

Intelligent Control for Vehicle Tracking, Accident Prevention and Safety

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Abstract

Intelligent vehicle technology is the new frontier in automobile industry. The capability of intelligent vehicle to communicate with both transmission and receiving side will help to recover speedy traffic routing adjustments and help to reduce traffic slowdown. Thus, the wastage of fuel can be reduced. As intelligent vehicle subsystems increasingly enhance driver control and safety, vehicle operators become more indirectly in control of their vehicles. The focus of this intelligent vehicle control is to fuse multiple sensor inputs to create a strategy for dynamic vehicle control.

Keywords: Automatic intelligent vehicle control system, eye blink sensor, alcohol sensor, vibration sensor.

I. INTRODUCTION

The noteworthy reason for death and disability is accidents. The repetition of car accidents in India is most noteworthy. A national crime records bureau (report) uncovered that consistently, more than 1,35,000, accident death occurs in India. In the capital of India, traffic accidents are multiple times higher. Traffic collisions are very common here. Car accidents related death rate expanded from 13 every hour in 2012 to 14 every hour in 2018. Among this more than 40 percent of these death rate are related with bikes and trucks. The most clumsy time on Indian streets is amid the pinnacle hour of evening and night. There are some of the counteractive actions taken to prevent mishaps.

- Primary prohibition: Eradication of conditions causing damage. Eg:- Traffic speed decrease, diminishing alcohol utilization..

- Secondary prohibition: Reduces seriousness of damage during mishap. Eg:- For children, safety seats in car, smoke alarm, bicycle with helmets..

- Tertiary counteractive action: First aid and immediate treatment and restoration. Eg:- Medical aid after mishaps, suitable clinical care after mishaps.

The intelligent vehicle technologies mainly apply to safety system of car and associated with self-sufficient electromechanical sensors producing alerts that can be transmitted inside a predetermined territory, say around 100 meters around the transmitter. In transport related applications the technological advancement using intelligent vehicle can be utilized for the well-being and business correspondence. These communications can be carried out in between vehicles or between a vehicle and a sensor which was fixed on street. Smart vehicle technologies give immediate on road data to the driven who wishes to reroute to a particular location and suggest a best course of travel trajectory. The mile makers thus communicate with regional monitoring station and transfer information and upload data collected by the system. The data further made accessible through standard internet convention ip address communication network.

II. DESCRIPTION OF AUTOMATIC INTELLIGENT VEHICLE SYSTEM

Figure.1 shows the block diagram representation of intelligent vehicle control system. It consists of driver circuit, microcontroller unit, eye blink sensor, alcohol sensor, ignition control and alarm circuit. In the existing system the eye blink sensor is installed in the eyeglass and it has to be worn. The IR sensor

is fixed to the glass to detect the eye blink rate. The breath analyzers are used by the traffic police to find the alcohol consumed by the driver but not available everywhere. The proposed system involves the eye blink sensor on the steering, which senses the eye blink and slows down the ignition system if the eye blink is abnormal. The alcohol sensor is placed inside the car which senses the alcohol content in the inhale and exhale of the driver. RF transmitter and receiver also involve in the speed limitation by sending signals. Piezoelectric materials are used to make the tier which when pressurized produce electricity. The eye blink senses the eye blink rate and compares with the normal rate, and reduces the speed of the vehicle. When the alcohol is present in driver's breath it is detected using the alcohol sensor during the start and the vehicle is prevented from moving. The RF transmitter is placed in a remote places like school zones, hospital zones and the signal has been transmitted to the receiver in the car. Thus the car speed is limited based on the signal received. The piezoelectric effect produces electricity based on pressure applied on the material. The definite usefulness depends enormously on locating and pointing of the emitter and locator with reference to eye. For instance, a moderately robust detection of flickering of eye is easy to accomplish by allocating the detector near to eyelid by using a rubber eye cup. Eye movement detection is more troublesome, yet the detection of absolute positioning can be done easily. This happens by the fast change in the light reflected from the eye amid the saccadic jumps.

