

ACCIDENT ALERT AND INTERCOMMUNICATION SYSTEM USING ARDUINO

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Abstract—The aim of this system is to prevent the accident mainly by knowing the distance between one vehicle and another vehicle and to detect the alcohol consumption of driver and to monitor the heart rate of driver. The propose system comprises an idea of having safety while reversing a vehicle or detecting an obstacle and to display the distance between one vehicle and other vehicle using LED and if the consumption of alcohol in driver goes beyond a limit the system shuts down automatically and it is displayed using LCD, and the heart rate monitor is used to continually detect heart rate and during critical cases a voice note is given to the nearby hospital through GSM module .And the lane detection is carried out using IR sensor.

Key Terms—Alcohol detection,Distance measurement, Lane detection, Voice note using GSM.

I. INTRODUCTION

Now day's many industries are using robots due to their high level of performance and reliability and which is a great help for human beings. The obstacle avoidance robotics is used for detecting obstacles and avoiding the collision. This is an autonomous robot. The design of obstacle avoidance robot requires the integration of many sensors according to their task. The obstacle detection is primary requirement of this autonomous robot. The robot gets the information from surrounding area through mounted sensors on the robot. Some sensing devices used for obstacle detection like bump sensor, infrared sensor, ultrasonic sensor etc. Whenever the robot is going on the desired path the ultrasonic sensor transmits the ultrasonic waves continuously from its sensor head. Whenever an obstacle comes ahead of it the ultrasonic waves are reflected back from an object and that information is passed to the microcontroller. The microcontroller control the motor in all the four directions and the speed of motor is carried using PWM.



FIG1: A ROBOTIC MODULE CONNECTED TO ARDUINO.

II. COMPONENTS USED

A) ARDUINO MEGA:

Arduino is an open source physical computing platform based on a simple input/output board. The Arduino mega board is a microcontroller board based on ATmega 2560. It can be simply connected to a computer with an USB cable or power it with a ac-dc adapter. The board is preprogrammed with a bootloader that simplifies uploading of programs to the on-chip flash memory. Hence the programs are easily uploaded on the hardware for working. The Arduino mega has 54 digital input-output pins (out of which 15 can be used as PWM outputs), 16 analog inputs, 4 UARTS (hardware serial ports), 16 MHz crystal oscillator, USB connection, power jack, an ICSP header and reset button. The board can operate on an external supply of 6-20 volts.



FIG 2: ARDUINO MEGA 2560

1) POWER PINS:

Vin: The input voltage to the board when it is using an external power supply.

+5V: The regulated power supply used to power the microcontroller and other components on the board. This can come either from Vin via an on-board regulator or be supplied by a USB or another regulated 5V supply.

+3V3: A 3.3-volt supply generated by the on-board regulator. Maximum current draw is 50 mA.

GND: Ground pins.

2) BOOTLOADER:

A standard Arduino bootloader uses STK500 version protocol. It works fine up to chips that have 128 bytes of flash.

Arduino needs a bootloader to program the sketches over serial/USB.

A bootloader is a code that resides in a special segment of flash memory. It can execute self-programming instructions, making it possible to modify flash memory without a conventional programmer like STK500 or AVRISP mkII.

Arduino microcontroller is preprogrammed with a boot loader that simplifies uploading of programs to the on-chip flash memory. The default bootloader of Arduino is optical bootloader.

B) ULTRASONIC SENSOR:

It is an excellent non-contact range detection sensor with high accuracy and provides stable readings.

It uses sonar to determine the distance to an object. Its operation does not get affected by sunlight or black material.

It comes complete with an ultrasonic transmitter and receiver module.

The module automatically sends eight 40 kHz and detect whether there is a pulse signal back.

Test distance = high level time x velocity of sound (340 m/s) / 2

The ultrasonic sensor module has 4 pins.

Vcc: +5 VDC

Trig: Trigger (INPUT)

Echo: Echo (OUTPUT)

Gnd: Ground

A short ultrasonic pulse is transmitted at the time 0 and is reflected by an object. The sensor receives the signal and converts it to an electrical signal. The next pulse can be transmitted when the echo is faded away. This time is called cycle period. The recommended cycle period should be no less than 50 ms.

