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Driver Safety Awareness & Assistance System for Vehicle Control

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Abstract-Now day's road accidents are happening due to driver's drowsiness, drunken behavior and improper physical conditions. This paper describes on a driver drowsiness detection system, monitoring physiological parameters like heart rate, body temperature and it also detect the alcohol consumption of driver. When such physiological parameters exceed their limits then the alarm rings and notification goes to vehicle owner It also provides drowsiness detection when it detects drowsiness then the alarm rings and vibration of seat take place For drowsiness detection and monitoring physiological parameters this system uses ARM7 – LPC 2148, Raspberry Pi 2 with camera module and various sensors like alcohol sensor, heartbeat sensor, temperature sensor.

Key Words:Driver Fatigue, Distraction, Drowsiness Detection, Driver Face Monitoring, gaze direction, Eye Gaze Technique, health monitoring Raspberry pi

1.INTRODUCTION In India automotive population is increases rapidly. Due to increase in traffic number of road accidents is increasing. In our country road accidents are menace. By the research of world health organization (WHO) it is identified the major cause of road accidents are due to the driver error and carelessness also the key players in the accident scenario are driver sleepiness, alcoholism and carelessness. Driver monitoring system can increase the safety of vehicle for passengers and also road user. Drowsiness, drunken behavior of the driver is the major driver errors. Sensors such as alcohol sensor, temperature sensor and heart beat sensor are used to detect the physical condition of the driver. Camera module used for the detection of drowsiness of driver. Regarding to the design of advanced safety system in automobiles this behavior of driver is serious issue.by implementing this kind of project on vehicle we can reduces such kind of road accidents and also improves driver's safety.

2.BACKGROUND Several works have been done in the field of driver abnormality monitoring and detection systems utilizing a wide range of methods. Among the possible methods, the best techniques are the ones predicated on human physiological phenomena .These techniques can be implemented by quantifying brain waves (EEG), heart rate (ECG) and open/closed state of the ocular perceivers. The former two methods, though being more precise are not authentic since sensing electrodes to be annexed directly onto the driver's body and hence be vexing and diverting the driver. The latter technique predicated on ocular perceiver closure is apposite for authentic world driving conditions, since it can detect the open/closed state of the ocular perceivers non-intrusively utilizing a camera. Ocular perceiver tracking predicated lethargy detection systems have been done by analyzing the duration of ocular perceiver closure and developing an algorithm to detect the driver's somnolence in advance and to admonish the driver by in-conveyance alarms.

3. SYSTEM DEVELOPMENT:

There are 4 phases mention below:

2.1Health monitoring: monitor the various health parameter of driver and detect the changes in health parameter and improve driver's safety [1]..

2.2 Capturing: Ocular Perceiver camera mounted on the dashboard is utilize for capturing ocular perceiver image of driver [2]

2.3 Detection: The capture image is analyzing by detecting open and close state of the ocular perceivers. The behavior of the driver is deduced using inbuilt HARR classifies cascades in open CV.

2.4 Correct: Correction actions are done by this phase to detect that particular abnormal behavior. The vehicle alarm & display are including the corrective action.

