



Distance estimation using pinhole approximation to avoid vehicle crash and back-over accidents

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ABSTRACT—

This paper proposes an intelligent collision avoidance system as a prototype, which avoids vehicle accidents and to provide a greatest security to the user in adverse or bad weather condition. Here, Ultrasonic sensor and vibration sensors placed in the car, where vibration sensor is used to detect the lane and avoids accident in significant manner. The vehicle state information is obtained using Ultrasonic sensor, which will continuously track for any obstacle from front side. If the obstacle is detected then microcontroller will continuously compare the distance given by Ultrasonic sensor. If the obstacle is closer to the car then the microcontroller will start applying safe limit conditions. The obstacle distance is 2cm the image captured by webcam and Obstacle details are sent to the user through Email by using GSM. If the distance is 5cm buzzer will be switched ON. The distance is 10cm send the phone call to user. The overall system is controlled by PIC and information is displayed on LCD. The vibration sensor with certain range of accelerating is fixed in the vehicle. When the vehicle is dashed with another or any other obstacle the vibration sensor detects whether the vibration is limit within range or not. It is greater it reports as accident and activate the auto dialer

Keyword- GSM, LCD, Ultrasonic sensor

1, INTRODUCTION

There are several advanced technology and innovations are available for vehicle safety. Even though there are advanced technological innovations for vehicle safety, the growth in number of accidents is continuously increasing. And these accidents are due to collision or intersectional accidents. Collision of vehicles occurs due to mistakes done by driver and intersectional accidents are caused due to bad weather conditions. Hence, to overcome these mistakes an intelligent collision avoidance system is proposed. So, the mistakes done by the driver are eliminated. Similarly vibration sensors and ultrasonic sensors are placed in all directions of the vehicle except in back side and these



sensors are regularly scans the road ahead for obstacles or vehicles and if any obstacle or vehicle find, then warning is given to the user. Another facility that we provide besides it is an automatic accident detection and information passing system by using GSM.

2, EXISTING SYSTEM

In this system the automatic braking at collision and also gives personal alert to the driver. It leads to safe in front of vehicle but not detect the collision car. So if rash driving at night times can't detect by existing system. This system used in the new version cars like BMW-7 series but it is very costly installation. In this method the hardware components used is one sensor for buzzer purpose and not detect the collide car by capturing the image using pin hole camera and it for future purpose to using the method image processing.

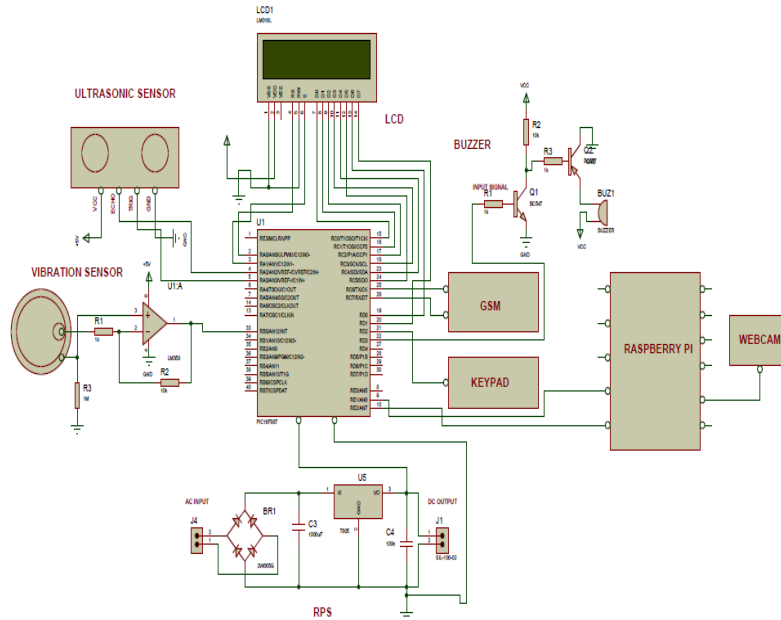
3, PROPOSED SYSTEM

In our proposed system we are going to use an accident detection unit which will be fitted inside the front and rear bonnet of the car. This accident detection unit consists of Ultrasonic sensor, vibration sensor and magnet which are kept at distance apart from each other. In case if the vehicle reaches the minimum saved limit, a buzzer is set to alert.

Further if there is any vibration received, image is captured using the webcam attached to the Raspberry Pi model, and also a mail is sent to the registered number. Continuous calculation of distance between two vehicles is been monitored using ultrasonic sensor. Microcontroller is the central processing unit CPU of our project. Once microcontroller gets signal from vibration sensor or the vehicle crosses the minimum limit, then it will immediately turn on the buzzer. A LCD is placed to display the message received from the microcontroller.

Content of Text sms are as below:

Accident has occurred.



