Design and Development of Arduino-Uno Based System to Control the Speed of Electric Vehicle

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ABSTRACT-Accidents due to drowsiness can be controlled and prevented with the help of eye blink sensor using IR rays. It consists of IR transmitter and an IR receiver. The transmitter transmits IR rays into the eye. If the eye is shut, then the output is high. If the eye is open, then the output is low. This output is interfaced with an alarm inside and outside the vehicle. This module is designed with ultrasonic transmitter, ultrasonic receiver, Arduino UNO R3board with PIC microcontroller, DC tool motor, Servomotor and it can be connected to the braking system of the vehicle to reduce the speed of the vehicle. The ultrasonic sensor generates (020-20)KHz frequency sign. The alarm inside the vehicle will go on for a period of time until the driver is back to his senses. If the driver is unable to take control of the vehicle after that stipulated amount of time, then the alarm outside the vehicle will go on to warn and tell others to help the driver. Accident due to cause of drowsy is controlled the vehicle. The term used here for the realization that the drivers drowsy is by using eye blink sensor of the driver. In recent times drowsiness is one of the major problem of highway accidents. If the driver is drowsy, then the system will give buzzer and the speed of the vehicle is reduced.
Keywords— Eye blink sensor, Drowsiness, IR

I.INTRODUCTION

This paper involves measure and controls the eye blink & alcohol content using IR sensor & alcohol detector. The IR transmitter is used to transmit the infrared rays in our eye. The IR receiver is used to receive the reflected infrared rays of eye. If the eye is closed means the output of IR receiver is high otherwise the IR receiver output is low. This to know the eye is closing or opening position. Alcohol detector detects the content of alcohol in the breath and thus it attempts to clamp down alcoholics.This system uses microcontroller, LCD display, alcohol detector, GSM and buzzer. The output of the sensor is directly proportional to the content of alcohol consumed. This output is given to logic circuit to indicate the alarm. This paper involves controlling accident due to unconscious through Eye blink & alcohol detector. Here one eye blink sensor and alcohol detector is fixed in vehicle where if anybody loses conscious and indicate through alarm, LCD and GSM. The circuit has an alcohol sensor. This sensor measures the content of alcohol from the breath of people. Output of the sensor is directly proportional to the alcohol content. When the alcohol molecules in the air meet the electrode that is between alumina and tin dioxide in the sensor, ethanol burns into acetic acid then more current is produced. So the more alcohol molecules more will be the current produced. Output of the sensor is then fed to the microcontroller for comparison.The output of the sensors are in the analog nature which should be converted into digital format. This is done by the analog to digital converter of the microcontroller unit. The microcontroller controls the entire circuit.The LCD displays the message, GSM sends message and buzzer produces alarm. The working conditions and various constraints were properly studied before carrying out further step.

II. LITERARTURE SURVEY

To increase traffic safety and to reduce the number of traffic accidents, numerous universities, research centres, automotive companies (Toyota, Daimler Chrysler, Mitsubishi, etc.), and governments (Europe Union, etc.) are contributing to the development of ADAS for driver analysis, using different technologies. In this sense, the use of visual information to obtain the state of the driver drowsiness and to understand his/her behaviour is an active research field.This problem requires the recognition of human behaviour when in a state of sleepiness by means of an eye and facial (head) analysis. This is a difficult task, even for humans, because there are many factors involved, for instance, changing illumination conditions and a variety of possible facial postures. Considering the illumination, the state of the art has been divided in two parts; the first provides details on systems that work with natural daylight whereas the second deals with systems which operate with the help of

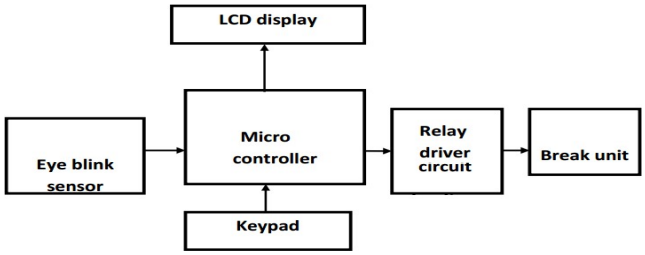
illumination systems based on near infrared (NIR) illumination.To analyse driver drowsiness several systems have been built in recent years. They usually require the problem to be simplified to work partially or for specific environments.D'Orazio et al. 2004, have proposed an eye detection algorithm that searches for the eyes within the complete image and have assumed that the iris is always darker than the sclera. Using the Hough transform for circles and geometrical constraints the eye candidates are located; next, they are passed to a neural network that classifies between eyes and non eyes. This system is capable of classifying eyes as being open or closed. The main limitations to this algorithm are as follows. It is applicable only when the eyes are visible in the image, and it is not robust for changes in illumination. Brandan et al., 2008**,** also have presented a system for drowsiness monitoring using template matching to analyse the state of the eye.Jiet al., 2002**,** have presented a drowsiness detection system based on NIR illumination and stereo vision. This system locates the position of the eye using image differences based on the bright pupil effect. Later, this system computes the blind eyelid frequency and eye gaze to build two drowsiness indices: PERCLOS (percentage of eye closure over time) and AECS (average eye closure speed).