3.1 Block Diagram:

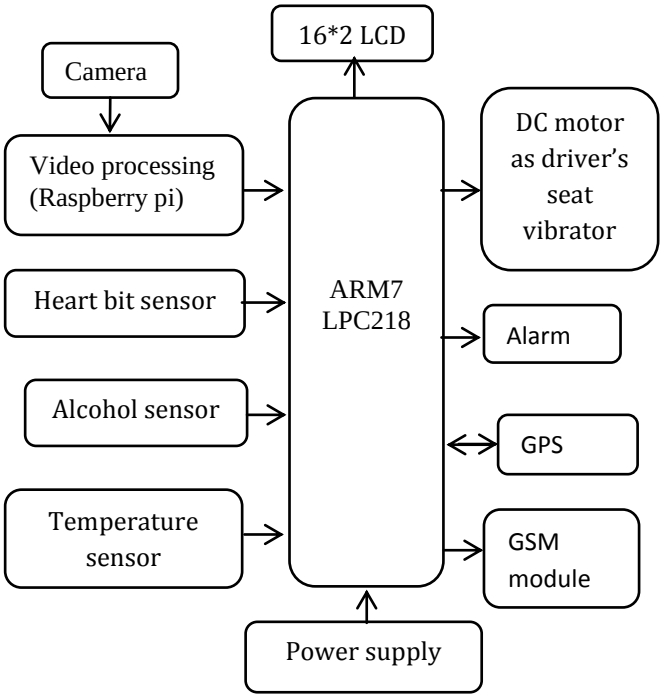

Fig 1.Block diagram

3.2 Block diagram description:

Above figure shows block diagram of project. Here arm LPC 2148 is main controller of this system. The camera module is connected to the Raspberry Pi for capturing the image of driver. There are 3 different sensors used for specific purpose & output of different sensors is given to the microcontroller. The values of these sensor displays on LCD screen. If drowsiness detected then there is vibration of dc motor take place, alarm rings, ignition of the car automatically off and message sends to the owner. In the same manner if driver taken an alcohol ignition gets off and message send to owners & GPS module are used to send the message & location of the car. Heart beat sensor and temperature sensor are used to count heart rate and temperature of the body if it goes beyond the certain limit then message send to the owner. Image processing is not possible on the ARM7 so we are using Raspberry pi for capturing image.

3.3 Flow chart:

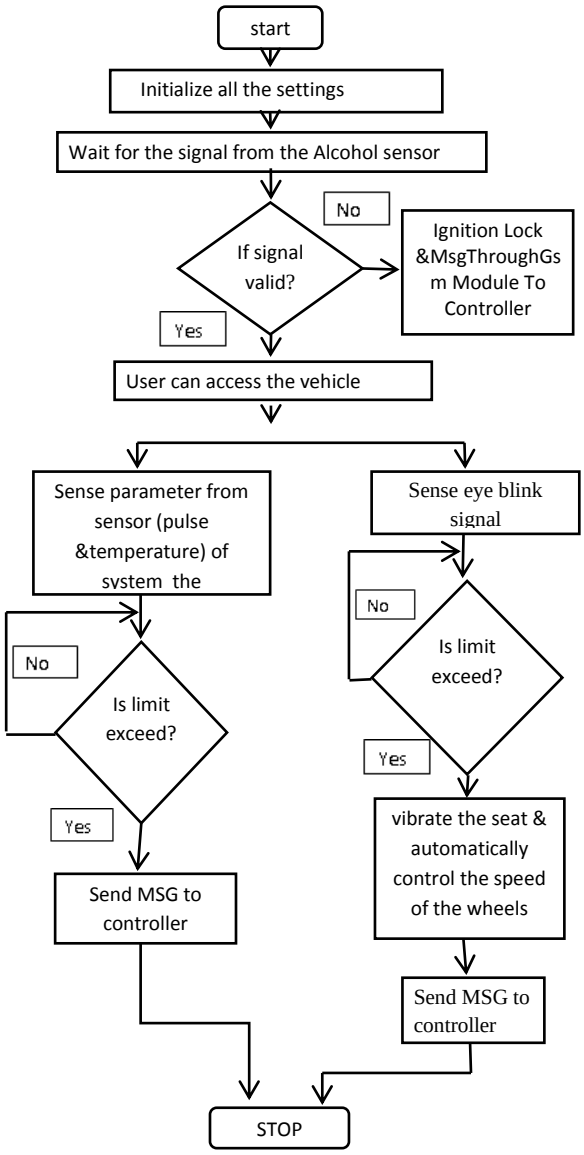

Fig 2.Flow chart

3.4 Procedure:

In the proposed system, importance given to the drowsiness detection. For that we are using Raspberry pi camera module. As showing in the flow chart firstly alcohol sensor used to sense alcoholic nature if it gets detected then ignition off, alarm rings, and message send to the owner. If not present then driver can access the car .The physical parameter such as heart beat, body temperature are measured using the sensors, if the values are exceed beyond the limit then alarm rings and message send to the owner. Driver image is requiring for the camera. Face detection take place followed by the eyes

detection. The eye detection technique detect the open eyes then if eyes are close for more than 4 second then drowsiness detected and alarm rings until driver can off alarm also at the same time dc motor vibrate, ignition gets off and message send to the owner.

