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Vehicle accident detection and alcohol detector system using arduino

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ABSTRACT

This project saves Human lives from an accident by detecting an accident in case it happens. But this need advance accurate human detection and also accident detection capability. This project includes features like speed measurement speed, location of car, Gas and alcohol detection. Using GSM technology, the current detail of the car can be sent to a dedicated mobile. Also we can track the current location of vehicle using GPS technology in case of an accident.

Keywords: Alcohol detection system; Vehicle control; DC motor; Arduino.

INTRODUCTION

Roads safety have always been in the center of attention. The signboards, direction arrows and lanes have made following rules much easier and served as an excellent guide, nevertheless, Uncontrollable factors such as drunken drivers exits and thus accidents still happen. In the united states of America alone and during 2014 nearly “9,967 people died of alcohol-impaired-driving”

[1], that is One alcohol-impaired-driving fatality every 53 minutes. The list goes on and on for other countries Too [2], therefore it is necessary to enhance and Improve new techniques. This project pushes x being deliberately dependent on personal contribution. The system should make a significant Leap in terms of public awareness in addition to the reduction of accidents caused by drunken drivers.

HARDWARE MODULES

Power supply

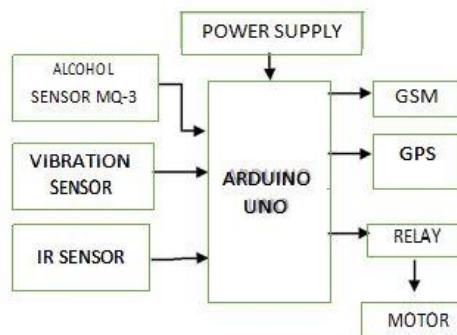


Fig.1. Block Diagram

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The diagram shown above (Fig. 1) can be divided into three major parts; the first part (from the left) is the key component in this project which is the Alcohol sensor, its role, as its name implies, detecting alcohol by breathing directly into it. The second part is the controlling unit; it has the necessary functions to read alcohol sensor's output, furthermore, the microcontroller will act accordingly in response to the detected alcohol

percentage by controlling the DC motors (either stop or run) and visually indicating its status. Last but not least, the third part; the Motor driver shield, this part in particular is to simulate a hypothetical scenario of motor control. The shield itself meant for driving DC motors since they need more current, which compensated via an on-board chip with external power feed. What comes next is a brief explanation of each part contribute into this project:

Arduino Microcontroller Board

The Arduino board is the central unit of the system.

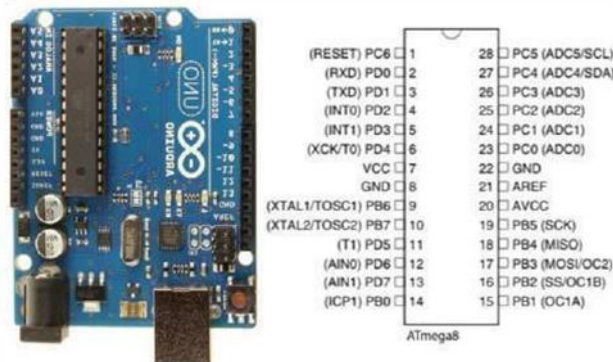


Fig. 2. Arduino Board Description

Introduction

Arduino is an open source electronic prototyping platform. Arduino is a single-board microcontroller that uses Atmel AVR processor as a brain. The built in I/O board can be easily programmed by Processing/Wiring based language. The programming language is similar to C++ with some modification and simplification. Arduino projects can be used standalone or by connected to computer by the software. The open source IDE program software can be downloaded for free from the official Arduino website.

The Arduino Uno board uses the IC ATmega328 as the microcontroller processor. The Arduino Uno board comes with 14 digital input/output pins (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. The Arduino Uno can be powered via either a USB connection or by an AC-to-DC adapter [3].

Highlighted Features

- Microcontroller ATmega328
- Operating Voltage 5V
- Input Voltage (limits) 6-20V
- Digital I/O Pins 14 (of which 6 provide PWM output) Analog Input Pins 6
- DC Current per I/O Pin 40 mA
- Clock Speed 16 MHz

Alcohol Sensor (MQ-3)

The Gas Sensor MQ-3 (Figure II-2) is a gas leakage detector used for indoors (e.g. home) or outdoors (e.g. industry). It is suitable for detecting few types of gases namely, Alcohol, Benzene, CH₄, Hexane, LPG and CO. The sensor is characterized by its high sensitivity and fast response time [4], thus, enabling an almost immediate data retrieval of the measured gases.



Fig. 3. Alcohol Sensor

The sensor outputs its values in term of varying voltage (Analog output); therefore, the data can be obtained via the microcontroller using its built-in

Analog-to-Digital converter. The sensor has several specifications; Table I lists some of it.

