

# Smart Driver Chair for Four Wheeler using IoT

Dimple Shimpi<sup>1</sup>, Kavita Naik<sup>2</sup>, Neha Kakhandaki<sup>3</sup>, Namrata Atole<sup>4</sup>

<sup>1,2,3,4</sup>Student, Dept. of Computer Engineering, JSPM's JSCOE Pune, Maharashtra, India.

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**Abstract** - In recent years the number of automobile usage is increasing with an increase in ratio of accidents. Driving Unconsciously and with alcohol consumption has affected driver and passengers lives. The security of the vehicles is a major concern as there is rise in theft of automobiles. Due to Drowsiness the Driver is distracted and is unable to concentrate on road and reduces the ability to take good decision while driving. Our project mainly focuses on security and safety of the driver and passenger. This system will be helpful for the school bus, IT sector transport service, private buses, State transport buses, Ambulance, VIP vehicles, Business Travel ,etc. In our Proposed system security of the vehicle is provided through biometric fingerprint sensor. Different sensors are used to monitor the health condition of driver such as heart rate, body temperature and drowsiness .An alert message and location of vehicle is given to the owner if the health condition of driver is not stable. In drowsy condition an alert is given through vibrator.

**Key Words:** WSN, IoT, Drowsiness Detection, Biometric Fingerprint Sensor, Alcohol Detection.

## 1. INTRODUCTION

Every year there is an increase in the death ratio and injuries due to driver's negligence or due to human health issues. More than 90 per cent of deaths were due to rash and negligent driving with the latest National Crime Research Bureau (NCRB) statistics revealing 1.5 lakh deaths .Due to Driver's Negligence and other parameters there is risk of passengers as well as driver's life.

In the year of 2016, road accidents in the country have decreased by around 4.1%, which has seen 4,80,652 road accidents as compared to 5,01,423 road accidents in 2015. However fatalities resulting from these accidents have risen by about 3.2% during the same period. Nearly 1,50,785 people were killed in 2016 as compared to 1,46,133 people killed in 2015.The National highways have accounted for 30.4 per cent of total road accidents and 36 per cent of deaths in 2017.

As the number of vehicles being stolen has raised by 30%, there is a need for security.

Drunk driving is another major cause of accidents. When driver is on alcohol consumption, their response time and

ability to focus on the road can be hugely reduced, increasing the risk of an accident.

Driver's Drowsiness has led to increase in the risk of accidents; usually this happens when the driver has not slept properly. It mostly appears in situations of stress and fatigue and it may be produced by sleep disorders, certain medications, and even, boredom, for example, driving for long periods of time.

In some cases, vehicle accidents are caused by drivers who are suffering from a medical condition. Health conditions that can make it unsafe for a driver to operate a vehicle such as blood pressure, body temperature and heart rate.

In this paper, our system mainly aims towards the safety and security of the driver as well as passengers. This system will also be helpful to prevent road accidents and will be useful for traversals, school buses, government vehicles, organization etc. The security of the vehicle is also taken into account by deploying a fingerprint sensor in order to avoid unauthorized access by a suspicious person which will result in decrease in auto theft. The drowsiness of the driver is checked by camera. This camera will detect whether the driver is drowsy or not. If the driver is drowsy there is a vibrator fixed on the chair which gets active and starts vibrating which will awaken the driver and the vibrator is automatically turned off when driver is awakened. Health related issues such as blood pressure, heartbeat, body temperature is monitored and measured. The alcohol sensor will be deployed on seat belt which will check whether the driver is alcoholic or not. If driver is alcoholic then it will give notification on an android application.

## 2. Problem Statement

Driving unconsciously has affected Driver and passengers (students, employees) lives. As the number of vehicles being stolen has raised by 30%, there is a need for security. Most of the time driving a vehicle has lead to series of accidental events, which are evolved with the mental state (such as drowsiness and stress) of the driver. Drinking and driving, not only put the drivers at risk, but also the passengers (students, employees) and the pedestrians. The effects of alcohol result in poor coordination, double vision, decrease of self-control, loss of consciousness and even death. Health related issues such as high/low blood pressure may cause problem like dizziness.

