

# Driver's Activity Detection System using Humanantenna



Sachin Paliwal, Birinderjit Singh Kalyan

**Abstract:** Now a days we can see that there are many cases which are occurring due to the drowsiness of drivers and that has become a main problem of the automotive industry. To overcome this in automotive industry the introduction of new technologies that is by introducing of new sensor which can detect the different activities. Detection of activities by sensors is for biological measuring such as heartbeat, oxygen level, respiration activity, etc. By applying such widespread variety of sensor usage in the system has a very high implementation cost and also very complexity which is a bit challenging design. In this paper, we are going study that how humantenna effect is used to detect and test the drive drowsiness by using simple and budget sensors in automotive industry.

**Keywords:** Automotive Safety, Drowsiness Detection, Human Touch Sensor, Driver's activity detection, Humanantenna.

## I. INTRODUCTION

Lazy driving can be one of the very dangerous pattern of driving and this can be considered as permanent reason of death and damages. When the survey of road user's was done in Europe then it was concluded that main cause of accident was due to the suffering of drowsiness of driver and the rate of accidents due to driver drowsiness was about 36%. So after such surveys automotive industry started paying their attention towards the best safety features with high equip vehicles. These features are introduce for various reasons such as avoidance of collision, warning from the pedestrian, detecting the changing of lane, getting feedback from driver, etc. By getting advance in sensor technology the use camera sensors and depth based sensor at back side of vehicle helps the driver by alerting them from danger of collapsing of a vehicle at any point. However once the sensor gets installed in the system but after the installation they are many challenges which can affect the functionality of the system. As an example the variations can be seen in camera sensor where camera lens get affected by the light and due to which image capture by the camera sensor has variation in background and color and big computation cost is required to process the massive image. On the other hand depth based sensor has difficulty in recognizing the shape and orientation. Nowadays, the automotive industry tries to minimize the car

accidents by integrating biosensors such as heart and respiration in-car embedded nonintrusive sensors [5], and automotive Guttersberg sensors [6] shown in Fig. 1. The heart and respiration in-car embedded nonintrusive sensors (HARKEN) are based on the detection of cardiac and respiratory rhythms through embedded sensors in driver's seat and seat belt [15]. In Guttersberg sensor [6], the detection of the drowsiness is done with the help of two different sensor that helps in measurement of total bending. They sensor are flexible sensor or bent sensor. The work of these sensor is temperature dependent. Hence, these sensor helps in calculate the resistance value of a steering wheel. Now for the driver alcohol detection system, a good step is taken as for this measurement a touch sensing system is introduce which is helping in to known the level alcohol concentration in blood. As its operation principle is very simple which include the use of the spectroscopy. The process in include when driver touches the system then by the tissues of hand it detect the alcohol concentration but it take 2 long hours for detecting. This paper is going to present the total effective cost of touch sensor which is integrated in surface of the steering wheel and this touch sensor is working purely on humantenna operation principle [8] which helps in detecting the human hand presence while handling the steering wheel.

## II. OPERATION PRINCIPLE AND DESIGN

Human body has several types of minerals in it, so it is good in conducting body to be use as an antenna. For proximity in the AC source extremely low frequency magnetic fields are induced. The description of this can be given by the Faraday's law. Idea behind this sensor is for harvesting of the induced voltage, which depends on the grip of driver's hand. However if the grip is loose then the alarms are set which start alerting the driver drowsiness. Figure 2 shows that how does an amplifier with composition of 2 BJTs are helping to produce the required voltage gain which helps in activating the microcontroller.

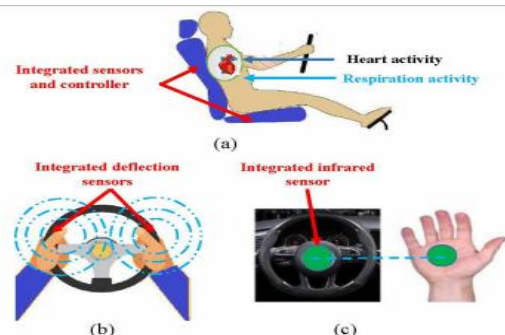


Fig.1.Schematics of Some Automotive Safety

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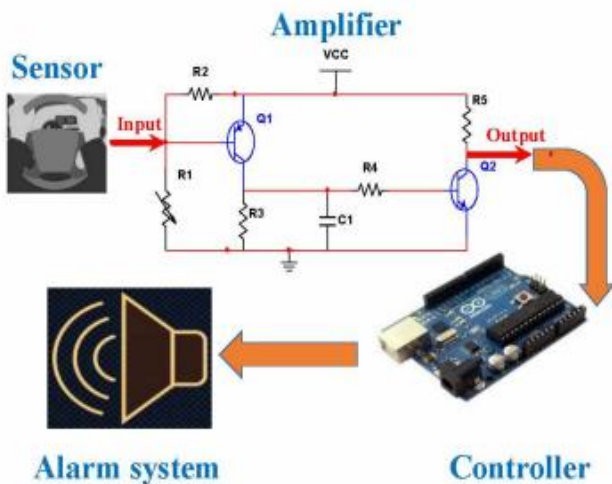
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- (a) HARKEN[5]
- (b) Guttersberg [6]
- (c) DADSS[7]



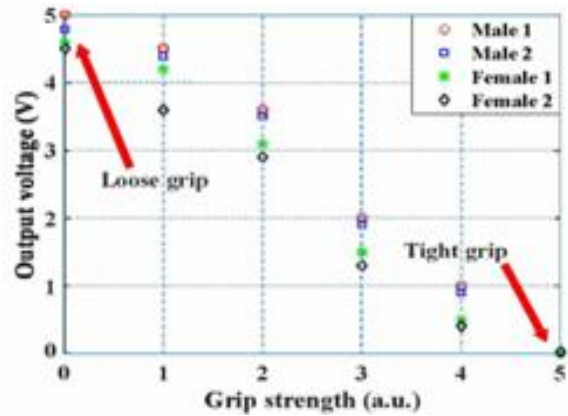
**Fig. 2. Schematic of The Proposed Signal Processing Stage**

## III. REVIEW ON SENSOR WORKING

How the step-up for the experiment is done is shown in figure3. As already said for the touch sensor and its installation. So by the diagram we can see how the wire is rolled around steering wheel through electrode over it. Proximity near driving wheel the alarms system and controller is placed. In the case of loose grip or low touching effect an alarm se set by controller which warns for the driver drowsiness and to identify the hand grip pattern on scale of 0 to 5 several experiment are perform. As 0 represent the loose grip and 5 represent the best grip or tight grip. Figure 4 shows the graph between grip strength and output voltage. By the graph we can clearly make out that by the value of output voltage the grip strength can distinguished easily. Same for the driver drowsiness, if the driver losses control over the wheels then it's because of loose grip which shows the high value of output voltage showing driver drowsiness.



**Fig.3.Experimental setup of the proposed System Installed on car**



**Fig. 4. Induced Voltage from Different Steering Wheel Grip Patterns**

## IV. CONCLUSION

In this paper we have studied about the sensors and the installation of them is easily done on the specified surface area of steering wheel to get the maximum benefit for them and no need to get any other special arrangements. By help of humantenna effect we have seen that detection of driver drowsiness is done. As by just using the hand grip strength the detection of induced voltage was done and this method proven to be very effective indicator to see the driver drowsiness. To add an addition benefit to its simplicity or cost effectiveness there was no requirement for adding a receiver and transmitter.

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