Can Based Accident Avoidance System

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Abstract: *Safety is generally the most significant property for automotive systems, and it is further improved by Advanced Driver Assistance Systems (ADAS) in modern automotive systems. To support ADAS and other advanced autonomous functions, automotive electronic systems become more distributed and connected than ever, no matter from the perspective of in-vehicle architecture or Vehicle-to-X (V2X) communication. The Controller Area Network (CAN) protocol has been the main focus of automotive security studies, and it has no direct support for security projection. Hoppe et al. demonstrated that the operations of electric window lifts, warning lights, and airbag control systems may be affected through the CAN protocol. A collision avoidance system is an arrangement of sensors, microcontrollers and buzzers that is placed within a car to alert its driver of any dangers that may lie ahead on the road.*

Keywords –*CAN, Accident avoidance, Safety, Speed control, ultrasonic, arduino*

I.INTRODUCTION

Cars on the same direction in highway usually keep a safe distance one another with a similar speed. A serious collision accident may occur if the driver can not react in time to brake, due to the driver's distraction, long-time driving fatigue, flake out, or even a sudden deceleration of the previous car.On the other hand, drivers need the mirrors to know other approaching cars from two-side or from the rear end. Even the driver check around carefully, he cannot take an immediate response, except push the horn, to a sudden approaching car and an accident is thus unavoidable. Therefore, developing a front obstacle alerting system and a rear end collision avoidance system subject to all directions are important in collision avoidance. For the front-end head-on collision avoidance subsystem, Ultrasonic sensor is adopted to measure the distance with respect to the previous car. Robert Bosch Co. introduced an in-car network the controller area network (CAN) bus, to replace the complex and expensive traditional in-car wiring. In this study, a high-level protocol CAN open is adopted to interconnect those CAN nodes with reliable communications among sensors.

II. OVERVIEW OF CAN PROTOCOL

Controller area network (CAN) provide high reliability andgood real-time performance with very low cost. Due to this,CAN is widely used in a wide range of applications, such asin-vehicle communication, automated manufacturing and distributed process control environments.CAN bus is a serialdata communication protocol invented by German BOSCHCorporation in 1983. CAN is a network protocol which isdesigned for the car industry.CAN supports data frames with sizes only up to 8 bytes as shown in Figure 1, since data communication in car often have many sensors transmitting small data packets.CAN use a large amount of overhead,which combined with a 15-bit CRC makes CAN very secure andreliable.CAN protocol use non-destructive bitwise arbitration process to access shared resource.

CAN protocol define a logic bit 0 as adominant bit and a logic bit 1 as a recessive bit, each transmitting node monitors the bus state and compares the received bit with the transmitted bit. The node stops transmitting if a dominant bit is received when a recessive bit is transmitted.Arbitration is performed during the transmission of the identifier field.

Start of Frame	Arbitration Field	Control Field	Data Field (up to 8 bytes)	CRC Field	ACK Field	End of Frame

Fig1.CAN Data Frame

III.PROJECTDESCRIPTION

3.1 Components Used:

i. Microcontroller (40 pins): The AT89S52 is a high performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory, with low power.
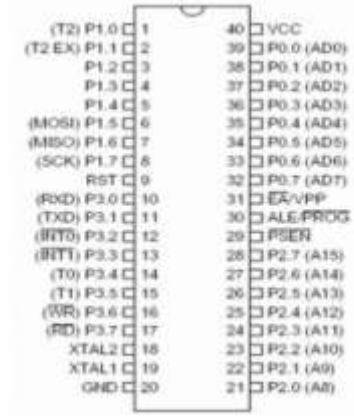

Fig.2 AT89S52 Pin Diagram

ii. Arduino: Arduino is a tool for making computers that can sense and control more of the physical world than your desktop computer. It is an open source computing platform based on microcontroller board. It is also a development environment for writing software for the board.

Fig.3 Arduino Uno

iii. Alcohol Sensor MQ-3: It is used for the purpose of detection. It detects the concentration of alcohol gas in the surrounding air. It then outputs its reading as an analog voltage. The Sensor has a sensing range of 0.05 mg/L to 10mg/L.

Fig.4 Alcohol Sensor

iv. Ultrasonic Sensor: An ultrasonic sensor is a device that measures the distance to an object using the sound waves. It measures distance by sending out sound wave a specific frequency and then to listen the sound wave that has bounced back.

Fig.5 Ultrasonic Sensor

v. PIR Sensor: A PIR sensor is an electronic sensor that measures infrared light radiating from objects in its field of view. They are low power, inexpensive, small and allows to sense motion i.e. whether a human has moved in r out of the sensor's range.

Fig.6 PIR sensor

vi. Relay: The relay is an electromagnetic switch that is operated by a relatively small electric current that can turn on or off a much larger current. It can move the switch from the off to on position instead of a person moving the switch.

Fig.7 Relay

vii. Buzzer: Buzzer also called as beeper is used to alert a user corresponding to a switching action, sensor input. They are also used in alarm circuits.