### 3. Literature Survey

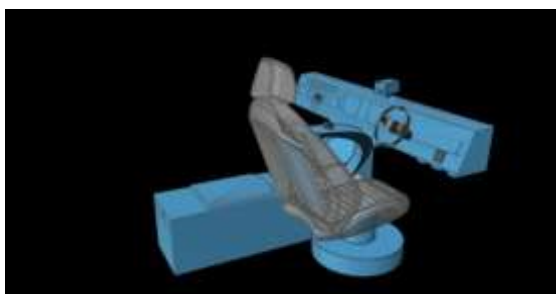
TITLE	AUTHOR	TECHNIQUE USED	ADVANTAGES
A Survey on Drowsy Driver Detection System	KusumaKumari B.M	<ul style="list-style-type: none"> <li>➤ Steering wheel movement(SWM)</li> <li>➤ Electro encephalogram(EEG)</li> <li>➤ Head pose, frequently yawning, eye closure and eye blinking</li> </ul>	Different methods are used to detect the drowsiness and alert the driver
Driver Behaviour Analysis for Safe Driving:	Ali GokhanYavuz	<ul style="list-style-type: none"> <li>➤ Facial Expression, Head movements ,Gaze Movements ,Eyelid Movement</li> <li>➤ Vaneet and C2C communication</li> </ul>	<ul style="list-style-type: none"> <li>➤ PERCLOS (Percentage of Eye Closure) is a reliable and valid metric to determine the alertness level of the driver</li> <li>➤ Alerting pedestrians using C2C communication</li> </ul>
Driver Drowsiness Detection, Alcohol Detection and Accidents Prevention	TejaswiniJagdale	<ul style="list-style-type: none"> <li>➤ Grayscale image processing</li> <li>➤ Image Blurring</li> <li>➤ Centre of Gravity</li> </ul>	Detect drowsiness as well as alcohol consumed and give an alert if any of these parameter found
Design of Alcohol Detection System for Car Users thru Iris Recognition Pattern Using Wavelet Transform	Lea Angelica Navarro	Alcohol Detection using Gabor filter algorithm	Provides safety of driver and accident prevention through alcohol detection
Automatic Driver Drowsiness Alert and Health Monitoring System using GSM	Bhavana T. Petkar	<ul style="list-style-type: none"> <li>➤ Heart Beat sensor, Body Temperature sensor and EyeBlink Sensor.</li> <li>➤ GPS module</li> </ul>	<ul style="list-style-type: none"> <li>➤ Location of the driver and vehicle is traced using GPS for security.</li> <li>➤ Monitoring of health parameters</li> </ul>
Alcohol Detection of Drunk Drivers with Automatic Car Engine Locking System	Dada Emmanuel Gbenga	<ul style="list-style-type: none"> <li>➤ LCD display unit, DC motor, Alcohol detection unit</li> <li>➤ Engine locking unit, Ignition System unit and Indication unit</li> </ul>	<ul style="list-style-type: none"> <li>➤ The alcohol sensor can operate for long period of time in this proposed system</li> <li>➤ The alcohol sensor delivers fast response when the alcohol is detected.</li> </ul>
Alcohol Detection and Seat Belt Control System using Arduino.	Ms.M.Malathi	<ul style="list-style-type: none"> <li>➤ Alcohol sensor</li> <li>➤ GSM technology is used in case car fails to ignite</li> <li>➤ GPS module is used to locate the car.</li> </ul>	<ul style="list-style-type: none"> <li>➤ The system checks for a drunken drive and avoids it explicitly.</li> <li>➤ The driver is not allowed to drive in a drunken state as well as if he/she is not wearing their seatbelt.</li> </ul>
Wearable Driver Drowsiness Detection System Based on	Lee Boon Leng	<ul style="list-style-type: none"> <li>➤ PhotoplethysmogramSensor and Galvanic Skin Response Sensor</li> <li>➤ Motion sensors</li> </ul>	<ul style="list-style-type: none"> <li>➤ The detection system is more accurate</li> <li>➤ It enables the detection of drowsiness level</li> </ul>

