors using a microcontroller, and to output result on the LCD screen placed in front of the driver. Buzzer is used to indicate sound alert when the vehicle comes near to other vehicleto avoid crash during the parking process. Distance measuring circuit is used to measure the distance that the car has traveled using color detecting sensor (the reflective object sensor).

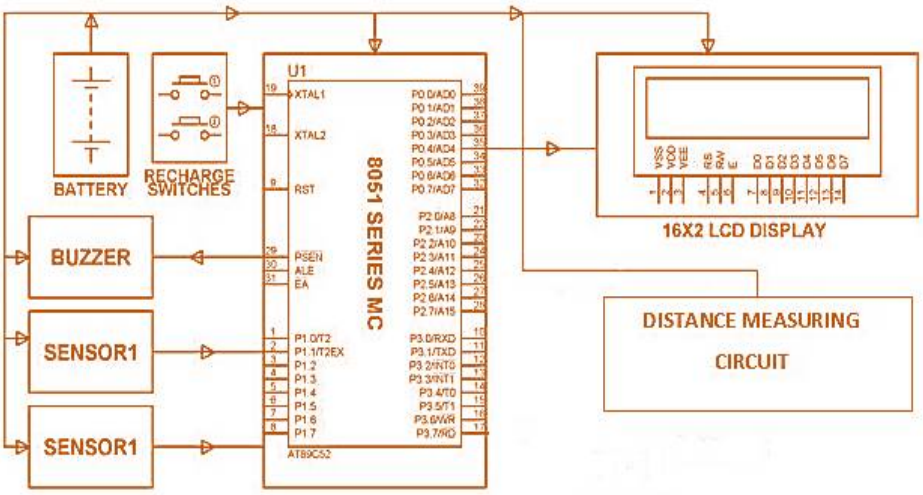

Fig. 1: Block diagram of the parking system

A. MICROCONTROLLER

Microcontroller 89S51 is classified as an eight bitfamily CMOS microcomputer of mcs-51. It needs 3capacitors, 1 resistor and 1 crystal as well as 5-volt powersupply in operating. Microcontroller 89S51 is providedwith memory not only RAM but also ROM, parallel andserial port (Universal Asynchronous Receiver/Transmitter), etc which all are in one single chip withFlash EPROM in micro control 89S51 chip, theadvantages are the designing of a system basis on microcontroller can be more cheap and easier.[3,5] FlashEPROM is loaded with programs include the instructionsthat will be compiled by the micro controller. Besides that,it can be reused for many times. It is a low power, highPerformance CMOS, 8-bit; 40-pin microcontroller with4K bytes of flash programmable and erasable read onlymemory (EPROM). The on chip flash allows the programmemory to be rapidly reprogrammed using a non-volatilememory programmer. [2, 3].

B. SRF04 - ULTRA-SONIC RANGER

In typical ultrasonic sensing the ultrasonicwaves are travelling in a medium and often focusedon evaluating objects so that a useful information onthe interaction of ultrasonic energy with the objectsare acquired as 2ultrasonic signals that are the waveforms variations with transit time. Such ultrasonicdata provides the fundamental basis for describingthe outputs of ultrasonic sensing and evaluatingsystems.The SRF04 Timing diagram is shown below thus only need to supply a short 10uS pulse to the trigger input to start the ranging. The SRF04 will send out an 8 cycle burst of ultrasound at 40khz and raise its echo line high. It then listens for an echo, and as soon as it detects one it lowers the echo line again. The echo line is therefore a pulse whose width is proportional to the distance to the object. By timing the pulse it is possible to calculate the range in inches/centimeters or anything else. If nothing is detected then the

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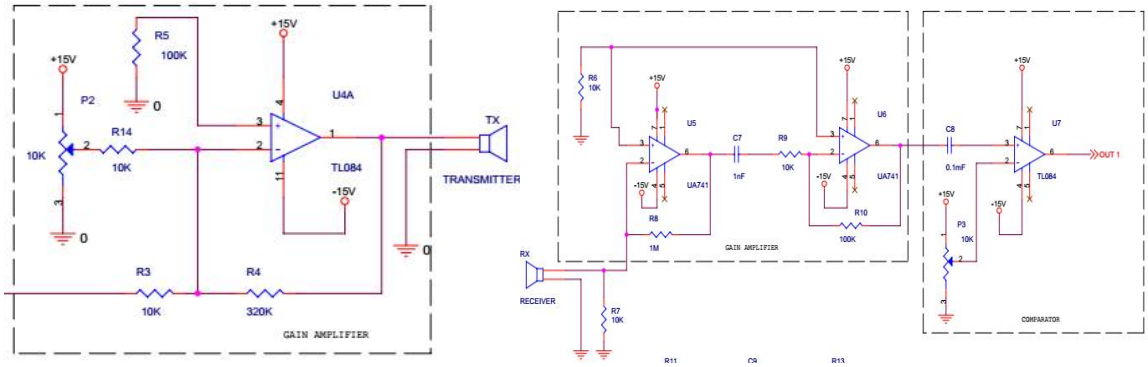
SRF04 will lower its echo line anyway after about 36mS.The sensors used areSRF04 because they are the cheapest and theirrange satisfied our desired distance range (3cm to 25cm).