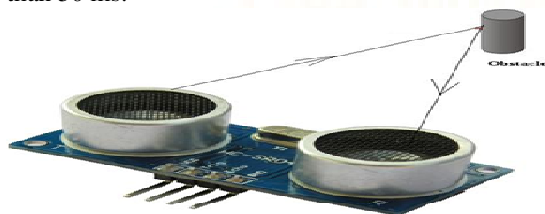


FIG 3:ULTRASONIC SENSOR

C) HEART BEAT SENSOR:

1) PRINCIPLE:

The heart beat sensor is based on the principle of photo plethysmography. It measures the change in the volume of blood through any organ of the body which causes a change in the light intensity through that organ. In case of applications where heart pulse is to be monitored, the timing of the pulses is more important. The flow of blood volume is decided by the rate of heart pulses and since light is absorbed by blood, the signal pulses are equivalent to the heart beat pulses.



FIG 4: HEARTBEAT MONITOR

2)FEATURES:

- Indicates heart beat by a LED.
- Provides a direct output digital signal for connecting to a microcontroller.
- Possesses compact size.
- Works with a working voltage of +5V DC.

3) COMPONENTS IN HEART BEAT SENSOR USING ARDUINO

1. Arduino
2. Heart beat sensor module
3. LCD
4. Push buttons
5. Power supply

D) ALCOHOL DETECTOR (MQ3):

This alcohol detector is suitable for detecting the alcohol concentration on your breath just like common breath analyzer. This sensor provides an analog resistive output based on alcohol concentration.

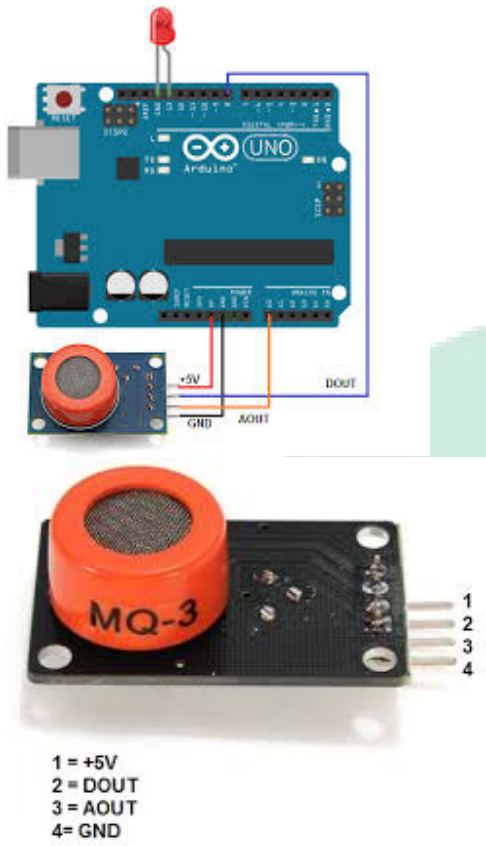


FIG 5: ALCOHOL SENSOR MQ3

| | | | |
|------------------------|-----------------------|--|--|
| Model No. | | MQ-3 | |
| Sensor Type | | Semiconductor | |
| Standard Encapsulation | | Bakelite (Black Bakelite) | |
| Detection Gas | | Alcohol gas | |
| Concentration | | 0.04-4mg/l alcohol | |
| Circuit | Loop Voltage | V_c | $\leq 24V$ DC |
| | Heater Voltage | V_H | $5.0V \pm 0.2V$ AC or DC |
| | Load Resistance | R_L | Adjustable |
| Character | Heater Resistance | R_H | $31\Omega \pm 3\Omega$ Room Tem. |
| | Heater consumption | P_H | $\leq 900mW$ |
| | Sensing Resistance | R_s | $2K\Omega - 20K\Omega$ (in 0.4mg/l alcohol) |
| | Sensitivity | S | $R_s(\text{in air})/R_s(0.4mg/L \text{ Alcohol}) \geq 5$ |
| | Slope | α | $\leq 0.6(R_{300ppm}/R_{100ppm} \text{ Alcohol})$ |
| Condition | Tem. Humidity | $20 \pm 265\% \pm 5\%RH$ | |
| | Standard test circuit | $V_c: 5.0V \pm 0.1V$ $V_H: 5.0V \pm 0.1V$ | |
| | Preheat time | Over 48 hours | |