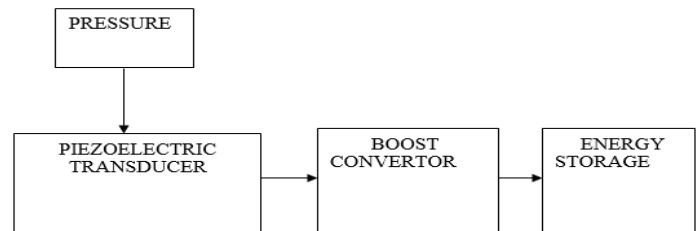


Figure 1. Block diagram representation of intelligent vehicle control system

III. METHODOLOGY & RESULTS

MICROCONTROLLER:

Microchip has been named as the second largest 8-bit controller provider in the world and has been known as maker of the microcontroller and various other control arrangements. The accompanying connections and the historical backdrop of microchip and PIC micro controllers are very efficient and well known. In addition to the assembler and C compilers available for PIC microcontrollers there are also basic compilers like the PIC basic compiler from MELABS or proton plus Compiler from crown hill or micro basic from microelectronic.

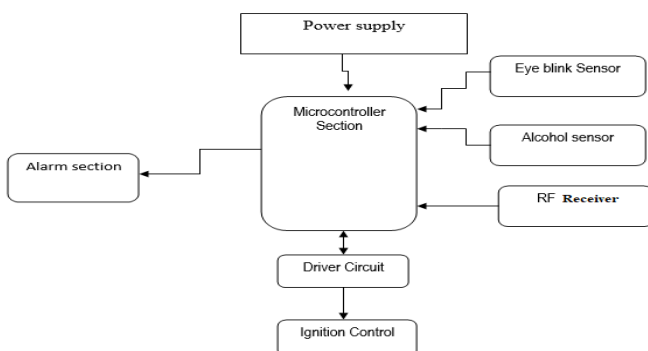
EYEBLINK SENSOR:

The eye-blink sensor has been operated by enlightening the eye and/or eye lid region with infrared light. At that point observing the changes in the reflected light utilizing a phototransistor and differentiator circuit. The precise usefulness depends enormously in the pointing and locating of the detector and emitter in regard with the eye. The highlights of this sensor are

- EYE BLINK notification by LED
- Fast output digital signal normally
- Small Size
- Operating Voltage +5V DC

Table-1. Parameters used for eye blink sensor

Parameter	Value
Voltage	+5V DC
Current	100mA



Output Data Level	TTL Logic
Eye Blink	Specified by LED and Output High Pulse

Table-1 indicates the value of parameters used for selection of eye blink sensor.

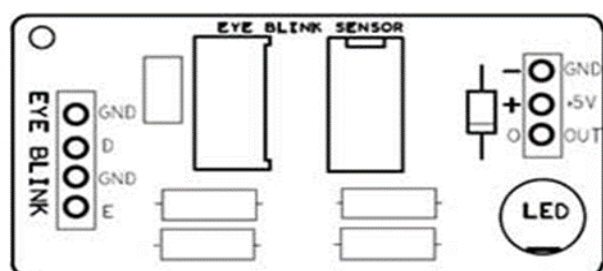


Figure.2. Block diagram representation of eye blink sensor

Figure.2 demonstrates control blocks for eye blink sensor. So as to utilize the sensor, apply a controlled DC power supply of 5 Volts. The Ground wire is black in colour, center wire is brown and positive supply wire is in red colour. These wires have been additionally set apart on PCB. To test the sensor, apply power to the sensor by connecting two wires +5V and GND. The output wire can be left without any connections. At the point when eye is shut, LED is off and the output voltage is 0V. The Eye blink sensor glass on the face below 15mm separation, and the LED will be flickering on each flicker. The output is very much high for Eye, when Eye is closed, and can be offered specifically to micro controller for interfacing application.