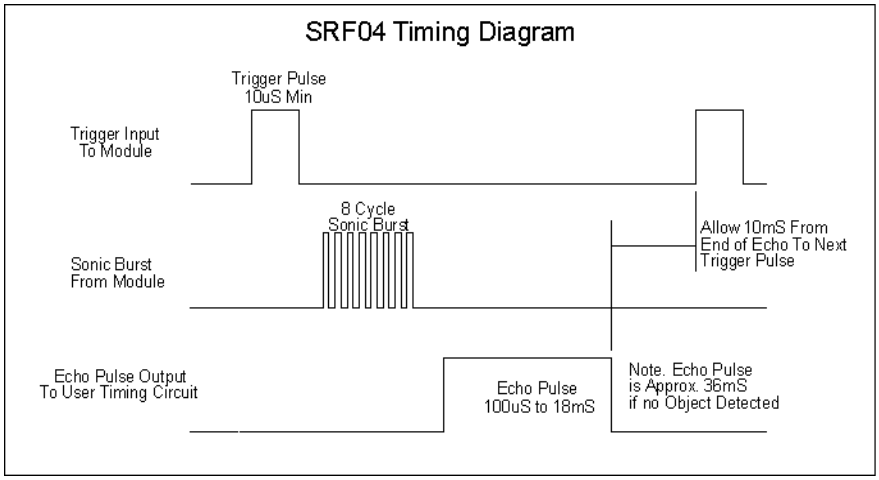


Fig. 2 Timing diagram of ultrasonic module

C. LCD MODULE

It is a flat panel display,electronic visual display that uses the lightmodulation properties of liquid crystals. Liquidcrystals do not emit light directly. LCDs are availableto display arbitrary images or fixed images which canbe displayed or hidden, such as preset words, digits,and 7-segment displays as in a digital clock. They use
the same basic technology, except that arbitraryimages are made up of a large number of smallpixels, while other displays have larger elements .Here LCD module is used to display unit interfaced with microcontrollerwhich is placed at the entrance of parking area. The LCDmodule plays a role to display the status of parking lot wheredrivers can view the status before entering the parking lot [10].

D. IR REFLECTIVE SENSOR

The reflectivity of infrared light varies withthe color and distance of the reflecting surface.According to this principle, Grove – InfraredReflective Sensor utilizes a RPR220 reflective photosensor module to detect color and distance. When alight-colored object approaches, the signal intensityreceived by infrared reflective sensor increases andthe indicator LED on board turns red. When a darkcolored object approaches, the intensity decreasesand the LED turns off. This sensor is a basic andwidely used part in applications such as linefollowing cars, rotary speed detection, auto datalogging on utility meters or other situations wherecolor or distance contrast is sharp.

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IV. RESULTS & DISCUSSION

The parking lot is provided with digital infrared sensor and is permitted to sense the parking lot continuously. Whenever it detects the presence of vehicles in parking lot, it will generate event on presence of vehicles to the microcontroller to which it is interfaced [10]. Then, microcontroller will send the information get from digital infrared sensor to both LCD and 8051unit. The 8051unit transmits the status data to the master unit at the entrance of parking lot. Then the status of parking lot is continuous updated in the master module. The LCD display is placed at the entrance of parking lot to display the number of available parking lot.

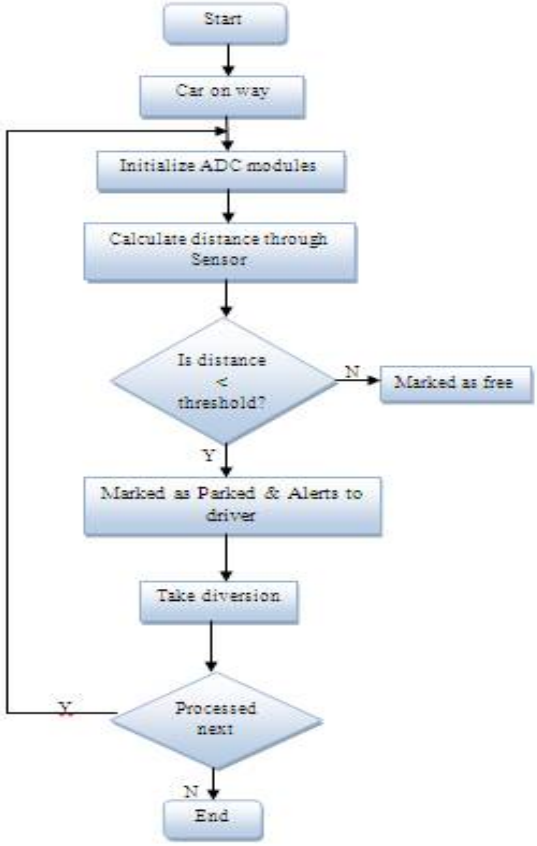

Fig. 3 Flow chart of system

V. CONCLUSION

This paper has proposed vacant parking slotdetection and tracking system that fuses the sensors hip.The sensortechnology is done by using digital infrared sensor play itsrole in sensing the presence of vehicles.Therefore, this proposed system canovercome the traffic congestion in finding available parkingvacancy. At the same time, it offers time savings andreliability which convince the users all time. The advantagesconsists of less time spend and fuel consumptions whilefinding for parking space.

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BIOGRAPHY

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