

SMART SYSTEM FOR VEHICLE MONITORING USING IOT

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ABSTRACT

This paper describes that transportation has great importance in our daily life. The main aim of this paper is to improve vehicle safety and system and linking driving license with the aadhar card. Nowadays people can get the card with much ease as its acceptance as a mandatory document for various initiatives has been officially made. It is believed that the card will further be given more importance as more as government schemes are being launched requiring it as a mandatory document. So by linking driving license to the aadhar card it will be useful to check the prevalence of multiple license. Here each and every person's driving license will be linked with the aadhar card, so the main advantage of this linking is that people who are in the age of eighteen and above only can drive the vehicle. Instead of using key, the fingerprint sensor is used to start the vehicle. And to avoid rash driving MEMS and vibration sensors are used to monitor the vehicle. And alcohol sensor is used to detect whether the person has consumed alcohol or not. All these sensors are connected with the arduino micro-controller. The sensor data of the vehicles will be sent to the cloud of the appropriate users to monitor it effectively.

Keyword : - Aadhar reader , Fingerprint sensor , Driving license

1. INTRODUCTION

The Internet of things is the network of physical devices, home appliances and items embedded with electronics, sensors, software which enables these objects to connect and exchange data. According to a random test done by the National Informatic Centre (NIC) in 2014, the total number of fake or duplicate driving licences in India was around 74 lakh. To avoid these kind of illegal activities the driving license should be linked to the aadhar card. This measure is expected to stop the over issuance and finding fake licenses. With the help of biometric details of the aadhar card the traffic police department will stop such activities. The aadhar card will serve as a single document that establishes the individual's identity. The RTO are also being equipped so that these details can be recorded by them for the issuance of driving license. There have been many instances where individuals were found having more than one driving license. In case of the one driving license is suspended, they will use the other one for continuous driving. The RTO'S also not having the proper online system to manage the driving license records which have led to the menace of duplicate and fake driving license. By linking aadhar to the driving license, the government can expect to have an enhanced control over the road safety rules and factors in India. And vehicle security is an important issues these days due to increased number of vehicle thefts. One more issue with the vehicle is handling its keys. For this problem fingerprint is used to start the vehicle. The user needs to scan the finger to start the car, the system allows only the authorized users to start the vehicle. Additionally alcohol sensor, MEMS and vibration sensors are used to prevent accidents on the road. The brain of the human body who drinks alcohol is affected within ten minutes of consumption due to the quick absorption of alcohol in the stomach wall. Consequently the driving skills are affected. In order to prevent such accident MQ3 gas sensor is used. MEMS and vibration sensor is used to avoid rash driving.

2. PROPOSED SYSTEM ARCHITECTURE

The arduino board uses a ATmega328P microcontroller. It is an open-source and platform independent and easy to use hardware and software. The block diagram consists of fingerprint sensor, alcohol sensor, MEMS, vibration sensor, relay and an IOT board. There are two steps in fingerprint sensor they are enrollment and verification. The optical character recognition is used in the fingerprint sensor.

2.1 Fingerprint Sensor

A fingerprint scanner system has two basic works, it needs to get an image of your finger, and it needs to determine whether the pattern of ridges and valleys in this image matches the pattern of ridges and valleys in pre-scanned images. The sensor is connected with the atmega328p microcontroller. A fingerprint in its narrow sense is an impression left by the friction ridges of a human finger. The recovery of fingerprints from a crime is an important method of forensic science. The downside of capacitive fingerprint readers is that they can't work if the finger is not clean or has water or sweat on it because that changes the conductivity upon which the system is built.

- Scanning
- Enrolment and verification
- Pattern recognition

Fingerprint matching techniques can be classified into three types. Minutiae-based matching is the most popular and widely used technique, being the basis of the fingerprint comparison.

2.2 Scanning

The Scanner uses a light sensitive microchip to produce a digital image. Once the finger is placed in the sensor, it will be automatically scanned and the image will be captured then it will be converted into a text form.

