

Arduino Based System to Prevent Vehicle Accidents

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Abstract

This process of systems will ensure us safety and protect us by commanding on the speed of the vehicle. In order to protect the vehicle, we use blinking sensors, smoke sensors (MQ2), ultrasonic sensors and other sensors. If any vehicle suddenly hits the road and the vehicle applies the brakes, the system will control the speed and prevent accidents. It likewise alerts the driver, and it demonstrates the driver when they are going to sleep mode during driving. These all sensors take the data from surrounding and send to the microcontroller (ATmega328P) and this microcontroller takes the action automatically. With the help of an IR sensor, we will monitor the driver's eyes. If any short-circuit occurs in parts of the engine, then a smoke sensor will detect it randomly and alert mode will be on for the driver and stop the vehicle. The presence of an Ultrasonic sensor detects the speed of the vehicle and simultaneously decreases the speed to zero. We call it "ARDUINO BASED SYSTEM TO PREVENT VEHICLE ACCIDENTS"

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Introduction

This process of systems will ensure us safety and protect us by commanding on the speed of the vehicle. In order to protect the vehicle, we use blinking sensors, smoke sensors (MQ2), ultrasonic sensors and other sensors. If any vehicle suddenly hits the road and the vehicle applies the brakes, the system will control the speed and prevent accidents. It likewise alerts the driver, and it demonstrates the driver when they are going to sleep mode during driving. These all sensors take the data from surrounding and send to the microcontroller (ATmega328P) and this microcontroller takes the action automatically. With the help of an IR sensor, we will monitor the driver's eyes. If any short-circuit occurs in parts of the engine, then a smoke sensor will detect it randomly and alert mode will be on for the driver and stop the vehicle. The presence of an Ultrasonic sensor detects the speed of the vehicle and simultaneously decreases the speed to zero.

Vehicle (specially Cars) accidents in the roads. During the year 2021, a total of 4,12,432 road accidents have been reported in the country in which 1,53,972 deaths and 3,84,448 persons injured. Though they are many root causes of accidents like disobeying the traffic rules, Rash driving by rider. Age group 18 to 45 accountable for almost accidents deaths, human errors like estimation of opposite vehicle were approaching or not, dizzy state of driver, drunk and drive etc.,

In this project, we try to address the solution to some of causes of accidents through low-cost Arduino based embedded system to prevent road accidents. Though there were many systems developed to prevent in.

Literature Review

Many research works are going on in this topic.

[1]. Md. Maruf Rahman developed a system that can locate the real time GPS coordinate which will then be sent to a cell phone

[2]. Prof. Dr. Bharati Wukkadada, proposed a device that can track animals, resources, and also automobiles that are being robbed

[3]. Seok Ju Lee also developed a system that is of low cost and was able to locate vehicle's position in an effective way

[4]. III. MODEL OF THE SYSTEM When the value of the velocity and tilting will exceed the range then a SMS will be sent through Arduino with real time coordinates.

Proposed System

The proposed system structure is developed using ESP32 microcontroller with eye blink sensor for driver drowsiness detection which also controls the speed of the vehicle in case of the sensor triggers, ultrasonic sensor for distance measuring and alerting. In case of any accident or smoke detected the smoke sensor is used for alerting for help which is done through IOT. The current status of the working project is displayed on the LCD.

The complete process builds upon Microcontroller and is programmed using the Arduino IDE software for all the operation and controls

Block Diagram

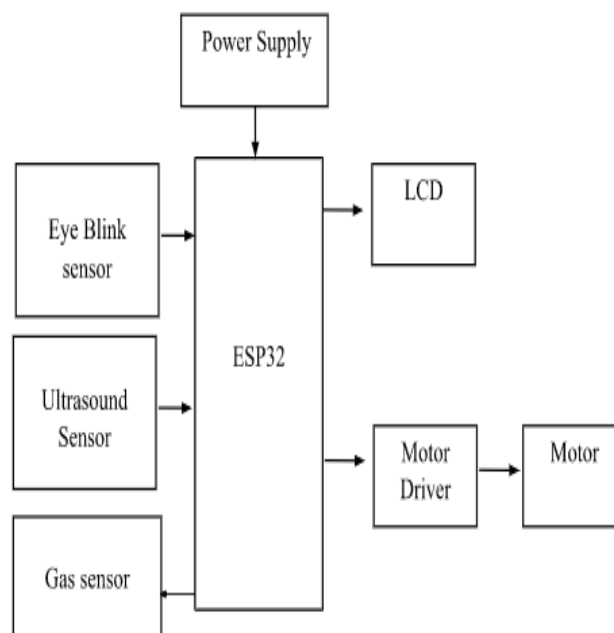


Figure 1. Block Diagram of Arduino based system to prevent vehicle accidents.

