Smart Transportation System Using IOT

Vidushi Bhadola[1], Dr. Mrs. Neha Agrawal[2]
[1]*B.Tech Student, Maharaja Agrasen Institute of Technology, Rohini, New Delhi*
[2]*Assistant Professor, Maharaja Agrasen Institute of Technology, Rohini, New Delhi*

***Abstract*- Logistics is a process which ensures efficient and cost-effective flow of goods and people and therefore, it is called as the backbone of every economy. In India itself, the road transportation industry accounted for 3.2 per cent of GDP in the year 2013/14. Also, with a surge in the number of taxis and trucks in the country due to increase in demand of the logistics sector, the accidents related to drunk driving and late alert of accident have drastically increased. Out of 5 lakh annual road accidents in India, more than 60% are caused due to the menace of driving under the influence of alcohol consumption. It is practically impossible for the owners of these cabs and truck drivers to keep a track of the activities of the drivers and accidents of these vehicles. The Indian Logistics sector is thus a highly unorganized sector, which leads to a lack of seamless movement of goods and people from one place to another. This project is aimed at outlining some of the key challenges faced by the logistics industry and providing a solution for the same. This paper provides a solution called as a SMART TRANSPORTATION SYSTEM built using the power of IOT - Internet Of Things. This solution makes use of sensors and the IOT technology to track the activities of the drivers and notify the owners to take the right action.**

Index Terms- Accident alert, Drunk Driver, IOT, MQ-3 Sensor, Raspberry Pi, Shock Sensor.

INTRODUCTION

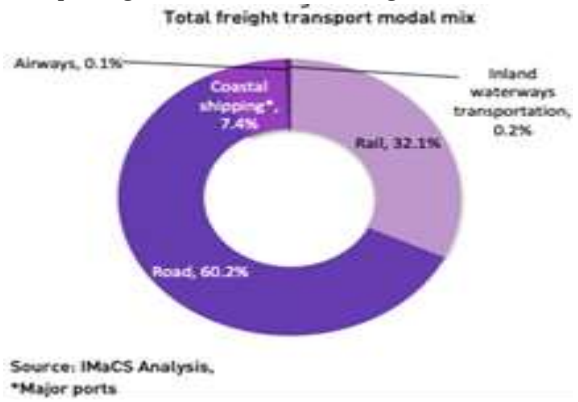
Logistics is defined as the process of planning, implementing, and controlling procedures for the efficient and effective transportation and storage of goods including services, and related information from the point of origin to the point of consumption for the purpose of conforming to customer requirements.

A. Logistics Scenario in India

As per the Economic Survey 2017-18, the Indian logistics sector provides livelihood to around 22 million people and improving the sector would facilitate a 10% decrease in indirect logistics cost, leading to a growth of 5-8% in exports. Also, the worth of Indian logistics market would increase from USD 160 billion to around USD 215 billion in next two years due to the execution of GST.

Due to various recent policies and programmers of Government of India, eg. the Make in India programme and improvements in infrastructure along with the emergence of skilled professionals, the country was ranked 35th in The World Bank LPI Index (Logistic Performance Index) that ranks countries based on Logistics Performance, moving up from 54th in 2014.

In India, road is the dominant mode of transport which accounts for 60% of freight movement. The most widely used mode of transportation are trucks. At present, around 1.5 million trucks operate on the Indian roads and their number increases around 10% annually. Rail and coastal shipping account for about 32 per cent and 7 per cent, respectively, while the share of inland waterways transportation and air is less than 1 per cent each. Railways are a relatively cheaper mode of transport and are mainly used for transporting bulk materials over long distances.



B. Challenges faced by Logistics Sector in India

There is an immense scope for further increase in India's rankings in The World Bank LPI Index if the existing infrastructural inefficiencies are addressed. The biggest challenges that currently besets the

Indian logistics industry is its unorganised nature. The other challenges hindering this sector's growth include poor integration of transport networks, integration with modern information technology and warehouse & distribution facilities, absence of multiple regulatory and policy making entities. These challenges severely affect India's performance in international trade, resulting into around 70% of the delays.

