iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 6 **Issue:** V **Month of publication:** May 2018

DOI: http://doi.org/10.22214/ijraset.2018.5190

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887
Volume 6 Issue V, May 2018- Available at www.ijraset.com

Wearable Emotional Monitoring Response System for Drivers

Mr. Anoop M M[1], Mrs.Sijitha Mol K S[2], Athira Anil[3], Sreeja Sivanpillai[4], Sumi Surya Lekshmi R D[5]
[1, 2, 3, 4, 5]*Department of Electronics and Communication Engineering St.Thomas college of engineering and Technology, Chengannur, Kerala*

Abstract: ***Negative emotional responses are a growing problem may lead to serious accidents on the road. Measuring stress- and fatigue-induced emotional responses by means of a wearable system would be useful for potentially prevent roadway tragedies. Now a day's road accidents are increasing mostly in heavy traffic countries this may lead to serious accidents or even death. The reason behind this is the driver is in stress or fatigue condition. The focus of this paper is to develop a wearable system and it would be useful for avoiding roadway tragedies. This system provides two alerting methods. An auditory response is from buzzer and is based on the Inertial Movement Unit. A Photoplethysmography Sensor, detect the heart beat rate and display a warning message to the LCD. During the critic situation a message is send to the predefined number through GSM. A motor will connect to the driver's seat, which will provides vibration when the driver is in an unconscious condition. A break system will also implemented with the help of a DC motor and a push switch. By using all this techniques we can protect the life of a driver.***
Index Terms: Photoplethysmography Sensor, Inertial Movement Unit, GSM module

I. INTRODUCTION

Although there are different types of emotions. They are either positive or negative. But the negative emotions are able to create physical discomfort inhuman
beings. According to researches, it's proven that stress and negative emotional
States are having a strong relationship with each other. A physically discomfort driver almost be in a state of distraction, may create harmful accidents. Traffic accidents are a major cause of death and injuries worldwide. It is found that each year at least 3881 major fatal accidents are occurred causing at least 4160 deaths and 41278 injuries in the state. A distracted driver is one of the main reason for these accidents. These papers introduce a wearable system for a driver which is continuously monitoring the emotion changes in human body. If it is found that the driver is in an abnormal condition the system will provides both visual and auditory alarms. This paper also introduces a braking system for the safety of driver

II. EXISTING TECHNOLOGY

A. Accident prevention using eye blink sensor

Now a days accidents due to drowsiness is controlled with the help of eye blink
IR rays.it consists of both a transmitter and a receiver section. The output becomes low when the eye is shut and it is high when the eye is open. The output from the system is connected to the alarm section which is placed inside as well as outside of the vehicle. The alarm inside the vehicle provides a sound for a particular time period. If the driver can't take the control
over the vehicle with in the time limit then the alarm outside will go on. This will a problem and get the attention of others.

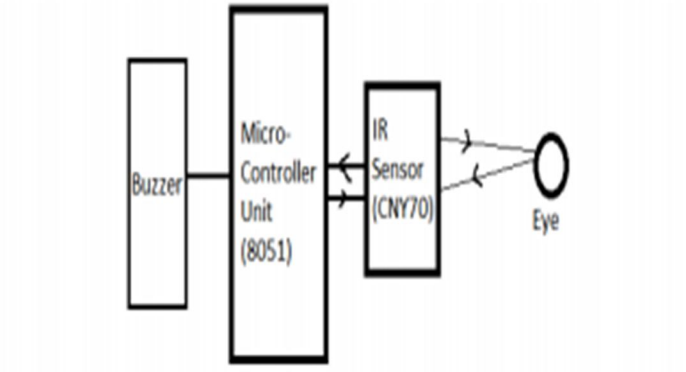


Fig. 1: Basic block diagram of accident prevention using eye blink sensor

ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887
Volume 6 Issue V, May 2018- Available at www.ijraset.com

III. PROPOSED METHODOLOGY

Negative emotional response may create serious accidents on road. Measuring stress and fatigue induced emotional responses with this wearable device will help to avoid roadway accidents. The emotional variations were identified by continuously monitoring the variations in heartbeat. This was done with the help of photoplethysmography sensor. Here the inertial motion sensing of the head movement was also performed. The sensors are connected to a microcontroller unit. The A/Converter section inside the microcontroller converts the analog data into a digital one.