High level (5V) → When Eye is closed, LED is ON.

Low level (0V) → When Eye is open.

The accurate operation mainly depends on the positioning and pointing of detector and emitter with regards to vision through eye. For instance, a moderately robust detection of blinking can be achieved by placing the detector close to the eyelid. Mounting the detector to the rubber eyecup of an HMD has this impact. Recognition of saccadic eye movement is more troublesome, however it is more easier than identification of absolute position because of the fast change in light reflected from eye

surface during the saccadic jumps.

ALCOHOL SENSOR

This is an easy to utilize Liquefied Petroleum Gas (LPG) sensor, responsible for detecting LPG (mainly propane and butane) levels in the air. The MQ-6 sensor can recognize gas levels somewhere in the range of 200 to 10000ppm. This sensor has a high sensitivity and quick output response. An analog resistance is the sensor's output. The sensor can work at temperatures from -10 to 50°C and absorbs less than 150 mA at 5V. The sensor's simple voltage interface requires just a single simple analog input pin from microcontroller. Specifications for this sensor are

Power supply needs: 5V

- Type of Interface: Analog
- Pin Identification: 1-Output
2-GND
3-VCC
- More sensitivity to alcohol and less affinity to Benzene
- Quick reactance and high sensitivity steady state
- Stable and long life
- Drive circuit is very simple

VIBRATION SENSOR/PIEZOELECTRIC TRANSDUCER

Vibration sensors identify the vibration of the ground soil in event of debris flow. Before introducing a vibration sensor, it is critical to figure out what dimension of vibration is proper to actuate the sensor, if there should be an occurrence of debris flow. It is likewise critical to remember the danger of unexpected enactment brought about by seismic traumas, as well as areas in which there is development of traffic and other vibration causes that may initiate the sensor. Highlights of this incorporate:

Easy to install and operate

- Simple to co-ordinate in test rig applications and in the control frameworks.

- Advanced digital electronics hardware for least noise combined with highest sensitivity
- 0.5 Hz to 22 kHz – response in frequency
- Velocity limited to 500 mm/s (3 territories)
- Analog speed output and computerized S/P-DIF sound interface perfect with VIBSOFT-SP and other obtaining frameworks supporting the S/P-DIF standard

Applications incorporate:

- Vibrations delivered by industrial machines are key parameters of health of machinery.
- Vibration history of machines are captured by machinery monitoring programs.
- Tracking of vibration levels over time helps the plant engineer in advance detection of problems and can avert serious breakdowns.

RF TRANSMITTER AND RECEIVER

The Radio frequency module, as indicated by its name, operates at Radio Frequency. The operating frequency range shows its range from 30 kHz to 300 GHz. In this RF module, the digital data has been presented as change in amplitude of carrier wave. This sort of modulation has been named as Amplitude Shift Keying (ASK). Transmission through RF has been considered as superior as IR (infrared) because of numerous factors. Mainly, signals through RF can traverse through long distances making it favourable for wide range applications. Similarly, while IR mostly works in direct mode, RF signals can traverse when there is a disturbance occurring in transmitter & receiver. Next, RF transmission is more efficient and dependable than IR transmission. RF communication utilizes a particular frequency whereas IR signals are influenced by other IR emitting sources. This RF module includes an RF Transmitter and an RF Receiver. The transmitter/receiver pair works at a frequency of 434 MHz. An RF transmitter gets serial data and sends by the way of wireless network through RF by the antenna associated at pin4. The traversal happens at the speed of 1Kbps-10Kbps. The data which is transversed is being captured by an RF receiver works

under the same frequency as that of the transmitter. The RF module has been utilized together with a pair of encoder/decoder. The encoder is utilized for encoding parallel information for transmission network while reception is decoded by a decoder. HT12E-HT12D, HT640-HT648, etc. are a few generally used encoder/decoder ICs.