Biomedical and motion sensors		<ul style="list-style-type: none"> <li>➤ SVM Model is used to check the accuracy of the system</li> </ul>	without installing any other component in the vehicle.
On using Driver's eyes to predict accident causing drowsiness levels	Alyssa Byrnes	<ul style="list-style-type: none"> <li>➤ Epworth Sleepiness Scale(ESS)</li> <li>➤ Stanford Sleepiness Scale(SSS)</li> </ul>	<ul style="list-style-type: none"> <li>➤ The results overall have been positive when conducted on driving simulator.</li> <li>➤ Monitoring driver drowsiness through video camera instead of attaching devices to the driver.</li> </ul>
Smart Wireless Healthcare Monitoring for Drivers Community	K.C. Kavitha	<ul style="list-style-type: none"> <li>➤ Pulse rate sensor</li> <li>➤ Body temperature Sensor</li> <li>➤ Blood pressure sensor</li> </ul>	<ul style="list-style-type: none"> <li>➤ Provides an end-to-end communication and complete solution for drivers' community</li> </ul>

#### 4. Proposed System

In Our proposed system, the authentication of vehicle's owner is done through fingerprint sensor which will be deployed on Dashboard of the vehicle to reduce the risk of theft. The image of the unauthorized person will be captured through the camera and will send it to the owner, the location of the vehicle is also traced through GPS and send it to owner. Hence, this will ensure the security of the vehicle. Sensors will be deployed on the seat belt to count the heart rate. Such driver impairments will be detected and predicted in order to reduce critical situations and road accidents.

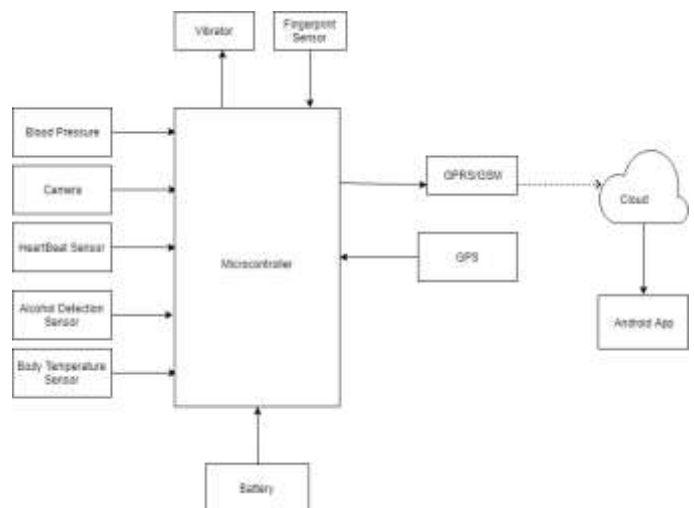
The drowsiness of the driver will also be detected by the system using image processing and if the driver is in drowsy condition a vibrator will get activated to alert and awaken the driver. It will detect driver's physical parameters like Blood Pressure, body temperature, and Heart beat count and will give alerts to the family members or school or industrial authorities. It will also detect alcohol consumption of the driver using sensor.



**Figure -1:** Smart driver chair (3D model)

- To check the authentication of driver through fingerprint sensor for security of vehicle from an unauthorized user.
- To check the drowsiness of the driver through camera using image processing.
- To detect the drivers alcohol consumption and if he found alcoholic, a message will given to the owner and family members for the safety of passenger and driver.
- The physical conditions of driver like Heart rate, Blood Pressure, body temperature are monitored to check the health condition of driver.