2.3 Enrollment and Verification

There are two steps involved in fingerprint sensor they are enrolment and verification. In enrolment the system will learn every person's fingerprint and each person's fingerprint will be scanned, analysed and stored in a coded form on a secure database. It takes less than half a second to store a person's print. In verification, the scanner will take the fingerprint and check it against all the prints in the database stored during enrolment, and decides whether the person is entitled to gain access or not.

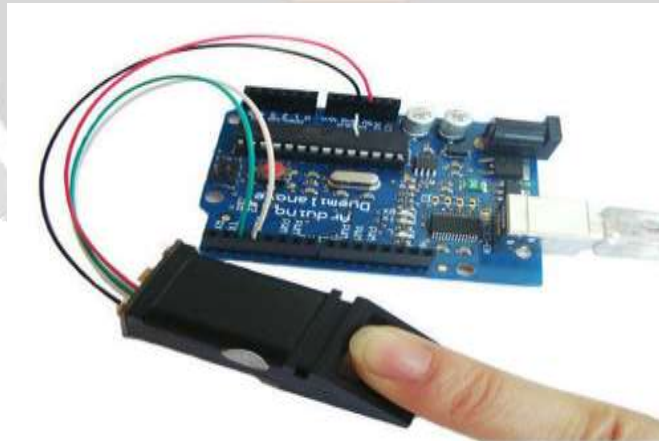


Fig -1: Fingerprint Sensor

2.4 Pattern Recognition

Pattern recognition is the machine learning that focuses on the recognition of patterns and regularities in data, although it is in some cases considered to be nearly synonymous with machine learning. The main aim of the pattern recognition is to generate image description and relating those to characterising classes of images. A process in raw data is taken and which an action is made based on category of the pattern is pattern recognition. It involves sensing, classification, post processing, pre-processing and feature extraction.

2.5 Alcohol Sensor

The MQ3 gas sensor is used for the detection of alcohol in the human body. This is the sensor which is very much sensitive to alcohol and it is found in wine, beer and liquor. This sensor is also used as a breathalyser to check the alcohol content in human's blood. This alcohol content gives a good indication to find whether the person is drunk or how drunk they are. The amount of alcohol exhaled into air is proportional to the alcohol that found in human blood. The mq3 gas sensor is a low semiconductor sensor that detects the alcohol gases at concentrations from 0.05 mg/L to 10 mg/L.

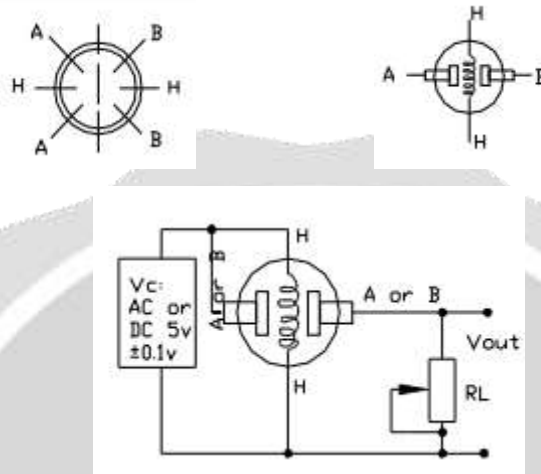


Fig -2: Alcohol Sensor

2.5.1 Working Principle

In MQ3 gas sensor the sensitive material used is SnO₂, whose conductivity will be lower in clean air. As the conductivity increases, the concentration of alcohol gases increases. This provides both analog and digital output. It has high sensitivity and fast response. There are totally six pins but the sensor consists of four pins they are +5V, AOUT, DOUT and GND. The +5V and GND pins establishes the power for the alcohol sensor. The other two pins are analog output and digital output. The operating voltage of this sensor is 5V±0.1 and the current consumption is 150Ma. The operation temperature is 10 degree to 70 degree Celsius. The more alcohol it detects, the analog output will be greater. Conversely, the less alcohol it detects, the analog output will be lesser. Once the analog output reaches the threshold the digital pin DOUT will be high. And when the DOUT pin goes high the arduino will detect this and through IOT the alert will be sent in the webpage and finally with the help of relay the motor will be stopped.