4. Technical Description

4.1 Raspberry Pi Single Board computer:

The size of Raspberry PI is single board computer which has 5 models

- Model A having 256 Megabyte RAM, one USB Port and no network connection.
- Model B contains 512 RAM, Ethernet port and 2 USB Ports.
- Model B+ contains 512 RAM, Ethernet port, HDMI, Camera interface slot & 4 USB Port.
- Generation 2 Model B contains 1GB RAM, 4 USB Port, 2 camera interface & HDMI interface.

Fig 3. Raspberry Pi

The Raspberry Pi tablet is implemented by using Model B+ which contains Broadcom BCM2835 system on chip that includes an ARM11765ZF-5700MHZ Processor. An SD Card & Video core 4 GPU. The GPU using H.264 AT 40MBITS/sec is capable of Blu-Ray quality playback. It has fast 3D core. The chip provides HDMI. The chip does not contain VGA support Debian& Arch Linux ARM distribution & Python are the main programming languages which support for the BBC, Basic C & Perl.

4.2 Alcohol Sensor:

Fig 4 MQ3 Alcohol Sensor

We are using breath analyzer sensor MQ-3 for detection of alcohol consumption of driver .this sensor output effects on the ignition system of vehicle. MQ-3 sensor is suitable for this application due to small size and better reliability.

MQ-3 sensor is useful for detecting various gases in air. For detecting alcohol we have to set value of load resistance to 200 KΩ value because of 0.4mg/L alcohol concentration in natural air

4.3 Temperature Sensor:

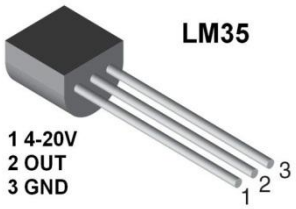

Fig 5. Temperature Sensor

LM-35 is suitable for measuring temperature of driver. Temperature sensor gives variable output voltage. This will help to monitor the variations in the temperature of patient. Body temperature means measurement of the body's ability to generate and get rid of heat. It is one of chief indicators of normal functioning and health.

4.4 Heart Beat Sensor:

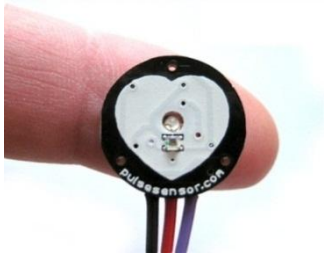

Fig 6 Heart beat Sensor

Heart beat is important factor affecting on human body. Human body pumps blood with every heartbeat and detects by heartbeat sensor. We have used a LDR and Red LED. For measuring heart rate driver have to place his/her finger between the component Red light will be reflected from patient's finger to LDR. And blood will pump with every heartbeat. This will cause fluctuations in the light intensity. Heart beat sensor utilized in this project works on the above principle. It gives out high pulses with every heartbeat. It works on pristine 5 volt DC. A heart rate monitor is simply a contrivance that takes a sample of heartbeats and computes the beats per minute so that the information can facilely track heart condition