Fig.8 Buzzer

viii. Bluetooth Module: Bluetooth is a specification for a small factor, low-cost radio solution providing links between mobile computers, mobile phones and other portable handheld devices, and connectivity to the Internet.

Fig.9 Bluetooth Module

3.2 Software Used:

i. B4A (BasicforAndroid): Basic4Android is a rapid application development tool for native Android applications, developed and marketed by Anywhere Software Ltd. B4A is an alternative to programming with JAVA and Android SDK.

ii. Keil ARM Programming: Keil MDK is the complete software development environment for a wide range of Arm Cortex-M based microcontroller devices. MDK includes the µVision IDE and debugger, Arm C/C++ compiler, and essential middleware components.

IV.FLOW OF THE PROJECT

- Connect Android phone with hardware.
- Drowsiness is getting detected using PIR sensor, If detected then data is transmitted to Arduino via CAN protocol.
- Water sprinkler via Relay and Vibration motor gets ON and TTS output from Android phone.
- Alcohol sensor will sense the alcohol level and the ignitions gets off.
- Ultrasonic sensors will detect the distance and send proper message to android phone and buzzer notification.
- CAN module is connected via serial communication to the microcontroller.
- Android phone acts as dash board.

V. BLOCK DIAGRAM
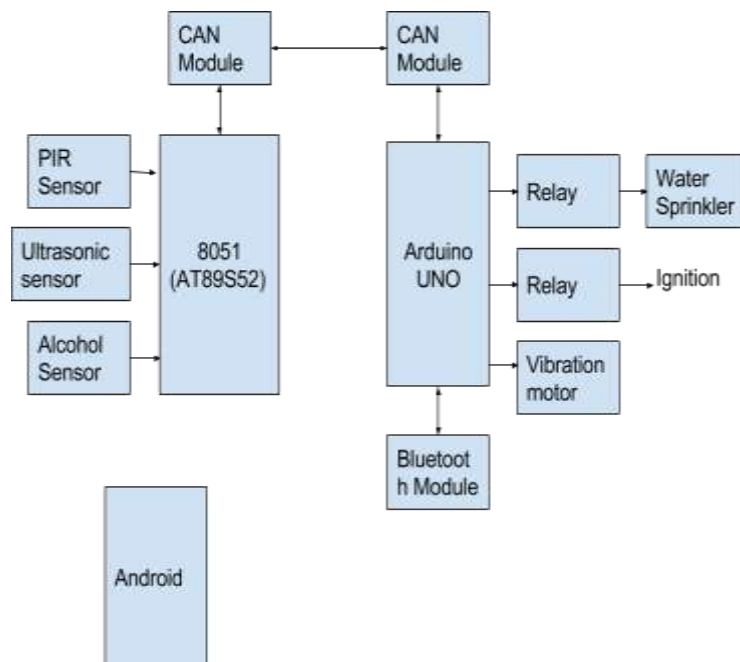
Fig 10 : Block Diagram

VI.   APPLICATIONS

- Transportation applications.
- Can be used in large vehicles.
- Can be implemented in Aerospace electronics.
- Used to detect any object in extreme conditions like fog and misty areas.
- Can be used in Passenger and cargo trains.
- Can be implemented in Robotics Application

VII.   ADVANTAGES & FUTURE SCOPE

1.1   Advantages:
- Centralize control.
- Multiple operations can be performed.
- Crash avoidance.
- Injury and Accident prevention.
- Road Safety.
- Commercially marketable Technical systems.
- Low cost.

1.2 Future Scope:
- GSM and GPS using Android phone.
- If alcohol sensed and a SMSis sent to relative.
- Image processing so as accident reason can be found.

VIII.   CONCLUSION

This project CAN BASED ACCIDENT AVOIDANCE SYSTEM is intended for a secure and smooth journey. The car/ vehicle itself is aware of its movement. If the driver himself is not concentrating on driving or any other parameters, which may cause damage to the vehicle as well a life, this intelligent car/ vehicle warn the driver regarding the danger ahead.

Acknowledgements

REFERENCES

[1].   An-Ping Wang, Jie-Cheng Chen and Pao-Lo Hsu, "Intelligent CAN-based automotive collision avoidance warning system," *IEEE International Conference on Networking, Sensing and Control, 2004*, pp. 146-151 Vol.1.
[2].   P. S. Kedareswar and V. Krishnamoorthy, "A CAN protocol based embedded system to avoid rear-end collision of vehicles," *2015 IEEE International Conference on Signal Processing, Informatics, Communication and Energy Systems (SPICES)*, Kozhikode, 2015, pp. 1-5.
[3].   M. Suresh, T.Venkata Ramana, CAN Based Accident Avoidance System for Automobiles,IJMETMR,2016 December, Vol 3(16)
[4].   Kashyap Joshi, Vipul Gohil, ARM 7 Based Controller Area Network for Accident Avoidance in Automobiles, IJETT,Volume 9 Issue 2- March 2014
[5].   Ratnaprabha Kasde and G. Gugapriya. Accident Avoidance System using CAN. Indian Journal of Science and Technology,2016 August, Vol 9(30)