Here a vibration motor is connected to the driver seat .If the driver is in an unconscious state, with the help of PPG and IMU sensors we can find out it. At that time the vibration motor will start to provide vibration to the driver's seat. So the driver can regain to normal state.

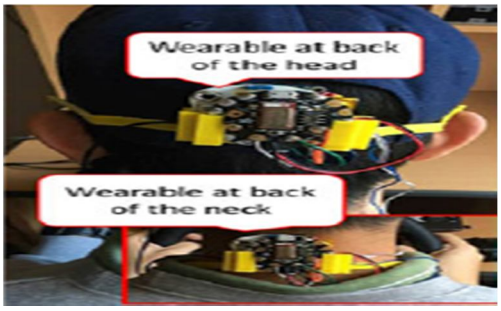


Fig. 2: Wearable emotional response monitoring system for drivers

Similarly here a motor is connected to a push switch which implies a breaking system and the motor is rotating in a normal manner. After pressing the button of the push switch, it can be observed that the speed of the motor getting too slow. Which means that, there is a switch in our proposed system while driving if the drive can't drive more he needs to press the button, the speed of the car will slowly reduces and the car will stop safely.

A. Block Diagram

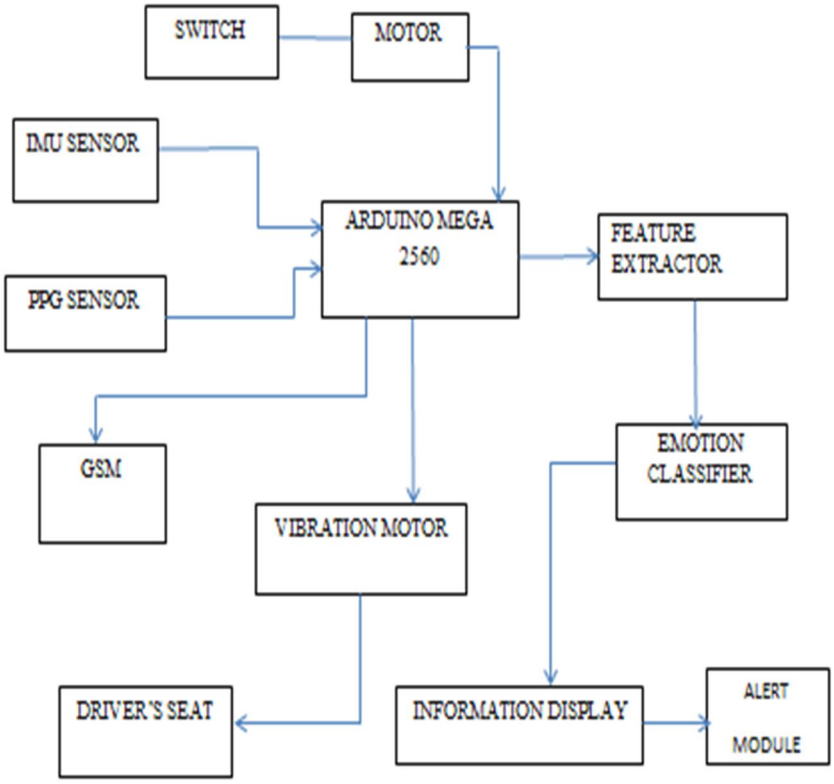


Fig. 3: Block Diagram

ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887
Volume 6 Issue V, May 2018- Available at www.ijraset.com

The first section is a sensor module, Consisting of a PPG sensor, and a 9 degree of freedom (DOF) absolute orientation inertial motor unit. Which is connected to an Arduino Mega 2560.The digital signal from arduino is extracted by means of feature extractor and then the emotions are get classified. When the values crosses the limit a message will send to the predefined number using GSM.in addition to that the buzzer will produce a warning. If the driver is in an unconscious state the vibration motor connected to the driver seat will produce a vibration. A motor is connected to the ardruino which is connected to a push switch, implement the breaking system.