2.5.2 Features

- It has 5V operation
- It is simple to use
- Output sensitivity adjustable
- Analog output 0V to 5V
- Digital output 0V or 5V
- Low cost

2.6 Vibration Sensor

Many applications are used for measuring the vibration level, but sensing the vibration accurately is a difficult job. In this paper the vibration sensor is interfaced with the arduino microcontroller to detect the rash driving. The vibration sensor SW-420 comes with the breakout board that includes comparator LM393 and an adjustable on board potentiometer for sensitivity threshold selection, and signal indication LED. This sensor produces some logic states which depends on the vibration and external force applied on it. When there is no vibration it gives the output as logic LOW. When there is vibration it gives the output as logic HIGH. The working bias of the circuit is between 3.3V to 5V DC.

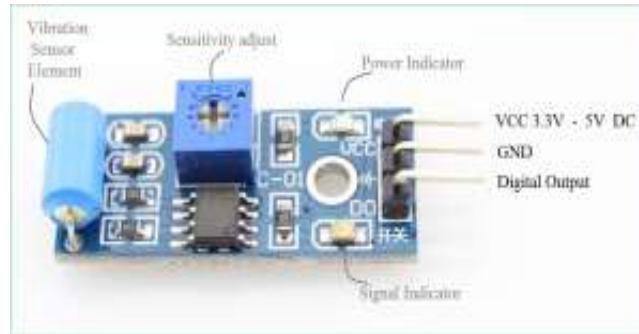


Fig -3: Vibration Sensor

The vibration sensor consist of two shear accelerometers that address two different sensitivity needs they are an industrial IMI accelerometer for harsh environments and a triaxial accelerometer for applications where cabling to the object under test needs to be minimized. NI offers an impact hammer for stimulus measurements. The vibration sensor has the sensitivity of about 10 mV/g and the measurement range is 500 g Pk. The broadband resolution is about 0.0005 grms, and the frequency range is 0.5 to 10,000 Hz.

- sensor works based on electromechanical principle. Vibration velocity sensors operates with electro dynamic principle and are used for measuring the absolute vibration.

Thus when the user drives the vehicle in high speed, the vehicle undergoes high vibration and this can be detected with the help of vibration sensor which was interfaced with microcontroller.

2.7 Mems Sensor

The Micro-Electro-Mechanical systems or MEMS is a technology in which its most general form can be defined as miniature mechanical and electro mechanical elements. These are used with the techniques of micro fabrication. The physical dimensions of MEMS vary from the micron on the lower end of the dimensional spectrum. The types of MEMS devices vary from simple structures having no moving elements, to extremely complex electro mechanical systems with multiple moving elements under the control of integrated microelectronics.

MEMS accelerometer is divided into two important micro system architectures they are piezo resistive and capacitive. The internal proof mass which is excited by acceleration is possessed by these two accelerometers. The difference of these two accelerometers lies in the transduction mechanism which is used to the movement correlation of the internal proof mass to accelerate. The balance of the difference capacitor is disrupted by the proof mass movement. Piezo resistive accelerometers are used for the identification of movement of the masses.