4.5 Raspberry Pi Camera Module:

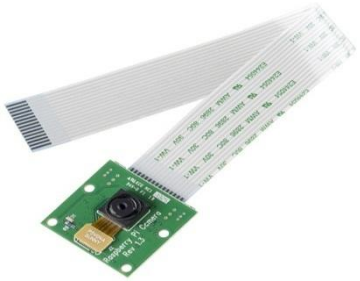

Fig 7 Raspberry Pi camera module

The Raspberry Pi camera board contains a 5 Pixel sensor, and connects via a ribbon cable to the CSI connector on the Raspberry Pi. A Utilizer's Guide describes setup and use. The video and still image quality is better than a USB webcam of kindred price. The Pi camera was relinquished for sale on the 14th of May 2013 and the initial engenderment was 10k units. The "Pi NoIR" version of the camera was relinquished on the 28th of October 2013. It has the same sensor with the IR filter abstracted, and an ebony PCB. With no IR filter, it can optically discern near-IR wavelengths (700 - 1000 nm) like a security camera, with the trade-off of poor colour rendition. It is otherwise the same and utilizes the same software as the mundane Pi camera.

4.6 GSM module:

Fig 8. GSM Module

GSM/GPRS comes with the interface of the modem can be control using AT command interface. SIM900 design with very powerful single chip processor's/GPRS is the quad-band module with size of 24mm*24mm*3mm. For industry standard interface SIM900 delivers GSM/GPRS 850/900/1800/1900MHz for SMS, voice, data with low power consumption. It is slim and compact of design. GSM device has communication on the pc or serial port. For data transmission the device want to communicate with the remote sever.

5.RESULT:

Sr.no	Parameter	Standard values	Action taken
1.	Drowsiness	When eye close for 3 sec	1.Vibration of seat 2. Alarm 3.Ignition Off 3.Send message over mobile
2.	Alcohol	When sensor detects more then 200ppm	1.Alaram 2.Ignition off 3.Sends message to alert the owner
3.	Temperature	Temperature above 38 And below 36	1.Alarm 2.Sends message to alert the owner or doctor
4.	Pulse	More than 72	1.Alarm 2. Sends message to alert the owner or doctor

Table 1 : Result

5.1 Normal state of eyes

In the normal driving condition both eyes are open as showing in the following fig and the result of this is showing on screen.

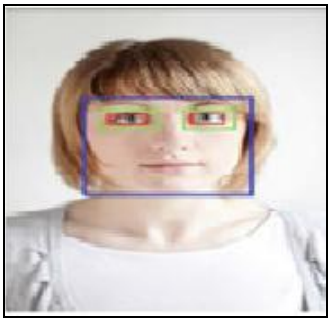

Fig 9 Normal state of eyes

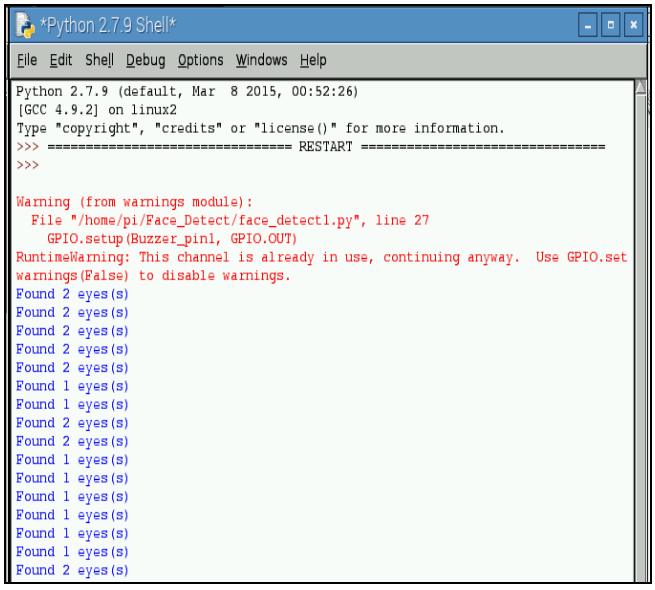

Fig 10.Normal state of eyes output screen on raspberry pi

5.2 When drowsiness detected:

As showing in the fig drowsiness detected,eyes are closed. Hence open eye detection is not performed & it gives output on the screen.