B. Circuit Diagram

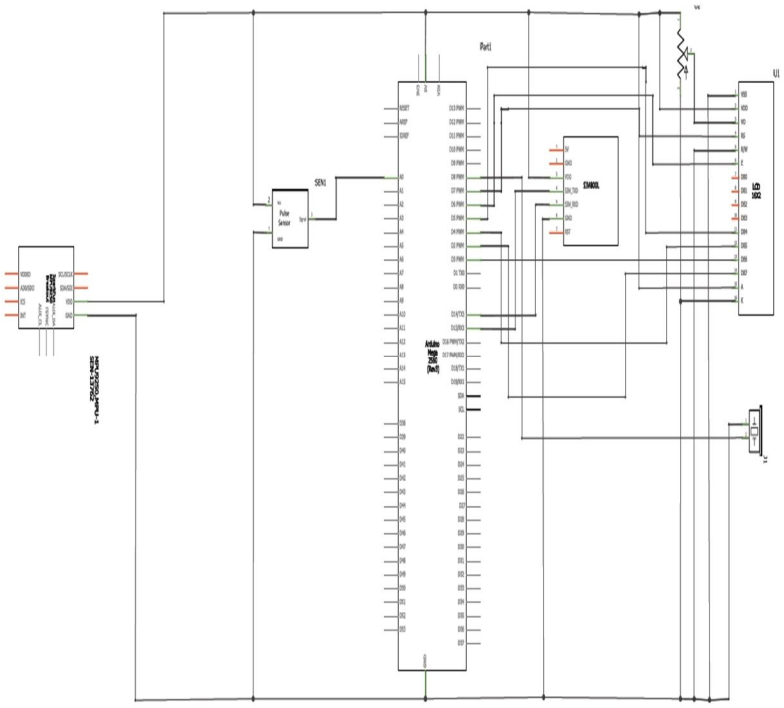


Fig. 4: Circuit Diagram

The PPG and IMU sensors are connected to the Arduino Mega 2560 micro controller. These two sensors were attached to the human body.so that they can obtain the analog signal from the body. The PPG sensor was connected either to the tip of the finger or to the back of the head. Because these two portions have a number of blood vessels comparing with other body parts. The sensor can identify any changes in emotion by monitoring the rate of change of blood flow.Simmilarly the IMU sensor also monitor the head movement. They are continuously monitor the changes and taken the analog signal from the body. The sensor provides the signal obtained from the body to the micro controller section. The micro controller has an in-built ADC.Thus the analog input is converted to a digital output with the help of ADC.According to the program, if the digital value crosses the predefined value the LCD screen will display an alert in the form of a message and also a message will send to the predefined number.Simmilarly the IMU sensor will monitor the head movement. When there is any variations occur, the buzzer will start to produce an alarm. At the same time the vibration motor connected to the driver's seat will produces a vibration. The device is designed to be wearable either at the neck or at the back of the head. The PPG signal is mostly obtained from the driver's earlobe or from the finger tip. Because the concentration of blood vessels is higher in that areas comparing to any other body parts. The IMU sensor is positioned as much as close to the back of the driver's head in order to track the head motion of the driver with 9-DOF.The city with heavy traffic put the driver in a stressful condition. While the city with less traffic change the driver mind in a relaxed state

IV. ADVANTAGES

Here the emotion status of the driver is continuously monitoring. If the driving person is in an unconscious state the visual and auditory system provides an alert. Hence we can potentially prevent the roadway tragedies. Comparing to the available existing systems, these wearable device is simple by construction. The Arduino mainly used here to reduce the size of the system hence makes the setup simple. Also the system performance doesn't affected by the head movement.

V. RESULTS

The entire experiment was simulates using Arduino programming. Because arduino programming helps to reduce complexity. Here mainly we are using a PPG and an IMU sensor. The PPG sensor used to measure heartbeat, each emotion has each heart rate. The state of a human can be identified by the change in heartbeat during the emotional condition such as fear, anxiety, anger etc.

