VEHICLE TO VEHICLE COMMUNICATION FOR SAFETY ALERT

N. Manasa[1], K. Venkata Kishore[2], G. Thanmai[3], A. Rahul[4],T.Chakravarthi[5],B.Phaneendra[6],Saidamma Boilla[7]

[1] *Student, EEE, NRI Institute of Technology, Andhra Pradesh, India*
[2] *Associate Professor, EEE, NRI Institute of Technology, Andhra Pradesh, India*
[3] *Student, EEE, NRI Institute of Technology, Andhra Pradesh, India*
[4] *Student, EEE, NRI Institute of Technology, Andhra Pradesh, India*
[5] *Student, EEE, NRI Institute of Technology, Andhra Pradesh, India*
[6] *Student, EEE, NRI Institute of Technology, Andhra Pradesh, India*
[7]*Assistant Professor, EEE, NRI Institute of Technology, Andhra Pradesh, India*

ABSTRACT

With the increasing number of vehicles on roads, the need for advanced safety systems has become paramount. This project proposes an innovative IoT-based solution for vehicle-to-vehicle communication to enhance road safety by integrating ultrasonic sensors, alcohol sensors, and fire sensors.
The primary objective of this project is to develop a comprehensive system that can prevent accidents by detecting potential hazards such as obstacles, impaired drivers, and vehicle fires. The integration of ultrasonic sensors facilitates real-time obstacle detection, alcohol sensors identify intoxicated drivers, and fire sensors detect vehicle fires The proposed system utilizes a network of Internet of Things (IoT) devices installed in each vehicle, enabling seamless communication and data exchange between nearby vehicles.

Keyword: - *Road Safety, Accident Prevention, Sensors, and Vehicle Safety.*

1. INTRODUCTION

The exponential growth in the number of vehicles on roads worldwide has led to an increasing concern regarding road safety. With this surge in traffic, the risk of accidents and collisions has also escalated, necessitating the implementation of advanced safety systems to mitigate these risks. In response to this pressing need, this project proposes an innovative IoT-based solution for vehicle-to-vehicle communication, aimed at enhancing road safety by integrating ultrasonic sensors, alcohol sensors, and fire sensors.

The integration of IoT technology and sensor systems in vehicles represents a paradigm shift in the approach to road safety. By enabling vehicles to communicate with each other in real-time and detect potential hazards, this project seeks to revolutionize accident prevention strategies and enhance overall road safety standards. The proposed system aims to address key challenges such as obstacle detection, identification of impaired drivers, and prompt detection of vehicle fires, thus contributing to a safer and more secure transportation environment. Through the seamless integration of ultrasonic, alcohol, and fire sensors, coupled with IoT connectivity, this project endeavors to create a comprehensive safety solution that can effectively prevent accidents and minimize the impact of unforeseen events on the road. By harnessing the power of technology, this initiative strives to pave the way for safer roads and improved driving experiences for motorists worldwide.

2. PROBLEM STATEMENT

The increasing number of vehicles on roads has led to a rise in road accidents and collisions, posing significant threats to public safety. Traditional safety measures and regulations are often insufficient to address the complexities of modern traffic environments, necessitating the development of advanced safety systems. Key challenges in road safety include

Accident Prevention: Despite existing safety measures, accidents continue to occur due to factors such as driver error, impaired driving, and unforeseen hazards on the road. Traditional safety systems are limited in their ability to proactively detect and prevent accidents before they occur.

Obstacle Detection: Identifying obstacles on the road, such as debris, pedestrians, or other vehicles, is critical for avoiding collisions. However, traditional vehicles lack advanced sensors and communication capabilities to detect obstacles in real-time and alert drivers accordingly.

Impaired Driving: Driving under the influence of alcohol remains a significant cause of accidents and fatalities on roads. Existing methods for detecting impaired drivers, such as roadside sobriety tests and breathalyzer tests, are reactive and often occur after an accident has already occurred.

Vehicle Fires: Vehicle fires pose a serious threat to driver and passenger safety, as well as surrounding vehicles and infrastructure. Detecting vehicle fires promptly is essential for preventing catastrophic incidents and minimizing damage and casualties.