II.PROPOSED SYSTEM

The proposed system provides a solution to the inefficient transportation of goods from point of origin to point of consumption. There is no way for the companies to track the activities of the drivers who are transporting the goods and materials. The drivers may get into an accident or the driver may be driving above the allowed limit of drinking, the company would not be notified of these activities of the drivers which leads to inefficient transportation and delays in transportation and all leads to loss of life and good and all this incurs extra cost to the company. For this purpose, the proposed system has the following hardware and software requirements enlisted in Table 1.

Hardware Requirements	Raspberry Pi 3 Shock Detector Sensor Module MQ-3 Sensor ADC MCP3208 Jumper Wires
Software Requirements	Raspbian OS Python 3

Table 1

A.Hardware Requirements

Hardware Requirements consists of the various hardware tools which are necessary for the completion of this project. These include various sensor, Raspberry Pi etc.

i. Raspberry Pi

The Raspberry Pi is a series of small single-board computers developed in the United Kingdom by the Raspberry Pi Foundation to promote the teaching of basic computer science in schools and in developing countries. Raspberry Pi 3 Model B was released in February 2016 with a 64 bit quad core processor, on-board WiFi, Bluetooth and USB boot capabilities.

Figure 2

A powerful feature of the Raspberry Pi is the row of GPIO (general-purpose input/output) pins along the top edge of the board. A 40-pin GPIO header is found on all current Raspberry Pi boards. Any of the GPIO pins can be designated (in software) as an input or output pin and used for a wide range of purposes.

ii. Shock Detector Sensor

The shock sensor is an electronic switch which induces shock force and transfers the result to a circuit device thus triggering it to work. It contains the following parts: conductive vibration spring, switch body, trigger pin, and packaging agent.

Figure 3

The shock switch works like this: the conductive vibration spring and trigger pin are precisely placed in the switch and fixed by adhesive. Normally, the spring and the trigger pin are separated. Once the sensor detects shock, the spring will vibrate and contact with the trigger pin, thus conducting and generating trigger signals.

iii. MQ-3 Sensor

Alcohol sensor (MQ3) as shown in above figure is suitable for detecting alcohol concentration just like in a common breath analyzer.

Figure 4

It detects the alcohol and send the output in form of analog signals to the Raspberry Pi. Its sensitivity towards benzene, gasoline, smoke and vapour is less while that toward the alcohol is very high. It contains Sno2 as gas sensitive material to sense alcohol. It is

also a low-cost material, has a long life, and require minimal or no maintenance.

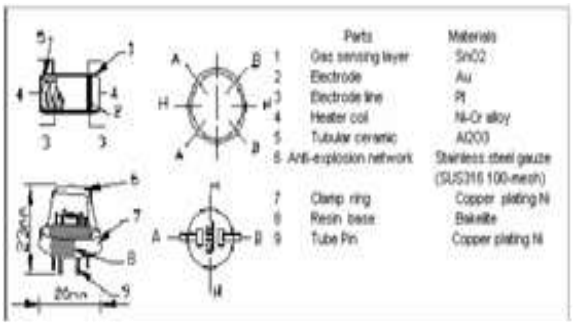


Figure 5

Figure 5 represents the structure and configuration of the MQ-3 Sensor.

iv. ADC MCP3208

All MQ-X sensors return analogue signals, which we can not easily read at the Raspberry Pi. For this, we need to use an analog-to-digital converter (ADC).

Figure 6

so we use the MCP 3208 which is an analog to digital converter. It takes the analog values generated by the MQ-3 sensor and convert it to digital signals in order to test the alcohol level.

III.WORKING OF PROPOSED SYSTEM

The proposed system works using IOT Architecture. It uses two different types of sensors- Shock Detector Sensor Module which detects shock and sends alert to authorities in order to decrease number of deaths due to late alert to authorities.

MQ-3 Sensor Module which senses the breath of driver to check whether the driver is driving under the influence of alcohol, and thereby avoiding accidents due to drunk driving.