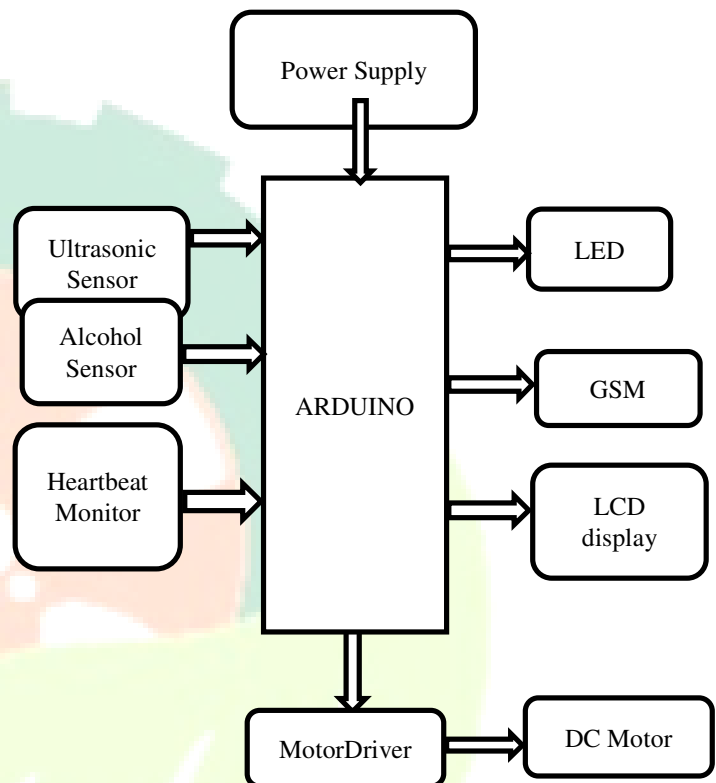
FEATURES:

- It has a simple 5V DC or AC circuit.
- It requires a heater voltage.
- Operating temperature: -10° to 70° .

III. PROPOSED SYSTEM

The proposed model uses Arduino Mega controller to control the whole process. The alcohol detection is based on breath

based system module. The alcohol detector will be placed behind the steering. The ultrasonic sensor continuously detects objects within its range after the ignition is on. The heart beat sensor monitors the driver's heart beat rate and sends information when it detects changes in the heart beat rate. The infrared sensor is used for lane indication in the vehicle.