III. PROPOSED SYSTEM

This paper involves measure of alcohol content and control of dc motor using IR sensor, Eye blink sensor & alcohol detector. Alcohol detector detects the content of alcohol in the breath and thus it attempts to clamp down alcoholics. This system uses microcontroller, LCD display, alcohol detector, GSM and buzzer. The output of the sensor is directly proportional to the content of alcohol consumed. This output is given to logic circuit to indicate the alarm. There are two alarms. One inside the vehicle to alert the driver and another outside to alert the people in the vicinity of the vehicle. If the eye is in a closed position, then the output is high. This output activates the corresponding pin in the microcontroller and sets off an alarm. The alarm continues to ring until the driver takes necessary steps to take control of the vehicle. If after a stipulated amount of time, the driver is unable to take control of the vehicle, then the microcontroller which is linked to the braking system, slows down the vehicle. An external alarm goes off indicating people to help the driver in the vehicle. The output of the sensors are in the analog nature which should be converted into digital format. This is done by the analog to digital converter of the microcontroller unit. The microcontroller controls the entire circuit.

ADVANTAGE:

- Accidents due to drowsiness can be avoided



- Intelligent and Safe Transportation.
- Drunken driving also prevented by using alcohol detector.
- Our system does not require the restraint of the external eyelids.
- Excellent frequency characteristics (DC to more than 500 Hz).

IV. FUNCTION OF COMPONENTS

- LM358 Comparator
- LCD display
- 8051 Microcontroller
- Buzzer (Piezo)
- Eye blink sensor (IR).

Infrared transmitter is one type of LED which emits infrared rays generally called as IR Transmitter. Similarly IR Receiver is used to receive the IR rays transmittedby the IR transmitter. One important point is both IR transmitter and receiver should beplaced straight line to each other.

The transmitted signal is given to IR transmitter whenever the signal is high, the IR transmitter LED is conducting it passes the IR rays to the receiver. The IR receiver is connected with comparator.

The comparator is constructed with LM 358 operational amplifier. In the comparator circuit the reference voltage is given to inverting input terminal.

So the comparator non inverting input terminal voltage is higher than inverting input. Now the comparator output is in the range of +5V. This voltage is given to microcontroller or PC and led so led will glow.

When IR transmitter passes the rays to receiver, the IR receiver is conducting due to that non inverting input voltage is lower than inverting input.

Now the comparator output is GND so the output is given to microcontroller orPC. This circuit is mainly used to for counting application, intruder detector etc.

Accidents are caused yearlong due to various factors such as drunk driving, texting while driving, speeding, distractions, sleeping on the wheel, etc.

Fig.4.1 Basic model of the system

4.1 Microcontroller

The AT89S8252 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of downloadable Flash programmable and erasable read-only memory and 2K bytes of EEPROM. The device is manufactured using Atmel's high-density non- volatile memory technology and is compatible with the industry-standard 80C51 instruction set and pin out.

The on chip downloadable Flash allows the program memory to be reprogrammed In-System through an SPI serial interface or by a conventional non- volatile memory programmer. By combining a versatile 8-bit CPU with downloadable Flash on a monolithic chip, the Atmel AT89S8252 is a powerful microcontroller, which provides a highly-flexible and cost-effective solution to many embedded control applications.

The AT89S8252 provides the following standard features: 8K bytes of downloadable Flash, 2K bytes of EEPROM, 256 bytes of RAM, 32 I/O lines, programmable watchdog timer, two data pointers, three 16-bit timer/counters, a six- vector two-level interrupt architecture, a full duplex serial port, on-chip oscillator, and clock circuitry.

In addition, the AT89S8252 is designed with static logic for operation down to zero frequency and supports two software selectable power modes.

The Idle Mode stops the CPU while allowing the RAM, timer/counters, serial port, and interrupt system to continue functioning.