Table i. MQ-3 gas specifications [5]

Item	Parameter	Min	Max	Unit
V _{CC}	Working Voltage	4.9	5.1	Volts
P _H	Heating consumption	0.5	750	mW
R _S	Sensing Resistance	1	8	MΩ
Scope	Operation Temperature	-10	70	°C
	Detecting Concentration	0.05	10	mg/L

Sensitivity Adjustment: Resistance value of MQ

3 is difference to various kinds and various concentration gases. So, when using these components, sensitivity adjustment is very necessary. It is recommended to calibrate the detector for 0.4mg/L (approximately 200ppm) of Alcohol concentration in air and use value of Load resistance that (RL) about 200 KΩ (100KΩ to 470 KΩ). When accurately measuring, the proper alarm point for the gas detector has to be determined after considering the temperature and humidity influence.

Specifications

- Power supply needs: 5V
- Interface type: Analog
- Fast response and High sensitivity
- Stable and long life

GSM Modem

In this we using GSM Modem 300, this GSM Modem can accept any GSM network operator SIM card as like a mobile phone with its own unique phone number. Applications like SMS Control, data transfer, remote control and logging can be developed easily. The modem can either be connected to PC serial port directly or to any microcontroller. Heartbeat abnormal condition when detected then this message is send to relative as well as ambulance alcohol detected is also send to relative and police station with car no and location using GPS system.

GPS (Global Positioning System)

GPS is a global positioning system which is used to get the location of particular object in latitude and longitude. we are going to use GPS system to send position information to police and relative of driver when alcohol detected as well as

accident happen then location, Vehicle no. is send to police station ,relative and ambulance for providing treatment immediately or as early as possible. And also police can track driver if alcohol detected, to give punishment. The Global Positioning System (GPS) is a satellite-based navigation system consists of a network of 24 satellites located into orbit. GPS works in any weather circumstances at anywhere in the world. Normally no subscription fees or system charges to use GPS. A GPS receiver must be locked on to the signal of at least three satellites to estimate 2D position (latitude and longitude) and track movement. With four or more satellites in sight, the receiver can determine the user's 3D position (latitude, longitude and altitude). Once the vehicle position has been calculated, the GPS unit can determine other information like, speed, distance to destination, time and other. GPS receiver is used for this research work to detect the vehicle location and provide information to responsible person through GSM technology.

Relay

Relay is used to turn off the ignition system by passing low power signal to ignition system .that's mean when alcohol detected power signal is triggered.

IR Transmitter and Receiver

Transmitter and recipient (Fig.3) are joined in a solitary lodging.[6] The tweaked infrared light of the transmitter strikes the article to be identified and is reflected diffuse. Part of the reflected light strikes the recipient and begins the exchanging operation. The two states – i.e. reflection got or no reflection – are utilized to decide the nearness or nonappearance of an article in the detecting range. This framework securely recognizes all protests that have adequate reflection. For items with a terrible level of reflection (matt dark unpleasant surfaces) the utilization of diffuse reflection sensors for short ranges or with foundation concealment is suggested.

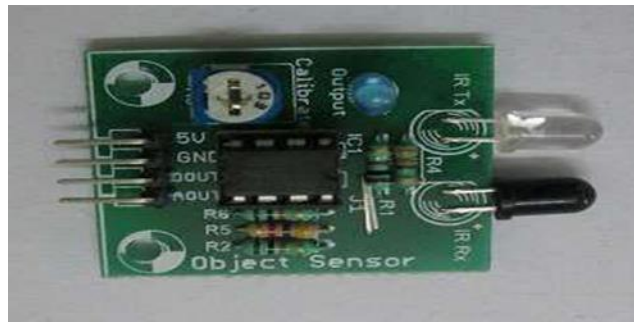


Fig 4. IR Sensor

The prototype in Fig 4 includes a pair of IR Sensors for detecting whether the rider is wearing the helmet, an alcohol sensor to check whether the rider is sober enough to drive the motor vehicle. Firstly, the prototype detects if the driver is wearing the helmet. Detection on the next step. If both the conditions are satisfied then the rider is safe to drive. If any one condition is not satisfied the LCD will display warnings stating to do so. On the other hand, we employed a face recognition using The Viola Jones algorithm for face detection which detects the face of the authorized owners.

Vibration Sensor

Displacement sensors measure changes in distance between a machine's rotating element and its stationary housing (frame). Displacement sensors come in the form of a probe that threads into a hole drilled and tapped in the machine's frame, just above the surface of a rotating shaft. Velocity and acceleration sensors, by contrast, measure the velocity or acceleration of whatever element the sensor is attached to, which is usually some external part of the machine frame.