3.1 Enhancement added to this project

In this project we have added magnet in the vehicles. This will help to prevent the accident caused. A simple law of repulsion is being used for this purpose. We are informing owner of the car through SMS that accident has occurred. We have used a comparator; this comparator has a fixed voltage at its positive input. And at the negative input, voltage from output of analog ultrasonic or vibration sensor is given. Whenever voltage of sensor crosses the threshold voltage level, then comparator gives low output to the microcontroller. This way microcontroller detects the output from both the sensor.

3.2 Applications of proposed system

- 1) School transport vehicle accident detection: “Vehicle Accident Detection system and Prevention” can be used in the school bus.
- 2) This project can be used for cab or car of companies.

4, SOFTWARE DESCRIPTION

A compiler is a computer program (or set of programs) that transforms source code written in a programming language (the source language) into another computer language

(the target language, often having a binary form known as object code). The most common reason for wanting to transform source code is to create an executable program.

This integrated C development environment gives developers the capability to quickly produce very efficient code from an easily maintainable high level language. The compiler includes built-in functions to access the PIC microcontroller hardware such as READ_ADC to read a value from the A/D converter. Discrete I/O is handled by describing the port characteristics in a PROGRAM. Functions such as INPUT and OUTPUT_HIGH will properly maintain the tri-state registers. Variables including structures may be directly mapped to memory such as I/O ports to best represent the hardware structure in C.

4.1, Compiler features of CCS

1. Built in libraries that work with all chips for RS232 serial I/O, I2C, discrete I/O and precision delays.
2. Integrates with MPLAB IDE and other simulators and editors for source level debugging. Standard HEX file and debug files ensure compatibility with all programmers.
3. Formatted printf allows easy formatting and display in HEX or decimal.
4. Efficient function implementation allows call trees deeper than the hardware stack.
5. Source code drivers included for LCD modules, keypads, 24xx and 94xx serial EEPROM's, X10, DS1302 and NJU6355 real time clocks, Dallas touch memory devices, DS2223 and PCF8570 serial SRAM, LTC1298 and PCF8591 A/D converters, temperature sensors, digital pots, I/O expander and much more.

5, HARDWARE DESCRIPTION

5.1, PIC Microcontroller

- PIC microcontroller is widely used for experimental and modern applications because of its low price, wide range of applications, high quality and ease of availability. It is ideal for machine control applications, measurement devices, and study purpose and so on.
- It is also called as “Computer on a Chip”.
- PIC was developed as Peripheral controller.
- PIC Microcontrollers are designed with a separate 14 bit program memory bus to carry instructions.
- A Separate 8bit data memory bus to carry data.
- This Design is commonly called harvard architecture ,and So PIC Microcontroller is based on Harvard architecture.
- Every instruction is coded as a single 14 bit word and fetched simultaneously with the corresponding data variable for that instruction.
- The Harvard architecture speeds up the Process by its design.
- The instruction set for the PIC Microcontroller consist of 35 instructions .



- Each Occupying a single 14 bit program memory word and a two stage Pipelining .

5.2, Applications of PIC16F887

- Automotive air bag systems
- Remote control
- TV, DVD player/recorder, DVR, PVR
- Sound system
- Industrial Instruments

5.3, Ultrasonic sensor

Ultrasonic sensor provides an easy method of distance measurement. This sensor is perfect for any number of applications that require you to perform measurements between moving or stationary objects. The Parallax Ultrasonic ultrasonic distance sensor provides precise, non-contact distance measurements from about 2 cm (0.8 inches) to 3 meters (3.3 yards). It is very easy to connect to BASIC Stamp or Javelin Stamp microcontrollers, requiring only one I/O pin.

The Ultrasonic sensor works by transmitting an ultrasonic (well above human hearing range) burst and providing an output pulse that corresponds to the time required for the burst echo to return to the sensor. By measuring the echo pulse width the distance to target can easily be calculated. Simple pulse in/pulse out communication requires just one I/O pin sensor detects objects by emitting a short ultrasonic burst and then "listening" for the echo. Under control of a host microcontroller (trigger pulse), the sensor emits a short 40 kHz (ultrasonic) burst. This burst travels through the air, hits an object and then bounces back to the sensor. The PING))) sensor provides an output pulse to the host that will terminate when the echo is detected, hence the width of this pulse corresponds to the distance to the target.

VIII. CONCLUSION AND FUTUREWORK

In this paper we have presented a method for finding a distance of the object by using a single camera. This method is aimed at reducing road accidents and parking area accidents where in the driver could be warned if the vehicle is close to an object. Here first we try to avoid the most general accidents which are occurred due to bad weather conditions. And if the accident occurred then the accident location can be located easily and the detection of accident is precise unlike the prior approaches, where detection of accident is done by either of the two sensors. In this approach the accident is detected by both the vibration and micro electro mechanical sensor and the information of accident location will be sent to already predefined numbers. A further development and testing is required and as such has to be implemented in vehicles and evaluated for real time data.

When cost of the materials comes into play camera serves the best alternative to stereo vision. To attain our objectives we are focusing on expanding our limitations of selecting the contour. We have various ideas for selecting the contour such as utilization of color of desired object and other methods like key point detection, local invariant descriptions and key point matching. These methods extend the limits of finding distances in different scenarios.

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