RELAY UNIT

A relay is an electrically operated switch. Many relays utilize an electromagnet to work at a switching mechanism mechanically, but other working principles are also used. Relays have been utilized where it is mandatory to regulate a circuit by a low-power signal (with electrical separation between control and controlled), or where many circuits must be regulated by one signal.

DC MOTOR

A DC motor is a class of electrical machines that transforms direct current electrical power into mechanical power. The most eminent types of motors depend on the forces generated by magnetic fields. Almost all kinds of DC motors have some sort of internal mechanism, either electromechanical or electronic, to regularly transform the direction of current path in the motor. Most kind of motors give rotary motion; a linear motor deliver force and motion in a straight line.

IV. HARDWARE IMPLEMENTATION

The hardware set up is shown in fig.3. The prototype system integrates the following hardware components, an LCD, MQ-3 alcohol sensor, DC motor, Buzzer and 2 LED's integrated to PIC microcontroller. Hardware consists of power supply unit, alcohol detection unit, the engine-locking unit, ignition system unit, display unit, alarm unit and indicating unit. An LCD display will be fitted inside the car to act as an indicator. A DC motor is used as the car engine to demonstrate the concept of engine locking. Micro controller will be looking for the output from allocated sensor supply unit. System has been supplied with 9V battery. A 5V dc supply is required by micro controller, sensor and display unit. DC motor requires 1.5V and LED needs 2V.

Any voltage above 12V will make the control device to burn and destroying the board. It is advisable to use voltage between 7 – 12V. Alcohol Sensor: It is made of tin dioxide (SnO₂) sensitive layer. The sensor is figured with a high sensitivity to alcohol and small sensitivity to Benzene. LCD display is used to display the message from remote location.



Figure 3. Hardware setup



Figure. 4. Output for normal speed



Figure: 5. Output of LCD display for school zone

Figure.4.and figure.5.showsthe LCD display output for normal mode and for school zone. The control of traffic can be enhanced by this method.

V. CONCLUSION

In this paper, an intelligent vehicle system, which enhance control of the driver and safety, has been

discussed. Vehicle drivers will become more alert and commanding on his vehicle by incorporating these types of multiple sensors. It has been able to prevent the driver from being unconscious by using eye blink sensors. It helps to avoid drunk and drive by using alcohol sensor. By this intelligent vehicle control, it helps to decrease the speed in essential zones by using R.F transmitter and receiver. Apart from this it helps to generate electricity by the use of piezo electric materials incorporated to automatic vehicle control system. Further some information may be send to the concerned person in case the driver meets with a accident using GSM. In case the person driving meets with an accident then a message will be send to the mobile number that is being fed in the system. The number may be to either a control room or hospital or relative so that necessary action may be taken immediately.

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AUTHORS PROFILE



Joly.M, has received the B.Tech degree from Regional Engineering College, Calicut, India, in 1998, M.E degree from Sathyabama University, Chennai, India ,in 2006 and currently pursuing Ph.D. in electrical engineering in Anna University, Chennai. She has published 4 international journals,2 conference papers. From 2008 to 2009, she was working as central government trainee in Kerala Electrical and allied Engineering co.Ltd, India. She had done her service in N.S.S Union College, Kerala, India from the year 2000 to 2003.She had worked as lecturer in Srinivasa College of Engineering and Technology from the year 2003 to 2005.Now, she is working in department of Electrical engineering, Saveetha Engineering College, Chennai, India, where she is currently an Associate Professor. Her research interests cover power electronic interfaces for solar PV systems and control aspects in renewable energy interfaces, control and integration system for digital system and using power electronics to distributed energy systems and power quality. She is a life time member for ISTE.She obtained premier Award for Entrepreneurship from Wadhwani foundation, national entrepreneurship network, best Paper Award for the paper "Control and Integration of Automatic Flood Warning and Alert system using

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