Hardware Components

Power Supply

The power supply section is the section which provides +5V for the components to work. IC LM7805 is used for providing a constant power of +5V. The ac voltage, typically 220V, is connected to a transformer, which steps down the ac voltage down to the level of the desired dc output. A diode rectifier then provides a full-wave rectified voltage that is initially filtered by a simple capacitor filter to produce a dc voltage. This resulting dc voltage usually has some ripple or ac voltage variation. A regulator circuit removes the ripples and also retains the same dc value even if the input dc voltage varies, or the load connected to the output dc voltage changes. This voltage regulation is usually obtained using one of the popular voltage regulator IC units.

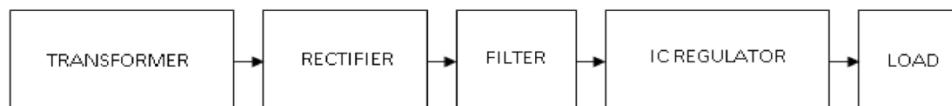


Figure 2.Block diagram of power supply

Esp32 Module

The ESP32 module is a low-cost, low-power system-on-chip (SoC) microcontroller with integrated Wi-Fi and Bluetooth capabilities. It is manufactured by Espressif Systems, and is designed for use in a variety of applications, including Internet of Things (IoT) devices, wearable electronics, and other embedded systems. The ESP32 module features dual-core processors running at up to 240 MHz, as well as a variety of built-in peripherals, including touch sensors, analog-to-digital converters, and pulse width modulation (PWM) controllers. It also includes support for a wide range of communication protocols, including Wi-Fi, Bluetooth, and Ethernet.



Figure 3. Esp32 Module

Eye blink sensor

Eye blink sensors are devices that can detect the motion of the eyelid and use it to determine if the person is blinking. These sensors can be used in a variety of applications, including assistive technology for people with disabilities, driver fatigue detection systems, and virtual and augmented reality applications.



Figure 4. Eye blink sensor

LCD (liquid crystal display)

The most commonly used Character based LCDs are based on Hitachi's HD44780 controller or other which are compatible with HD44580. The most commonly used LCDs found in the market today are 1 Line, 2 Line or 4 Line LCDs which have only 1 controller and support at most of 80 characters, whereas LCDs supporting more than 80 characters make use of 2 HD44780 controllers. Most LCDs with 1 controller has 14 Pins and LCDs with 2 controller has 16 Pins (two pins are extra in both for back-light LED connections).

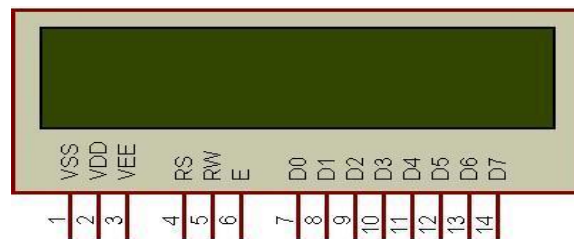


Figure 5. LCD type HD44780 pin diagram

Gas Sensor

A gas detector is a device which detects the presence of various gases within an area, usually as part of a safety system. This type of equipment is used to detect a gas leak and interface with a control system so a process can be automatically shut down. A gas detector can also sound an alarm to operators in the area where the leak is occurring, giving them the opportunity to leave the area. This type of device is important because there are many gases that can be harmful to organic life, such as humans or animals



Figure 6. Gas Sensor

Ultrasonic Sensor

Ultrasonic sensors are electronic devices that are used to detect the presence or proximity of an object by emitting high-frequency sound waves and analyzing the sound waves that are reflected back from the object. They are widely used in various applications such as automation, robotics, and security systems.



Figure 7. Ultrasonic Sensor

Motor and Motor Driver

Motors are devices that convert electrical energy into mechanical energy, allowing them to generate motion or force. There are many different types of motors, each with its unique characteristics and applications.