IV. SCOPE

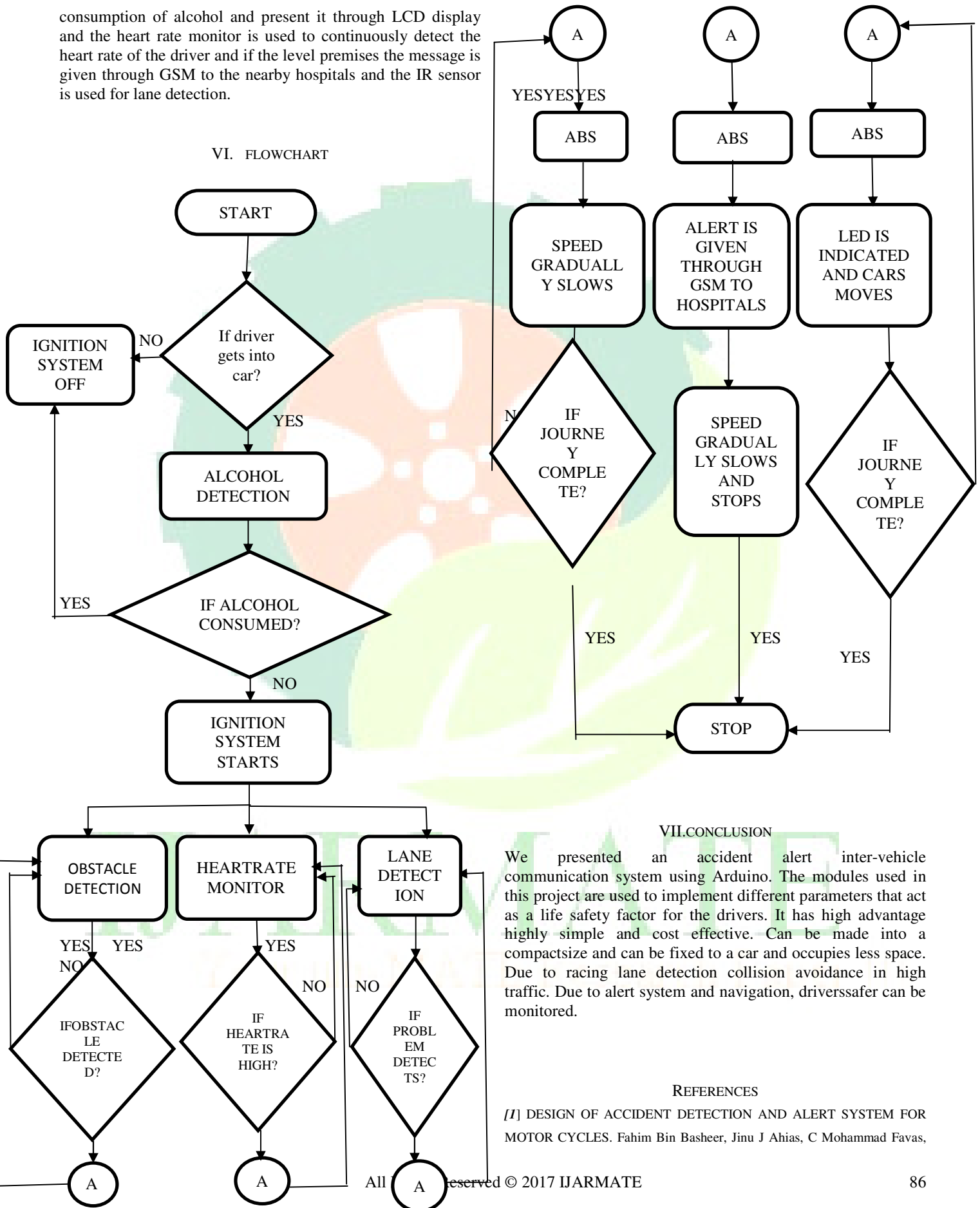
The driver safety in vehicles is an important aspect to avoid accidents which has not been implemented efficiently. Collision of vehicle with other vehicles and objects is the most common factor for accidents. Indication about objects near the vehicle will help greatly to prevent accidents. Heart beat monitoring of the driver is a necessary factor to ensure driver safety. This has not been introduced much in vehicles which will greatly provide health information about the driver.

V. IMPLEMENTATION

Number of traffic accidents are reported every year due to driver's declined alertness during driving and also due to drunken driving. It is necessary to monitor various parameters in order to assist and alert the driver so that accidents can be avoided. In this paper, we present the design and implementation of a prototype driver assistance and vehicle safety monitoring system. This system measures various driver assistance parameters such as obstacle detection, heartbeat, and alcohol consumption, and various vehicle parameters, the proposed system is built using Arduino UNO board consisting of ATmega328P microcontroller. The Ultrasonic sensor is used for obstacle detection and collision avoidance, the alcohol sensor is used to determine the

consumption of alcohol and present it through LCD display and the heart rate monitor is used to continuously detect the heart rate of the driver and if the level premises the message is given through GSM to the nearby hospitals and the IR sensor is used for lane detection.

VI. FLOWCHART



VII. CONCLUSION

We presented an accident alert inter-vehicle communication system using Arduino. The modules used in this project are used to implement different parameters that act as a life safety factor for the drivers. It has high advantage highly simple and cost effective. Can be made into a compact size and can be fixed to a car and occupies less space. Due to racing lane detection collision avoidance in high traffic. Due to alert system and navigation, drivers safer can be monitored.

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