The Power-down mode saves the RAM contents but freezes the oscillator, disabling all other chip functions until the next external interrupt or hardware reset.

4.2 Eye blink sensor

This paper involves controlling accident due to unconscious through Eye blink. Here one eye blink sensor is fixed in vehicle where if anybody loses conscious and indicate through alarm, gsm and LCD. This paper involves measure and controls the eye blink using IR sensor. The IR transmitter is used to transmit. The infrared rays in our eye. The IR receivers used to receive the reflected infrared rays of eye. If the eye is closed means the output of IR receiver is high otherwise the IR receiver output is low. This to know the eye is closing or opening position. This output is given to logic circuit to indicate the alarm, gsm and LCD. This circuit is mainly used to for counting application, intruder detector etc.

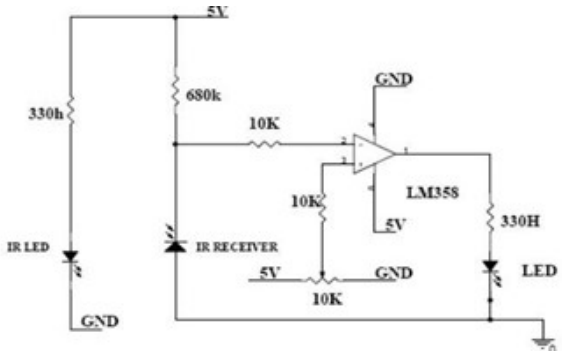


Fig.4.2 IR circuit

4.3 Buzzer

A buzzer or beeper is a signalling device, usually electronic, typically used in automobiles, household appliances such as a microwave oven, or game shows. It most commonly consists of a number of switches or sensors connected to a control unit that determines if and which button was pushed or a pre-set time has lapsed, and usually illuminates a light on the appropriate button or control panel, and sounds a warning in the form of a continuous or intermittent buzzing or beeping sound.

Initially this device was based on an electromechanical system which was identical to an electric bell without the metal gong (which makes the ringing noise). Often these units were anchored to a wall or ceiling and used the ceiling or wall as a sounding board. Another implementation with some AC-connected devices was to implement a circuit to make the AC current into a noise loud enough to drive a loudspeaker and hook this circuit up to a cheap 8-ohm speaker. Nowadays, it is more popular to use a ceramic-based piezoelectric sounder like a Son alert which makes a high-pitched tone. Usually these were hooked up to "driver" circuits which varied the pitch of the sound or pulsed the sound on and off.

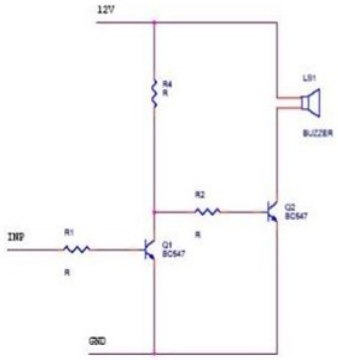


Fig.4.3 Alarm circuit.

4.4 Transformer

The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 thus has an advantage over linear temperature sensors calibrated in ° Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade scaling.

The LM35 does not require any external calibration or trimming to provide typical accuracies of ±1⁄4°C at room temperature and ±3⁄4°C over a full −55 to +150°C temperature range. Low cost is assured by trimming and calibration at the wafer level. The LM35's low output impedance, linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy. It can be used with single power supplies, or with plus and minus supplies.

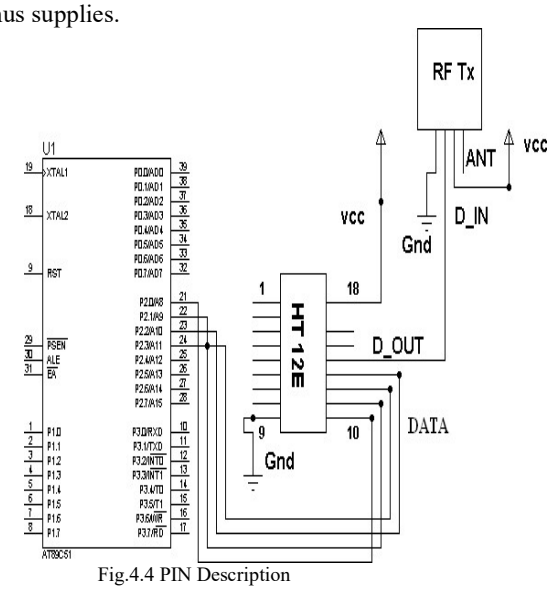


Fig.4.4 PIN Description

The potential transformer will step down the power supply voltage (0-230V) to (0-6V) level. Then the secondary of the potential transformer will be connected to the precision rectifier, which is constructed with the help of op–amp. The advantages of using precision rectifier are it will give peak voltage output as DC, rest of the circuits will give only RMS output.