A motor driver is an electronic device that controls the speed, direction, and torque of an electric motor. It provides the necessary power to the motor to move a load or a system. Motor drivers are commonly used in industrial automation, robotics, automotive, and other applications where precise motor control is required.



Figure 8. Motor Driver

Result

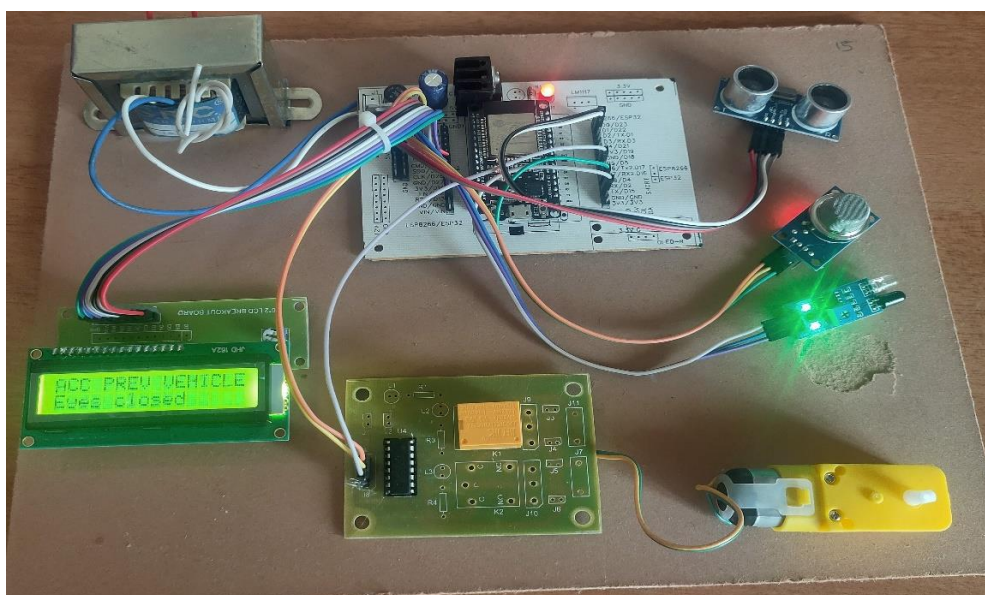
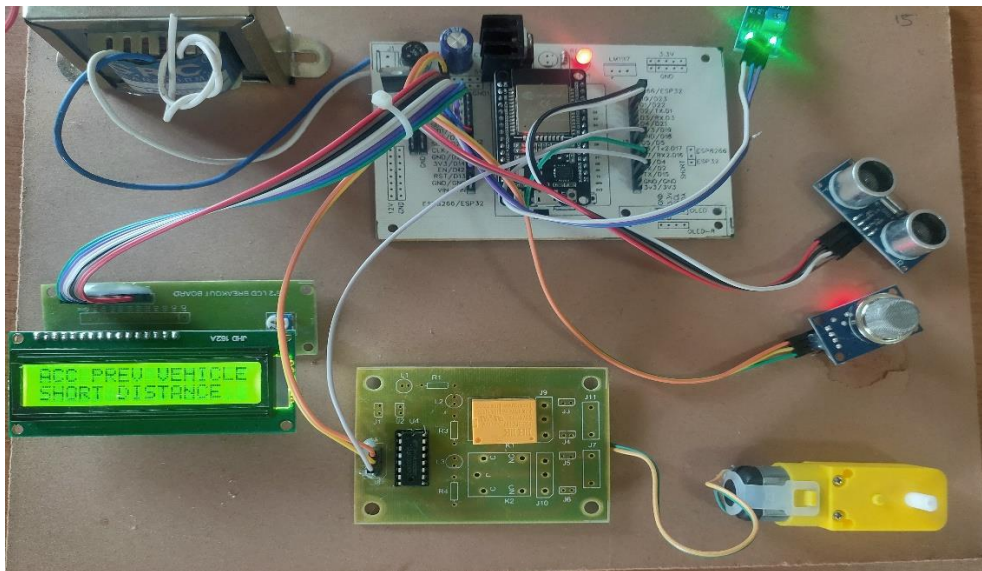
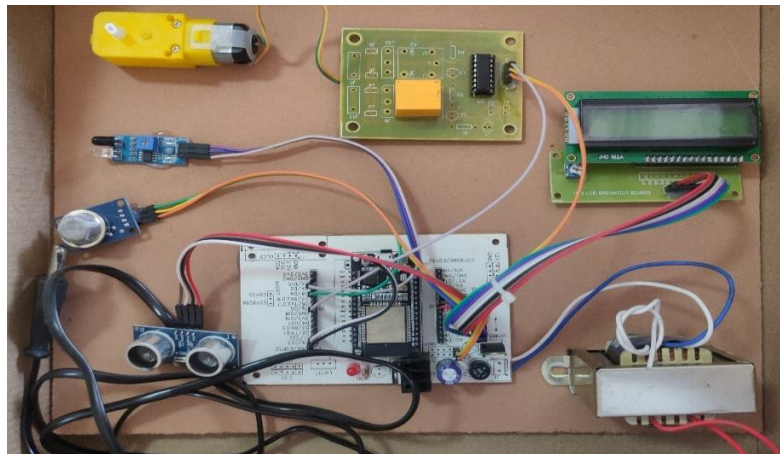