A.Module 1: Shock Sensor Module

In this project, I used a shock sensor to detect a car accident and record the video in a pi camera module.

Figure 7

The shock switch works like this: the conductive vibration spring and trigger pin are precisely placed in the switch and fixed by adhesive. Normally, the spring and the trigger pin are separated. Once the sensor detects shock, the spring will vibrate and contact with the trigger pin, thus conducting and generating trigger signals.

When the shock is detected, a message is sent using Twilio service to the mobile number of the concerned authorities and this also starts the Pi Camera which records the video.

This projects also makes use of Twilio -

The Twilio service provides a service of - Programmable SMS which lets you send and receive text messages globally with the API that over a million developers depend on.

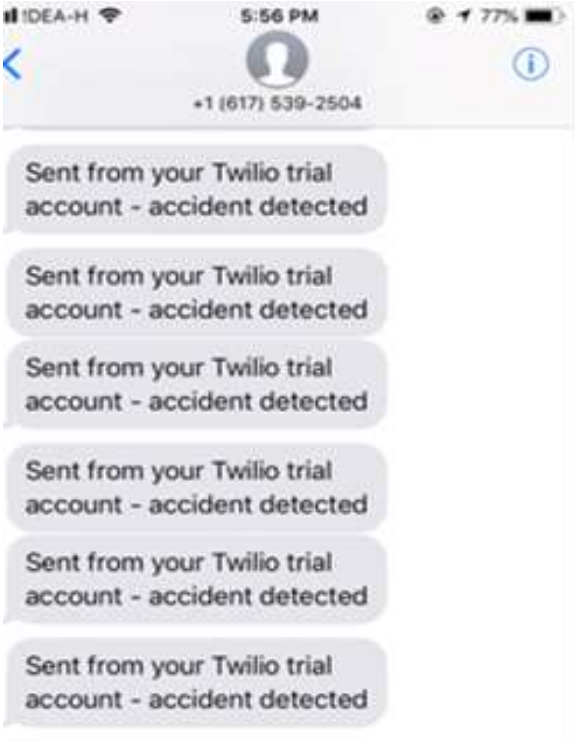


Figure 8

Figure 8 shows the alert sent using twilio service to any mobile number. The operational flow of module 1 is as shown below in figure :

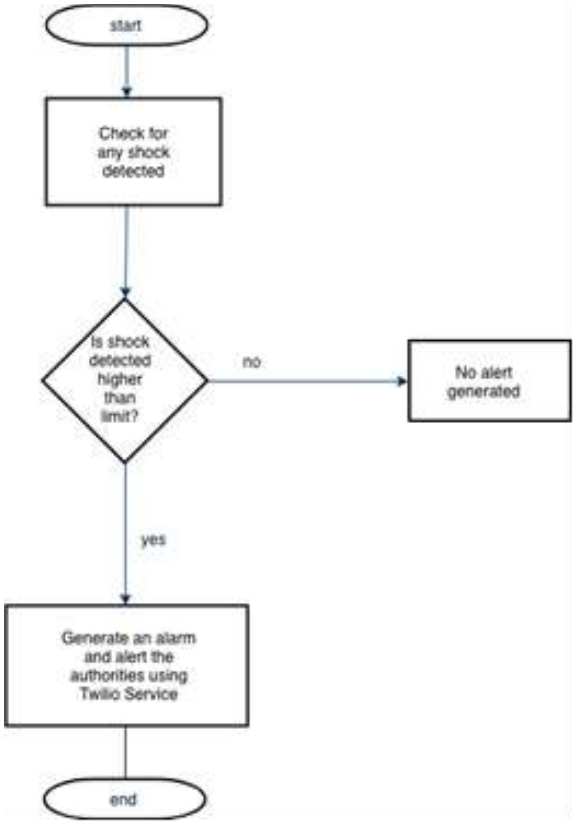
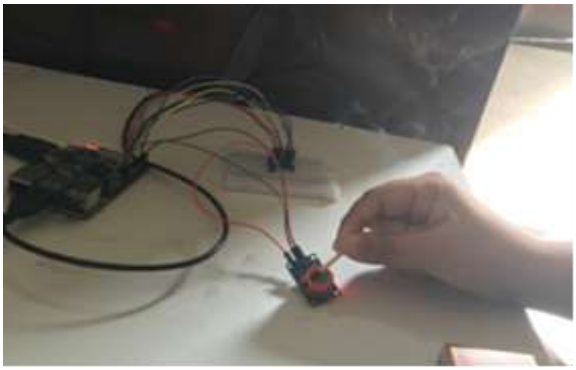