#### 6. Block Diagram



**Figure -2:** Block Diagram

#### 5. Objectives

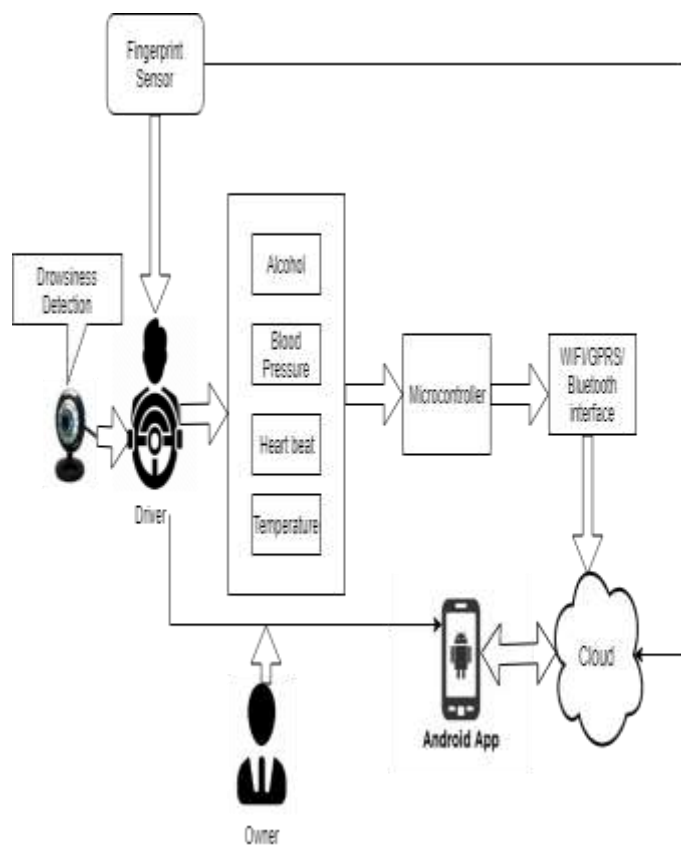
- Main Objective of this system is for the safety and security of the driver and passenger.

#### 7. SYSTEM ARCHITECTURE

In the below architecture, the enrolment of biometric fingerprint of the driver is done for authentication through

fingerprint sensor .The biometric information of authentic driver's are stored on the cloud. Camera is used for drowsiness detection of the driver. Incase if the unauthorized person is trying to gain authentication of vehicle the image is being captured and stored on the cloud.

Different sensors such as alcohol, Blood Pressure, Body Temperature, Heart beat are connected to the arduino mega for processing the data and stored on the cloud. The ADC is used to convert the analog signals coming from different sensors to digital signal .The WIFI module is used to share the data to the cloud collected from different sensors. The data stored in cloud is interfaced with the Android App. The owner views the driver's information through the android app.



### Drowsiness Detection

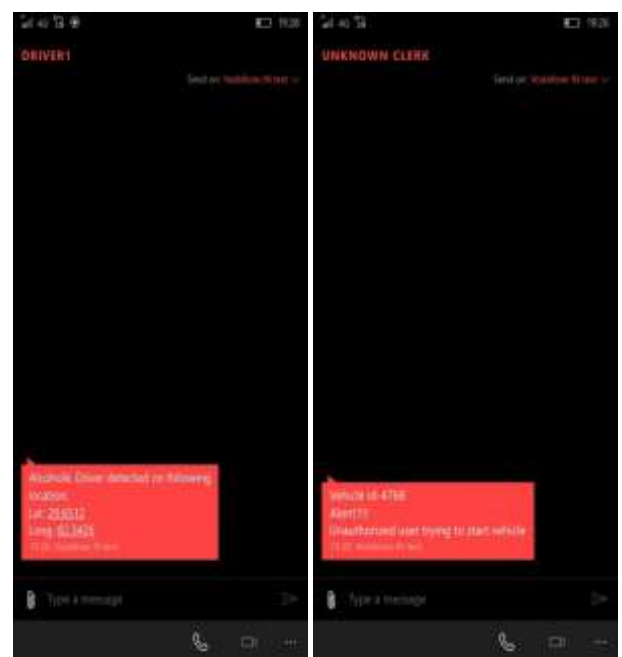
A Camera is fitted on the top at some distance in the vehicle. The camera monitors the stream of faces, if the face is found a Facial landmark Detection is applied and extract the eye region. From the eye region, the eye aspect ratio is calculated to detect if the drivers Eyes are closed or opened. If the eye aspect ratio indicate that the drivers eye has been closed for a longer period of time an alert is given through the vibrator which is deployed on the back rest of the driver's chair to awaken or alert the driver.



### 7. CONCLUSION

This project concludes that through our system lives of the passengers as well as driver will be saved, and there will be decrease in the ratio of accidents. As there is rise in theft in vehicles the security is provided through biometric fingerprint which will prevent robbery of vehicles. The location of the vehicle is traced through GPS. Drowsiness of the driver is detected through camera that will decrease the probability of accidents.

### 7. RESULTS



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