Figure 9. Hardware kit

Conclusion and Future Scope

The project “**Arduino based system to prevent vehicle accidents**” has been successfully designed and tested. It has been developed by integrating features of all the hardware components used. Presence of every module has been reasoned out and placed carefully thus contributing to the best working of the unit. Secondly using highly advanced IC’s and with the help of growing technology the project has been successfully implemented.

1. Integration with other technologies
2. Artificial intelligence
3. Wireless communication
4. Cybersecurity
5. Standardization
6. Autonomous driving

Reference

- [1] "Statistics of Accident & casualties – Bangladesh Road Transport Authority (BRTA)", Brta.gov.bd, 2017. [Online]. Available: <http://www.brta.gov.bd/newsite/en/statistics-of-accident-casualties/>. [Accessed: 3- Sep- 2017].
- [2] M. Rahman,J. Mou,K. Tara,M. Sarker “Real Time Google Map And Arduino Based Vehicle Tracking System” in 2nd International Conference on Electrical, Computer & Telecommunication Engineering (ICECTE),2016, pp.1-4.
- [3] B.Wukkadada,A. Fernandes “ Vehicle Tracking System Using GPS and GSM Technologies” IOSR Journal of Computer Engineering (IOSR JCE), PP 05-08
- [4] S.Lee,G. Tewolde,J. Kwon “ Design And Implementation Of Vehicle Tracking System Using GPS/GSM/GPRS Technology And Smartphone Application”IEEE World Forum on Internet of Things(WF-IoT),2014, PP 1-6
- [5] "AccelerometerSensor,Working,Types,Specification,Selection,Applications", Instrumentation-Electronics, 2017. [Online]. Available: <http://www.instrumentationtoday.com/accelerometer/2011/08/>. [Accessed: 3-Sep- 2017].
- [6] "Arduino - Home", Arduino.cc, 2017. [Online]. Available: <https://www.arduino.cc/>. [Accessed: 3- Sep- 2017].
- [7] D. Lee, "Garmin | What is GPS?", Www8.garmin.com, 2017. [Online]. Available: <http://www8.garmin.com/aboutGPS/>. [Accessed: 3- Sep 2017].
- [8] "Sim900A GSM Module Interfacing with Arduino UNO - Electronic Wings", Electronicwings.com, 2017. [Online]. Available: <http://www.electronicwings.com/arduino/sim900a-gsm-module-interfacing-with-arduino-uno>. [Accessed: 3- Sep- 2017].
- [9] M. Module, "Micro SD Card Module", Future Electronics Egypt (Arduino Egypt), 2017. [Online]. Available: <https://store.futureelectronics.com/products/micro-sd-card-module>. [Accessed: 4- Sep 2017].
- [10] Sharma, C. P. (2006). Customer care-Indian Railways. CTRAM, www.ctram.indianrail.gov.in/3rdCTRAMJOURNAL.

- [11] Sunitha C.K. (2015). A Study on Passengers" Satisfaction towards Indian Railway Services. PRIMAX International Journal of Marketing
- [12] Neha Sharma and Surya Prakash Rathi (2014), Employer Branding, International Journal of Advance Research, IJOAR. Org, Vol. 2, Issue 3, pp.1-11.
- [13] Pushpendra namdeo, R. K. Ghai (2012), "Employer branding: a new corporate strategic plan, Asian Journal of Multidimensional Research, Vol. 1, Issue 3, , pp. 41-47.