Fig -4: Bottom view of MEMS sensor

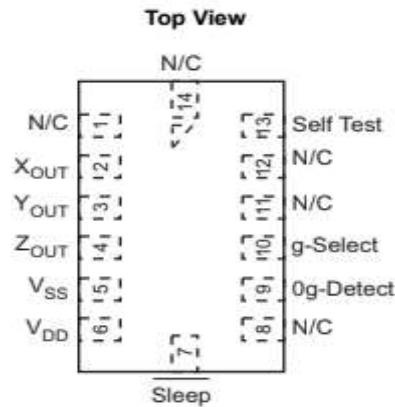


Fig -5: Top view of MEMS sensor

- The LM393 vibration sensor consists of four pins they are VCC, GND, AOUT and DOUT.
- There are 14 analog pins in the arduino microcontroller in which one of the pins from analog will be connected to the AOUT of the vibration sensor.
- The pins VCC and GND are connected to the power supply and the ground pins of arduino.
- The vibration measurement comes in three basic types they are displacement, velocity, and acceleration.
- The distance between the machine's rotating element and its stationary housing is measured by displacement sensors.
- The MMA7361L is a low power, low profile capacitive micro machined accelerometer which has a signal conditioning, a 1-pole low pass filter, and a temperature compensation.
- The low power compensation of this sensor is about 400 mA and the sleep mode is 3Ma
- It has the low voltage operation between 2.2V to 3.6V. And it is highly sensitive and fast turn on time.(0.5ms enable response time)
- It is a environmentally preserved product and signal conditioning low pass filter.
- It has a robust design, 0g- detect for free fall protection and low in cost.
- The MEMS sensor consists of five pins they are GND, XOUT, YOUT, and ZOUT and the power supply.
- In this paper the MEMS is obtained in digital form hence the XOUT, YOUT and ZOUT pins of MEMS is connected to the digital pins of arduino microcontroller.
- The VCC and the GND is given to the power supply and the ground pin of the microcontroller
- Particular threshold values will be fixed to the x, y, and z directions. Once the user exceeds the threshold value it will be seemed to rash driving and the status of the vehicle will be monitored by the traffic police department which was stored in the cloud using IOT.

2.8 Relay

A relay is an electrically operated switch. Many relays use an electromagnet to operate a switching mechanism mechanically, but other operating principle is also used. Relays are used where it is necessary to control a circuit by a low power signal or where several circuits must be controlled by one signal. The first relays were used in long distance telegraph circuits, repeating the signal coming in from one circuit and retransmitting it to another. Relays were used extensively in telephones exchanges and early computers to perform logical operations. Relays allow one circuit to switch the second circuit which can be completely separate from the first. There is no electrical connection inside the relay between the two circuits, the link is magnetic and mechanical. The relatively large current is passed by the coil of the relay for a 12V relay, but it can be as much as 100mA for relays designed to operate from lower voltages. Most ICs (chips) cannot provide this current and a transistor is usually used to amplify the small current to the larger value required for the relay coil. The maximum output current for the popular 555 timer IC is 200Ma so these devices can supply relay coils directly without amplification.

2.8.1 Features

The features of Relay is given as

- Selection of plastic material for high temperature and better chemical solution performance.
- 75 ohm characteristic impedance
- Simple relay magnetic circuit to meet low cost of mass production.
- Switching capacity available by 10A in spite of small size design for high density PC board mounting technique.
- 2.5 GHz bandwidth.
- VSWR at 2.5 GHz < 1.6 (typical < 1.3)

2.8.2 Specifications

Relay has the following specifications

- Operating voltage: 12 volts DC nominal
- Current Draw: 30 milliamps
- Minimum pull-in voltage: 9 volts DC
- Diode protection across relay coil
- Contact ratings
- 7 A @ 30 volts DC
- Size: 1.1 * 1.55 (28mm *39mm) Ea

3. CONCLUSIONS

The major threat to the people of this generation was death due to accidents. The youngsters of today's world were not properly following the traffic rules and the speed limit, so this paper is very useful to prevent such kind of accidents and by using the fingerprint to the vehicles will be more secured. The smart vehicle monitoring system aims at providing an excellent system in which the person's driving licence will be linked to the aadhar card so that the user can't able to drive the vehicle if he / she not hold the driving licence. And if the user has consumed alcohol or makes rash driving the vehicle will be stopped and caught by the traffic police immediately.

4. REFERENCES

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