Figure 9

B.Module 2: MQ-3 Sensor Module

In this module I have installed the MQ-3 sensor, integrated with the ADC MCP3208. The MQ-3 Sensor detects the smoke level and raises an alarm if the level is higher than permitted value.



Figure

Since, the MQ-3 alcohol sensor is expected to detect alcohol level of the driver alone and not that of the fellow passengers in the motor-vehicle, it is important to embed the device at that position that is at the top of the steering wheel (see figure). This will ensure that the device work efficiently and effectively.

Figure 10

The operational flow of the module 2 is as shown below in figure . The module detects the alcohol in breath and checks if the value is less that the permitted value. In India, the permissible blood alcohol content (BAC) is set at 0.03% per 100ml blood. If the content found in driver's breath is greater than this value, then the ignition is turned off if car is not moving. If car is moving alert can be generated.

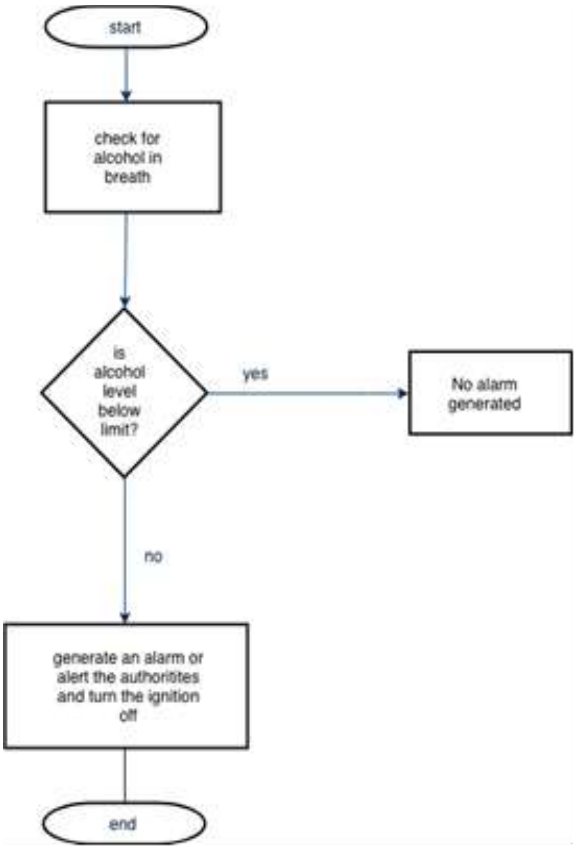


Figure 11

IV.CONCLUSION

The system is an accident alert system along with a drunk driver detection system that detects the

intoxicated level of the drunk driver with high level of certainty and detects any accident to the car and generates a corresponding alert. The system detects drunk driver situation initially or during the driving condition and activates the alter mechanisms for local persons along with remote indication to the authorized persons. The main aim of the of the project is to decrease the chances of loss of lives in accident occurring because of intoxicated state of driver and late alert to the required authorities, hence improve public safety and also a better system for the logistics companies to track their drivers. Based upon the latest semiconductor gas sensing technology and a sensitive shock detector, the system is cost-effective, reliable, fast, at a distance measuring system that can be easily housed in a vehicle. The development cost of the device would be less than INR 3000.

Apart from this, vehicle location tracking and alter system of this kind can be helpful both in case of personal as well as business purpose, improves safety and security of the person on road.

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