Communication Between Vehicles: Traditional vehicles operate independently on roads, with limited communication capabilities between them. This lack of communication hinders the exchange of critical information, such as potential hazards or impaired driving incidents, between vehicles in real-time.

In light of these challenges, there is a pressing need for an advanced safety system that can proactively detect and prevent accidents, facilitate real-time communication between vehicles, and address key safety concerns such as obstacle detection, impaired driving, and vehicle fires. This project aims to develop an innovative IoT-based solution to address these challenges and enhance road safety for all motorists.

3. COMPONENTS

3.1 Arduino Uno

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega8U2 programmed as a USB-to-serial converter. "Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno and version 1.0 will be the reference versions of moving forward. The Uno is the latest in a series of USB Arduino boards, and the reference model for the Arduino platform.

Fig -1 Arduino Uno

.3.2 MQ3 Sensor

MQ-3 module is suitable for detecting Alcohol, Benzine, CH4, Hexane, LPG, CO. Sensitive material of MQ-3 gas sensor is SnO2, which with lower conductivity in clean air. When the target alcohol gas exist, the sensor's conductivity is more higher along with the gas concentration rising. MQ-3 gas sensor has high sensitivity to Alcohol, and has good resistance to disturb of gasoline, smoke and vapour. This sensor provides an analog resistive output based on alcohol concentration. When the alcohol gas exist, the sensor's conductivity gets higher along with the gas concentration rising.

Fig -2 MQ3 Sensor

3.3 L298N Module

The L298N Motor Driver module consists of an L298 Motor Driver IC, 78M05 Voltage Regulator, resistors, capacitor, Power LED, 5V jumper in an integrated circuit**.**

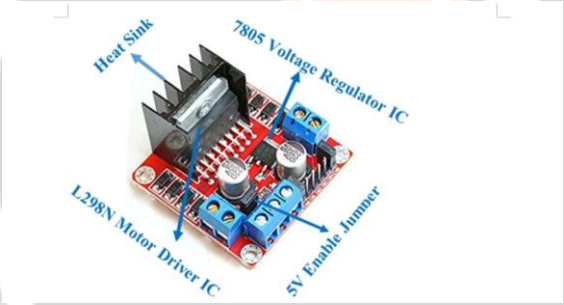


Fig -3 L298N Module

3.4 Fire Sensor

This tiny Flame sensor infrared receiver module ignition source detection module is Arduino compatible can use to detect flame or wavelength of the light source within 760nm~1100nm also useful for Lighter flame detect at the distance 80cm.Greater the flame, farther the test distance. It has the Detect angle of 60 and very sensitive to flame spectrum.

It produces the one channel output signal at the D0 terminal for further processing like an alarm system or any switching system. The sensitivity is adjustable with the help of blue potentiometer given on the board.

Fig -4 Fire Sensor

3.5 Accelerometer

We use PIC16F877A microcontroller. It is a low power, high speed CMOS FLASH/EEPROM technology. It is also a low cost easy to program microcontroller which have only 35 instruction set.

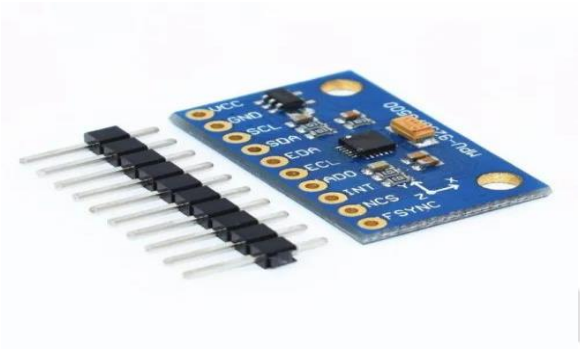


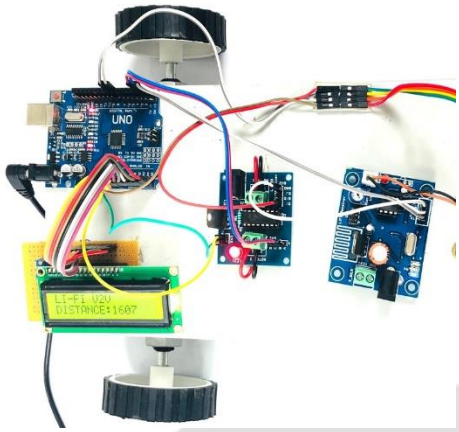
Fig -5 Accelerometer

3.6 Eye Blink Sensor

An eye blink sensor detects the opening and closing of the eyelids to monitor eye movements, often used for user interaction or safety systems.