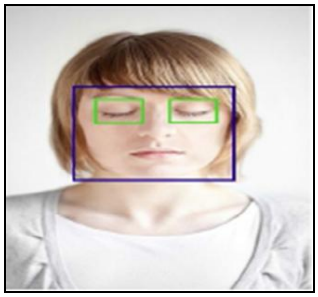

Fig 10.Drowsiness detected

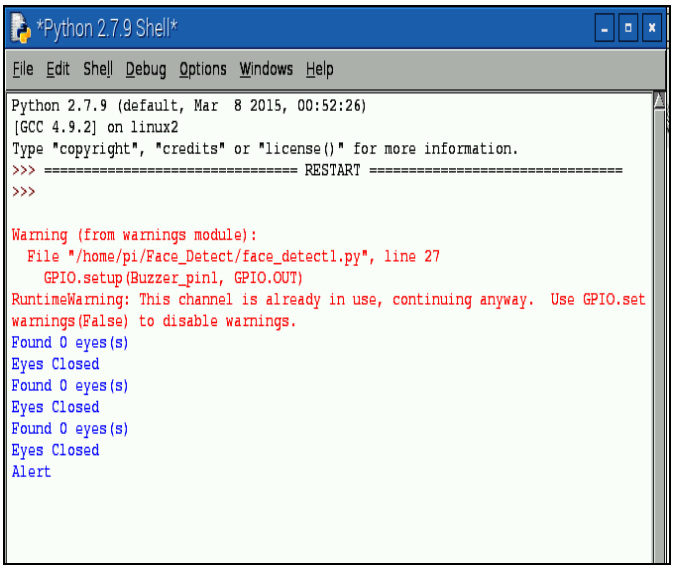

Fig 11.Drowsiness detected output screen on raspberry pi

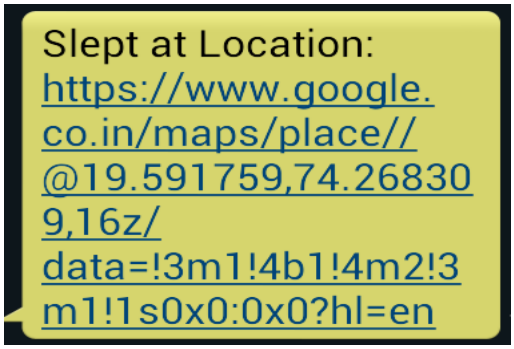

Fig 12.SMS alert on controllers mobile

5.3 When driver is drunk:

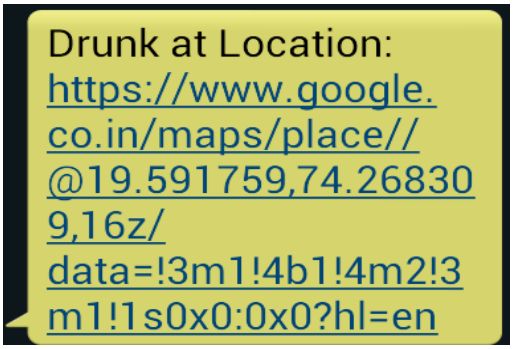

Fig 13.SMS alert on controllers mobile

5.4 When driver temp and pulse increase:

Fig 14.SMS alert on controllers mobile

6.APPLICATION

1] This can be useful in driver health monitoring.
2] It used to locate the position of vehicle.
3] Also it is used for drowsiness detection system.
4] Alcoholic nature of the driver is detected.

7.FUTURE SCOPE

We have used camera module in our system by using same camera we can implement face detection technique for authorized driver to utilized vehicle. If theft trying to start vehicle at that time it can't start and picture of theft capture and vehicle lock and that picture sends to appropriate emails.

8.CONCLUSION

Accidents drowsiness detection system obviates the driver from entering the state of lethargy while driving The system is developing by adding different sensors & Camera with appropriate hardware units & controller. In

today's vehicle this system is well employed & t can be commercially generalized. Due to this system, we can reduce the road accidents. It also monitors drivers health parameter to provide better safety.

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