In normal condition the heartbeat of human is approximately 72 but in abnormal conditions the range is between 60 to 90. When the driver is in the abnormal condition a visual alert is displayed on the LCD screen "you are in danger please stop driving" and also a message will send to the predefined number. For example if the heart rate measured by the PPG is 82, then according to program the person in an abnormal condition. The visual alert will display on the screen as well as a message will send to the predefined number. be detected using IMU sensor. When the variations are detected the buzzer produces an alert warning. A Vibration motor was already fixed in the seat of the driver, when the buzzer produces a sound the motor will also provides a vibration to the driver. Thus the person experiences a vibration, by the help of these the person can come back to the normal condition if the situation is not so bad. A break system is also implemented in our project by using a dc motor and a push switch. If the driver is in a situation like he can't drive more and needs to stop the car immediately.in an abnormal condition he can't able to provide the sufficient concentration to that. In our proposed break system, in which the driver just need to press the button, then the speed will automatically reduced.

VI. CONCLUSION

In this wearable emotion response monitoring system results proved that physiological features are the best indicators for identifying emotional responses among various conditions. It is obtained with the help of features extracted from PPG and IMU. The vibration motor will provide the vibration as an alert when the driver is in an unconscious state. The breaking system will also helpful to potentially prevent the roadway tragedies. This device provides much advanced facilities. Thus we can reduce stress, strain and drowsy related road accidents. Our proposed system demonstrated as a high potential for the implementation of a wearable emotional response-evaluation system, which is based on head motions as well as the variations in heart rate.

REFERENCES

[1] "Emotion" by Richard H. Hall, 1998(online PDF)
[2] "Introduction to Brake Systems", ©2004 Melior, Inc.
[3] American heart association, Learn and Live "ECG Basics"@2006
[4] Linda A. Camras Department of Psychology, DePaul University, USA Differentiation, "Dynamical Integration and FunctionalEmotionalDevelopment", Emotion Review Vol. 3, No. 2 (April 2011)
[5] Abhi R. Varma , Seema V. Arote, and Chetna Bharti, "Accident Prevention Using Eye Blinking and Head Movement," Emerging Trends in Computer Science and Information Technology -2012(ETCSIT2012).
[6] Chris Thompson, Jules White, Brian Dougherty, "Adam Albright, and Douglas C.Schmidt, Using Smartphones to Detect Car Accidents and Provide Situational Awareness to Emergency Responders" Wiley-IEEE Press 201
[7] J. Parak, J. Havlik, "ECG SIGNAL PROCESSING AND HEART RATE FREQUENCY DETECTION METHODS" in Proc. Int. Conf. Commun. Syst. Netw. Technol., Gwalior, India, Apr. 2013.
[8] Swati Kale, Rashmi Bhadke, Anuja Sali, Nanasaheb Kadu, "Drowsiness Detection and Warning System" International Journal of Advanced Research in Computer Science & Technology (IJARCST 2014
[9] Toshiyo Tamura , Yuka Maeda , Masaki Sekine, and Masaki Yoshida,"Wearable photoplethys- mographic Sensors—Past and Present", Electronics 2014, 3, 282-302; doi:10.3390/electronics302028
[10] Hamid M. and AliZainab S. Alwan, "Car Accident Detection and Notification System Using Smartphone" IJCSMC, Vol. 4, Issue. 4, April 2015, pg.620 – 635
[11] Hedrick Johannes Luinge and tee Hoogez and-Sappemeer, "inertial sensing of human movement" Twente University Press P.O. Box 201
[12] Boon Giin Lee, Member, IEEE, Teak Wei Chong, Boon Leng Lee, Hee Joon Park, Yoon Nyun Kim, and Beomjoon Kim, "Wearable Mobile-Based Emotional Response-Monitoring System for Drivers", 2168-2291 © 2017 IEE
[13] Physio Med, "Correct Sitting Posture: Driving" [online]

