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IOT BASED DRIVER DROWSINESS AND HEALTH MONITORING SYSTEM

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Abstract - *This paper introduces driver drowsiness and health parameters detection system. Road accidents sometimes may be caused by lack of health and fatigue among drivers. Driver fatigue is a very serious problem which is a root cause for many road accidents. It is not possible to calculate the exact number of accidents because of drowsiness but research shows 20% of accidents happens only because of fatigue (rospa).This "IOT BASED DRIVER DROWSINESS AND HEALTH MONITORING SYSTEM" provides USB Camera for Eye-Blink Monitoring System and includes a buzzer that alerts the driver when he is drowsy. Driver's location can be tracked using GPS. In the proposed application design the admin will be monitoring the system parameters and send a message to the friends/relatives in case of emergency. The driver's health is monitored by wearable heart beat sensor and temperature sensor. Alcohol sensor is provided to detect the alcoholic condition of the driver, and when the alcohol level crosses the set threshold value, the vehicle speed goes down and after some point of time engine seizes and the vehicle stops.*

Key Words: *Eyes Detection, Health Monitoring, Alcohol Detection.*

1. INTRODUCTION

This section summarizes the various reasons for accidents. The goals and motivations for this proposed project is to develop cost effective system that can be implement in all range of cars and it should save people.

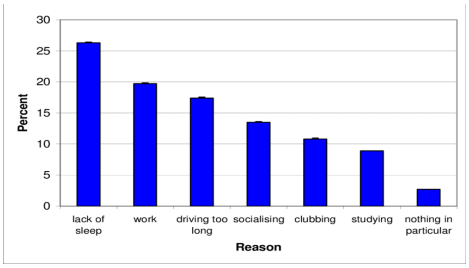

Fig 1 Reasons for car accidents

In India, drowsy driving is a major problem. The risk and often ruinous results of drowsy driving are alerting. Drowsy driving is the dangerous combination of driving and sleepiness or fatigue. This generally happens when a driver has not slept for sufficient hours, but it can also happen due to medications, alcohol or shift work. Fig.1 shows the graph representing several reasons for accidents recorded on yearly basis.

However, the drink and drive cases has increased enormously. Every year probably 200 people are killed in drink and drive accidents. It is not only the driver who suffers, but also his passengers/co-travelers gets affected. According to a research in 2016, 100 footsloggers were seriously injured or killed, 390 car passengers lost their lives, and 40 children were killed or seriously injured due to drunk-driving.

1.1 Block Diagram

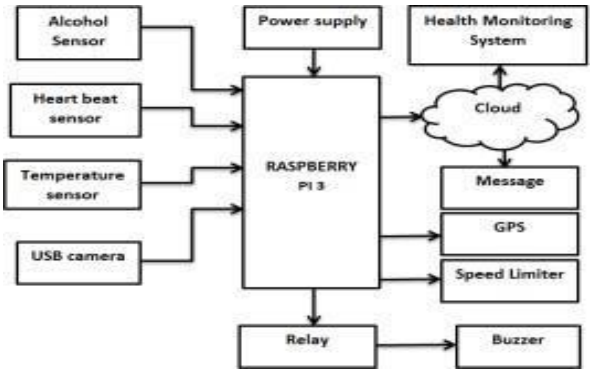

Fig 1.1 Block diagram of system

Above fig.1.1 shows the block diagram of IOT based driver drowsiness detection and health monitoring system. It consists of Raspberry pi 3, sensors, USB camera and a buzzer. Heart beat sensor and temperature sensor provide inputs to Raspberry pi-3 .These sensors are used to measure the health parameters of the driver [1]. Alcohol Sensor is used to detect the alcoholic state of the driver. For controlling this condition speed limiter is provided. When alcohol is detected, the speed of vehicle goes down. USB Camera is provided to continuously monitor the position of driver's eyes. When driver's eyes are closed for more than a particular number of seconds, then buzzer will be on. This sound will alert the driver and thus he can be awake. As a result of this, the accident can be avoided. The driver's data is sent to the health monitoring system in the server. Even if case of any emergency, the location of driver can be tracked via GPS. The driver's condition is informed to his

friends/relatives through an SMS. And thus, the driver can be assisted at the right time.

1.2 Design Requirements

A. Hardware

- Raspberry-pi 3
- USB Camera
- Temperature Sensor
- Heart Beat Sensor
- Alcohol Sensor(MQ-7)
- Buzzer

B. Software

- Python IDE
- Communication Protocol
- HTTP
- Open CV

A. Information of Raspberry pi 3

Raspberry Pi 3 is a mini computer which consists of a processor, GPIO pins, USB ports and has a capability of interfacing with CSI and DSI. Fig.1.2 shows the configuration of Raspberry pi 3[1].

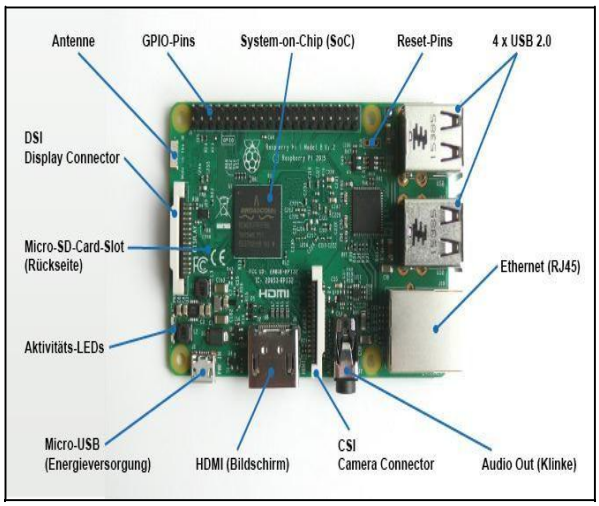

Fig 1.2 Raspberry pi 3

As presented in the year 2016, Raspberry Pi 3 B accompanies a quad center processor, and demonstrates preferable execution being multiple times progressive over Raspberry Pi 1. Its speed is 80% more compared to Raspberry Pi 2.

B. Heartbeat Sensor

Heart beat can be measured using optical power variation. If driver's finger is placed on sensor, the sensor then starts working and measures the pulse rate of driver and gives this data to the Raspberry Pi. Fig.1.3 shows the simple heartbeat sensor. It has 3 pins i.e. Vcc, ground and signal pin. Heart beat sensor relies on the principle of photo phlethysmography. It measures the volume of blood with respect to the changes in the intensity of light.

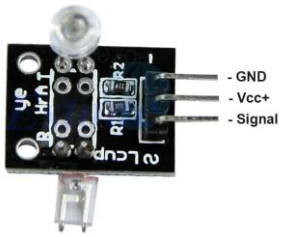

Fig 1.3 Heart beat sensor

C. Temperature Sensor

The pin configuration of DHT11 temperature sensor is shown in fig. 1.4. It has three pins i.e. VCC, GND and DATA pin. DHT11 sensor has an ability to measure both temperature as well as humidity. It has high reliability and excellent long term stability. It has NTC type thermistor and resistive element. It requires +5V supply voltage. Temperature range of this sensor is 0-50 C with +/- 2 C errors, humidity range is 20-90%RH.

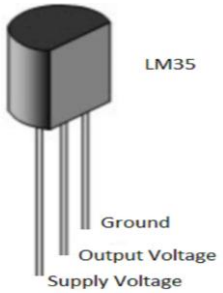

Fig.1.4 Temperature Sensor

D. Alcohol sensor (MQ7)

This sensor is used for identifying liquor through the breath of a person. It has high affectability and quick reaction. It is ease semiconductor sensor which can distinguish liquor fixation from 0.05 mg/L to 10 mg/L. This sensor can give both simple and computerized yield. It is effectively compact with Raspberry Pi, Arduino sheets, microcontrollers. Fig.1.5 shows the liquor sensor MQ3. It has 4 pins VCC, ground, computerized yield and simple yield stick.

Fig 1.5 MQ7 sensor

E. USB Camera

USB camera can easily be interfaced with any operating system. The USB technology has a transfer rate of 480 Mb/s. It is also available with transfer rate of upto 5 GB/s. Edmund optics (EO) offers variety of USB cameras. EO USB cameras are available in CMOS as well as CCD sensor types. Fig.1.7 shows the picture of a USB camera.

Fig 1.7 USB camera

2. LITERATURE SURVEY

Now a days, there is increasing research interest in developing remote access model for driver drowsiness detection and health monitoring parameters [4]. Previous works investigated the reasons of fatigue. Research paper on "Survey on Driver's Drowsiness Detection System" [3] Ms. Shubhangi Kalyane and Ms. Parmindar Kaur introduced a system based on driver drowsiness detection by monitoring yawning and eye movements of the driver. [2] Kunika Chhaganbhai Patel, Shafiullah Atiullah Khan and Vijaykumar Nandkumar Patil introduced "Real-Time Driver Drowsiness Detection System Based on Visual Information" where the continues observation of the driver is taken and alerts if the driver is drowsy.

Research paper on "survey on driver health monitoring and alcohol control system" [5] G.Arun Francis, M.Wilson Wilfred, R.Sekar introduced a system based on IOT for detecting temperature and pulse rate sensor for monitoring health of driver.

3. EXPERIMENT RESULTS

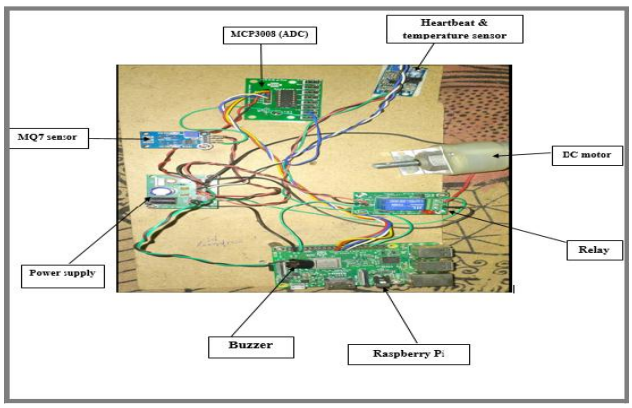

Fig 2.1 Hardware setup

The obtained result explains the working of our proposed system. The python code along with built-in libraries is used to implement the proposed system. Hardware setup is shown in Fig.2.1. Python library allows selecting the region of interest (ROI) around the eyes. Eyes are detected with a rectangular or square box as shown in fig. 2.2. Open and closed eyes are detected by the system. Drowsiness condition is detected via a USB camera and the data is processed using python built-in library. If the driver is drowsy then an alert is generated via the buzzer.

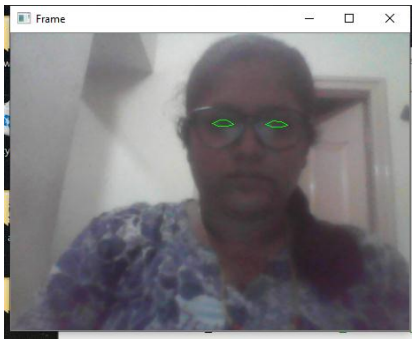

Fig 2.2 Drowsiness detection using eye ball position

Also the health parameters, i.e. the heart beat and body temperature of the driver is monitored continuously by the proposed system. The Fig 2.3 shows a graphical representation of temperature values recorded with respect to date.

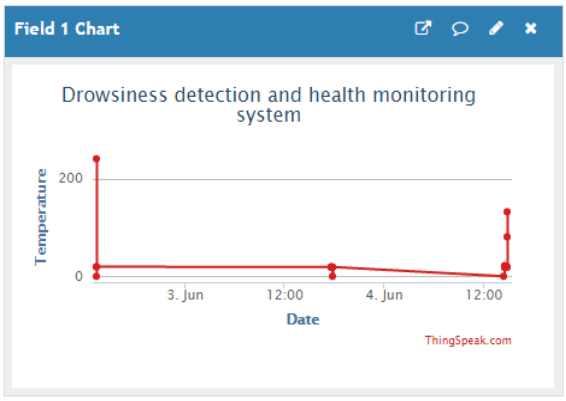

Fig 2.3 Health monitoring graph

4. CONCLUSION

This paper implements the driver drowsiness detection and health monitoring system using IoT. Purpose of our project is to help in solving real life problem in a very cost effect way. Whenever the driver feels drowsy, the buzzer will be on and the driver in turn gets an alert. This system uses temperature and heartbeat sensor to measure the health parameters of the driver. Alcohol sensor is used to check the alcoholic state of the driver. When the alcohol is detected the vehicle speed goes low and eventually the vehicle will be stopped. Also in case of an emergency, a doctor or driver's friends can reach him by knowing his location via GPS. As a result the accident ratio can be reduced. Thus, our project if commercially developed will help in saving the precious lives of drivers and co-passengers.

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