4. WORKING

1. Safety Message Generation: A vehicle's microcontroller generates a safety message based on sensor data and other relevant information.
2. RF Signal Transmission: The safety message is transmitted as an RF signal using the RF transceiver and antenna.
3. RF Signal Reception: Nearby vehicles receive the RF signal using their RF transceivers and antennas.
4. Safety Message Processing: The received safety message is processed by the microcontroller to determine its relevance and accuracy.
5. Alert Generation: If the received safety message is deemed relevant and accurate, the microcontroller generates an alert to inform the driver of a potential safety hazard.



5. CONCLUSION

In conclusion, the implementation of the alcohol detection system using Arduino, MQ-3 alcohol sensor, 16x2 LCD, and a buzzer offers a practical solution for detecting alcohol presence and alerting individuals to potential risks. By leveraging the capabilities of Arduino and sensor technology, this system provides a simple yet effective means of monitoring alcohol concentration in the environment.

Through the integration of the MQ-3 alcohol sensor and Arduino, the system can accurately measure alcohol concentration levels and display the results in real-time on the LCD display. Additionally, the inclusion of a buzzer allows for audible alerts to be issued when the alcohol concentration exceeds a predefined threshold, providing immediate feedback to the user.

Overall, this project demonstrates the potential for using Arduino-based solutions to address safety concerns and promote awareness of alcohol-related risks. With further refinement and optimization, such systems could contribute to enhancing safety measures in various environments, including vehicles, workplaces, and public spaces.

In conclusion, the alcohol detection system serves as a valuable tool for promoting safety and raising awareness of the dangers associated with alcohol consumption, ultimately contributing to the well-being and protection of individuals and communities.

6. REFERENCES

[1]. Xue Yang University of Illinois at Urbana-Champaign xueyang@uiuc.edu2. Jie Liu Microsoft Research liuj@microsoft.com3. Feng Zhao Microsoft Research zhao@microsoft.com4. Nitin H. Vaidya University of Illinois at Urbana-Champaign nhv@uiuc.eduConference Name,Mobile And Ubiquitous Systems: Networking And Service,2004 MOBIQOUITOUS 2004 The First International Annual Conference.

[2]. Hybrid vehicular communications based on V2V-V2I protocol switching"Anna Maria Vegni/and ThomasD.C. Littley/Department of Applied Electronics, University of Roma Tre, Rome, Italyamvegni@uniroma3.Department of Electrical and Computer Engineering, Boston University, Boston MA, USAtdcl@bu.edu December 2, 2011.Conference Name:-Vehicle Information Communication System 2011 Conference.

[3]. Vehicle-to-Vehicle Communications Readiness of V2V Technology for Application"Harding, J., Powell, G., R., Yoon, R., Fikentscher, J., Doyle, C., Sade, D., Lukuc, M., Simons, J., & Wang, J. (2014, August).Vehicle-to-vehicle communications: Readiness of V2V technology for application. (Report No. DOT HS 812 014). Washington, DC: National Highway Traffic Safety Administration Conference Name: -National Highway traffic system administration April 2014 IEEE conference.

[4]. Data Naming in Vehicle-to-Vehicle Communications"Lucas Wang1, Ryuji Wakikawa2, Romain Kuntz2, Rama Vuyyuru2, and Lixia Zhang11. Computer Science Department, University of California, Los Angeles2. Toyota Info Technology Center, USA Mountain View, CAConference Name:-Computer Communication workshop (INFOCOM WKSHPS), 2012 IEEE Conference.