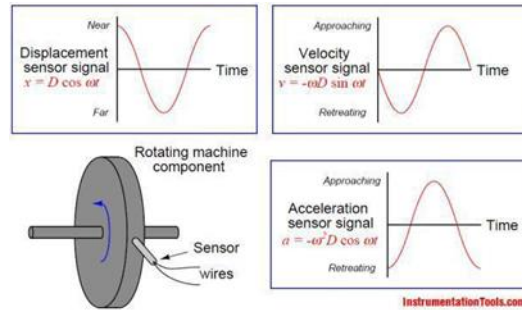


Fig 5. Operation of Vibration Sensor

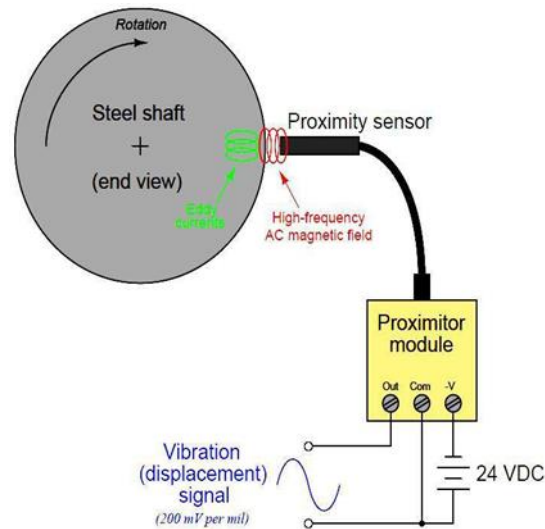


Fig 6. Vibration Sensor

A design of displacement sensor manufactured by the Bently-Nevada Corporation uses electromagnetic eddy current technology to sense the distance between the probe tip and the rotating machine shaft. The sensor itself is an encapsulated coil of wire, energized with high-frequency alternating current (AC). The magnetic field produced by the coil induces eddy currents in the metal shaft of the machine, as though the metal piece were a short-circuited secondary coil of a transformer (with the probe's coil as the transformer primary winding). The closer the shaft moves toward the sensor tip, the tighter the magnetic coupling between the shaft and the sensor coil, and the stronger the eddy currents. The high-frequency oscillator circuit providing the sensor coil's excitation signal becomes loaded by the induced eddy currents. Therefore, the oscillator's load becomes a direct indication of how close the probe tip is to the metal shaft. This is not unlike the operation of a

metal detector: measuring the proximity of a wire coil to any metal object by the degree of loading caused by eddy current induction.

PROPOSED SYSTEM

First reads the value of Alcohol concentration which changes regularly in the car and corresponding value gets sensed by Gas sensor MQ-3. If any alcohol is detected in the driver's cabin then display the alcohol concentration on LCD and buzzer on for indicate or alert the driver to avoiding any chance of accident. Speed of vehicle is measured on the basis of tachometer for this we use IR sensor TLP 1031A, tilt sensor is used to detect accident. When accident happens then SMS will be send (through GSM module) with position of vehicle (longitude and latitude through GPS system) to the concern authority or owner of the vehicle.

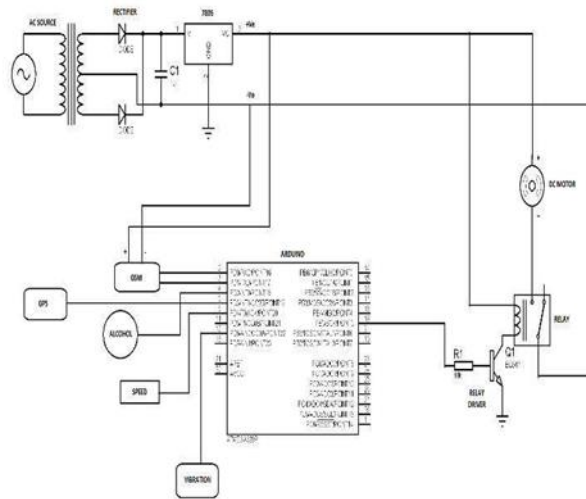


Fig 8. Circuit Diagram

Arduino will work on 5v dc. So, the 230v AC will step-down into 5v Dc. The transistor Q1 operates 1v. Normal condition the relay is close condition. If Alcohol will be detected by alcohol sensor it will open the relay and motor will go to off condition. The speed will be measured in IR sensor. The vibration sensor will measure the vibration of car if any accident occurs it will activate the GSM and GPS. The GPS will be used to track the car for which location. And the GSM will be used to call the nearby ambulance.

Advantages

1. Intelligent and safe transportation
2. Cost Reduction

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RESULT

The project is done by ARDUINO, IoT can extend a human life and economically under knowledge person it can be operated.

CONCLUSION

We propose an intelligent vehicle system for accident prevention and making the world a much better and safe place to live. Passive Infra-red sensor is a reliable solution for detecting humans or animals and this technique certainly can save lots of lives. Pre-crash detection systems must be equipped with a combination of different sensors. Detecting humans or animals including obstacles will certainly give us a better solution to reduce the death of humans in road crashes.

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