4.5 L298 Motor Driver

The DC motor receives power from this motor driver, which in turn is powered from the SST microcontroller board. The enable pins of this driver should be high to send the power to the motor.

4.6 GSM Module

The GSM module used is GSM-SIM300. This module's primary function is to send an audio warning message to the owner's registered number that is, in case of any accident the owner is notified by it android application which plays an audio saying accident occurred, kindly check your phone.

A sim card is to be fixed in this module to simultaneously send a text message on the owner's phone.

4.7 SST Microcontroller

This is the main working unit which connects all the inputs and outputs to its 4 ports namely, P0 P1 P2 P3 and each of them have 8-pins which act as pins for input and output. The main ac dc power supply f 12V is given to this board.

It has a huge RAM and ROM which helps the program run faster as compared to other microcontrollers and also provides extra memory storage capacity.

4.8 Three terminal voltage regulators

Fig shows the basic connection of a three-terminal voltage regulator IC to a load. The fixed voltage regulator has an unregulated dc input voltage, VIN, applied to one input terminal, a regulated output dc voltage, Vout, from a second terminal, with the third terminal connected to ground.

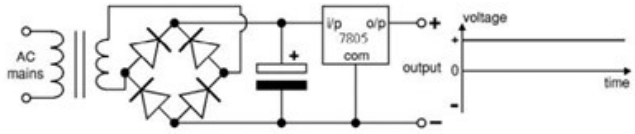


Fig.4.5 Circuit diagram of power supply

. Driver drowsiness resulting in reduced vehicle control is one of the major causes of road accidents. Driving performance deteriorates with increased drowsiness with resulting crashes constituting 20%-23% of all vehicle accidents.

The National Highway Traffic Safety Administration (NHTSA) conservatively estimates that 100 000 reported crashes are caused by drowsy drivers each year. These crashes result in more than 1500 fatalities, 71 000 injuries, and an estimated $12.5billion in diminished productivity and property loss. Many efforts have been made recently to develop on-board detection of driver drowsiness.

The drowsiness features are characterized by the blinking frequency of the eye by the driver

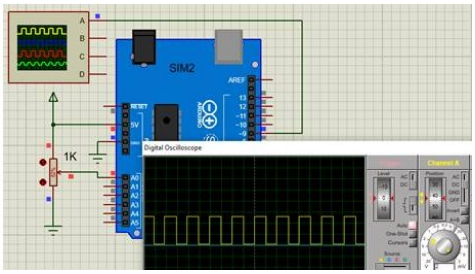
Table 4.1 Drowsiness Features

State	Output	Risk
Awake	Conscious	Normal
Drowsy	Less conscious	Risky
Sleep	Out of conscious	Extreme risk

V. SIMULATION RESULTS

Source code:

```
void setup() {
Serial. Begin (9600);
Pin Mode (3, OUTPUT); // Motor pin 1
Pin Mode (4, OUTPUT); // Motor pin 2
Digital Write (4, LOW); // Normally LOW in this pin
Pin Mode (A0, INPUT); // 10k Potentiometer
}
Void loop () {
Into s=analog Read (A0); // 10k Potentiometer
Into z=map(s, 0, 1024, 0,255);
Serial.println (z);
Analog Write (3, z);
}
```



Output wave with Arduino

VI. RESULT

The purpose of such a model is to advance a system to detect fatigue symptoms in drivers and control the speed of vehicle to avoid accidents. Advanced technology offers some hope avoid these up to some extent. This paper involves measure and controls eye blink using IR sensor.

VII. CONCLUSION

Many accidents occur due to the drowsiness of the driver and the driver could not control the vehicle.

In this paper, the drowsiness of the driver is identified by the eye blink closure and the blink frequency through infrared sensor worn by the driver by means of spectacles frame or IRS. If the driver is drowsy, the system will give buzzer alarm and the speed of the vehicle is reduced within 3 to5 sec.

By observing the working of this Eye Blink Monitoring system, it is found that while driving when the driver wears the goggle with IR sensor. The following points can be observed,

- The normal blinking rate of eye is not affected.
- When the driver is awake, the system will be in standby mode.
- When the driver tends to sleep, the system sounds an alarm, causing the driver to wake up & concentrate on driving.

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