Authors

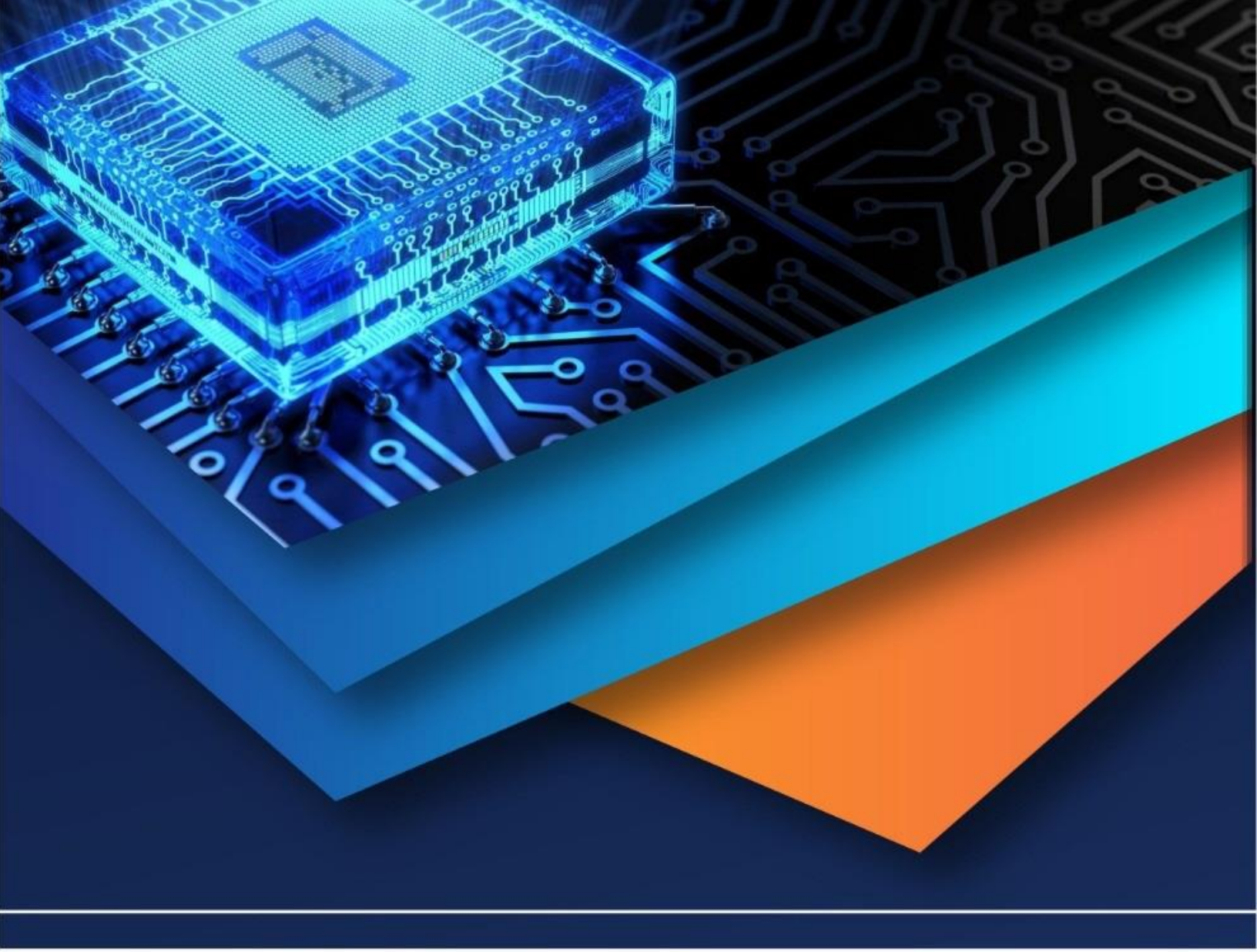
1.Mr.Anoop M M
HOD, Dept.of ECE
St.Thomas College Of Engineering and Technology, Chengannur
Email id:anoopmm777@gmail.com

2. Mrs.Sijitha Mol K S
Asst. prof., Dept. of ECE St.Thomas College Of Engineering and Technology, Chengannur
Email id:sajeev.sijitha@gmail.com

3. Athira Anil
B Tech Scholar
St.Thomas College Of Engineering and Technology, Chengannur
Emailid:athiranair8943@gmail.com

4. Sreeja Sivanpillai
B Tech Scholar
St.Thomas College Of Engineering and Technology, Chengannur
Emailid:sreejasivanpillai17@gmail.com

5. Sumi Surya Lekshmi R D
B Tech Scholar
St.Thomas College Of Engineering and Technology, Chengannur
Emailid:sumisuryalekshmi@gmail
.com



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY