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Technological Insurance for Happy and Safe Journey

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***Abstract*—In the past, present and future, human life is more important than anything else in the society. The main aim of this paper is to add a technological feather to the human life, by ensuring safety to the human life, when a person is driving the vehicle. To enhance the safety system in transportation, here we designed a system to detect human's drowsiness. By calculating human heart beat rate and eye blink rate which decides the person's drowsiness condition. In this paper we designed smart spectacle by using TCRT 5000 IR sensor and heartbeat sensor which detects heart beat rate of the driver. By using these two, vehicle automatically detects the drowsiness of the driver and direct the concerned to alert, so that life will be saved from the accident.**

***Index Terms*—Eye blinks rate, Heartbeat rate, IR sensor, drowsiness, Micro controller,GSM and automatic breaking system.**

I. INTRODUCTION

The word "drowsiness" means "sleepiness[1]. Many factors played a vital role in the modern civilization. Transportation has crucial role in the development of individual country and self. Transportation includes two wheels, four wheels and more like cars etc. As per the census data from USA, out of all accidents 83 Percent of the accidents are occurring due to the drowsiness or sleepiness of the persons who is driving. Due to one person's drowsiness many lives are in trouble. Nowadays particularly four wheeler vehicles (Car, Bus) has become the integral part of human life even in developed countries. As per the 2013, Global status report 2,31,000 people were killed only due to accident which occurred because of the drowsiness of the driver. In the year of 2015, five Million road accidents occurred in India. More importantly 1.5 Million people killed and 5 Million people got injured and it may likely to raise in days to come as per the data available. After observing the above statistics there is huge responsibility on researchers to contribute a technological solution for the existing problem. Many research group tried their best to reduce the number of accidents every year, but still it is a never ending problem for the society.

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The drowsiness of the person can be detected by using two basic sensors i.e. eye blink and heart beat sensors. The eye blinks and heart beat rate is a standard biological data or parameters which determines the drowsiness of the person.

So, we are trying to develop a system which automatically detects the drowsiness of the person, while driving the vehicle to prevents accidents. Here driver is supposed to wear the eye blink sensor frame and heartbeat sensor throughout the course of driving. The smart spectacles count eye blinking rate and the heart beat sensor measures the heartbeat of the driver respectively. Based on the information from both sensors, the driver is feeling drowsy, driver gets alerting signal through the buzzer and the vehicle speed can be controlled automatically.

II. UNIQUENESS OF THE DESIGN

Though there exist many solutions to avoid the accidents, this project is more realistic and easily to implement in the existing system. Here we are integrating both eye blink and heart beat sensors data to Arduino micro controller for detecting the drowsiness of the person. Once confirming the drowsiness of the driver the accident avoiding mechanism starts working in step by step mode. First by buzzer alarming followed by automatic breaking system to control the speed of the vehicle and further information will be given to nearby police station and hospital ambulance through the GSM Module, which is the integral part of the design. The designed prototype in the real time will be an added technological aid for the happy and safe journey. The subsequent chapters will explain the design procedure and implementation.

III. BLOCK DIAGRAM AND FLOWCHART

A.Block Diagram:

Once the sensors are enable, the data will be taken from heartbeat sensors and eye-blink sensors. Those inputs will be given to the micro controller, such that the accident prevention mechanism starts working from here. Heart beat sensor is also known as pulse sensor.

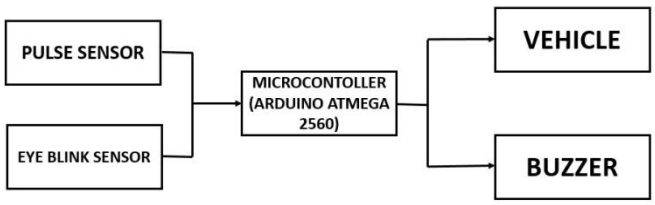

Fig. 1. Block Diagram

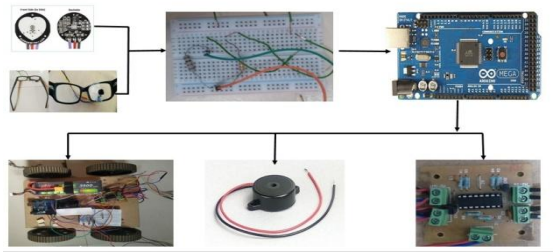

Fig. 2. Practical Implementation of the Block Diagram

B. Arduino Mega

The Arduino Mega is a micro controller board based on the ATmega2560 chip which operates with source of 5V.It has 16 Analog pins(A0-A15),31 Digital pins (22-53), 12 PWM pins (2-13),a 16MHz crystal oscillator on board, a USB port, a Power Jack,10 Communication pins(0,1,14-21),and a reset button. To program this Arduino, we have a software called Arduino IDE. In this project we used two analogpins (A0,A1) from the sensors as inputs to Arduino, four PWM pins (2,3,4,5) as outputs from the Arduino and these four pins as inputs to vehicle.

Fig 3. Arduino Mega

C. Buzzer

The buzzer name is piezo electric buzzer. The piezo electric buzzer is a alarming device which will be used in timers and alarm devices etc. If the DC voltage is applied across the buzzer then a beep sound is produced. This buzzer sound is used as alerting signal for the drowsy driver while preventing the accidents.

Fig 4. Buzzer

D. Dc Motors

The DC motors is the machine that converts electrical energy into mechanical energy in the form of rotation. This DC motors is used in fans, weaving machines, lifts etc. Four Dc motors were used to design the prototype vehicle.

Fig 5. Dc Motor

E. Eye blink sensor (TCRT5000 Reflective IR sensor)

The TCRT5000 Reflective IR sensor consists of both Photo diode and Photo transistor. This TCRT5000 Reflective IR sensor is used for object detection and calculating the distance of the object. The TCRT5000 Reflective IR sensor is mounted on the spectacles. The Photo diode is used for generating an IR signal. It has two terminals one is Anode and second one is Cathode. The Photo transistor is used to read the IR signal. It has two terminals one is Emitter and second one is collector. The smart spectacle with TCRT5000 reflective IR sensor detects the no of eye blinks of the driver.

Fig 6. Eye Blink Sensor

F. Heartbeat Sensor

In this Drowsiness Detection project, we used another sensor that is Heart beat sensor to prevent accidents. It is also called as the Pulse sensor. The Heart beat or Pulse sensor mainly consists of three wires that is Red, Black and Purple as shown in Figure1.The Red wire is connected to the +5V power supply and The Black wire is connected to the ground, the Purple wire is connected to the signal pin that is analog pin in Arduino. This sensor optically detects the changes in blood flow volume via reflection from or transmission through the tissue. The pulse sensor has two modes of transmission one is Trans missive mode and another one is Reflective mode. Finally, it detects the heartbeat of the driver.

Fig 7. Heart Beat Sensor

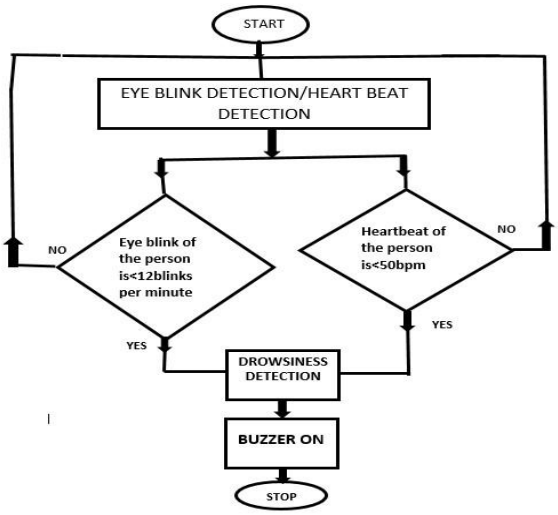

Fig 8. Flowchart

Fig 9. Real time Implementation

IV. EXECUTION

After designing the accident prevention system, we experimented on the different age group people. The results were mentioned in the subsequent tables and graphs.

A. Table-1: Experimental Results

S.NO	Age in years	Eye Blinking/min.	Heartbeat/ min.
1	5	7	80
2	6	6	84
3	7	7	81
4	8	6	90
5	15	9	69
6	16	8	74
7	17	15	78
8	18	6	71
9	19	5	65
10	20	8	87
11	21	10	66
12	22	7	79
13	23	7	73
14	24	8	83
15	25	8	80
16	39	10	78
17	40	9	90
18	45	9	99
19	50	8	87
20	55	7	105

Experimental Results

B. Figures

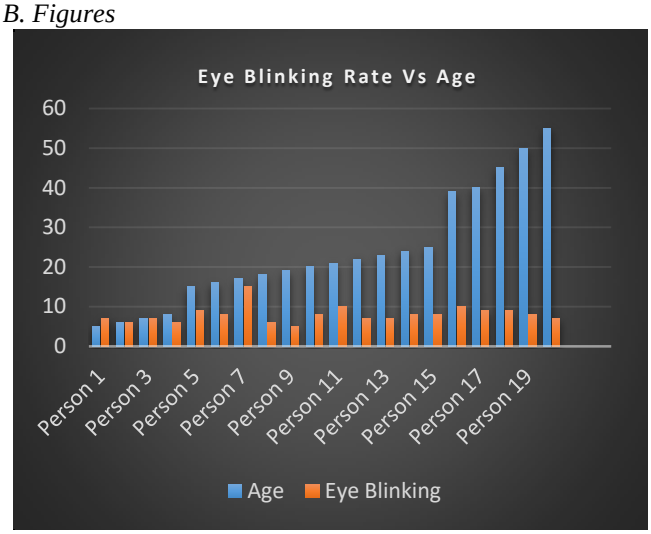

Fig 10. Eye Blinking Vs Age

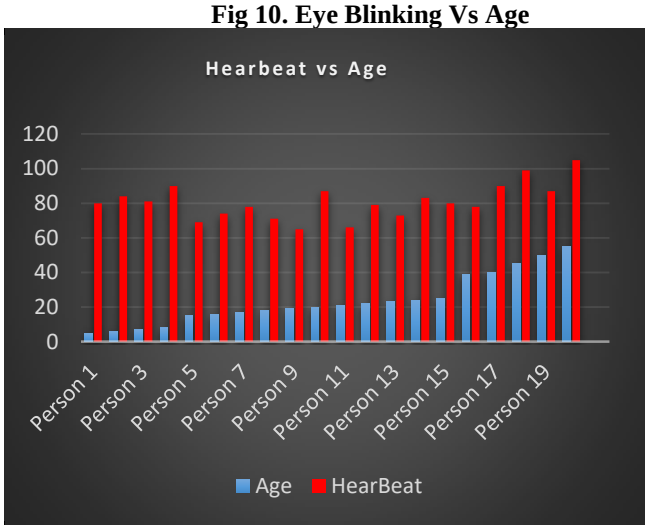

Fig 11. Heartbeat Vs Age

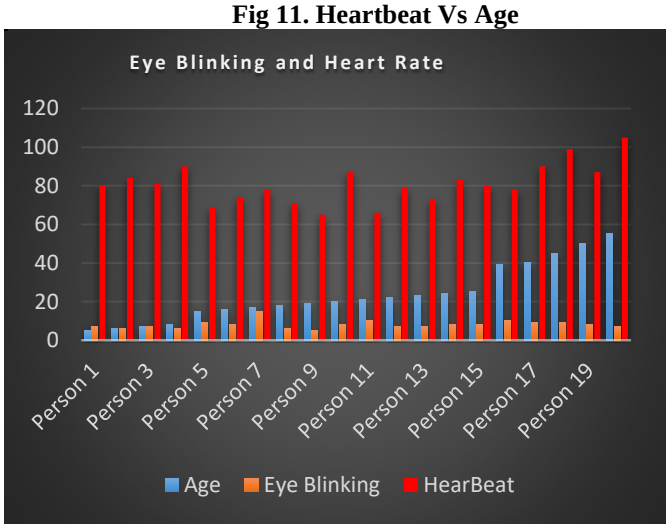

Fig 12. Eye blinking and Heartbeat Vs Age

C. Graphical Representation

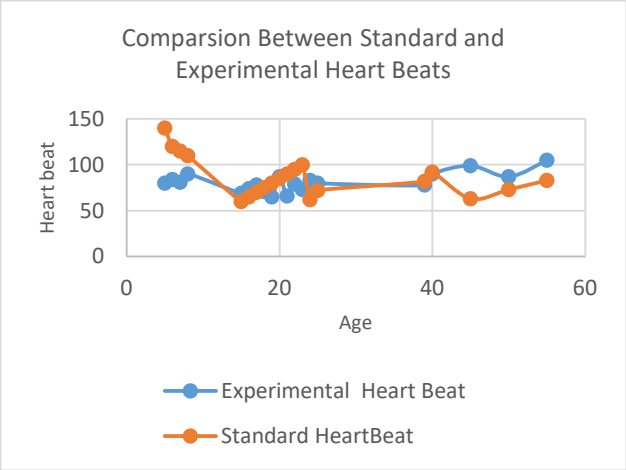

Fig 13. Comparison between standard and experimental heart beat

V. RESULT AND DISCUSSION

We verified the accident prevention system on different age group people and the statistics were given in the above tabular form. The graphical representation is shown in the fig13 which compares the standard and experimental heartbeat rate for the different age group people. Here we can clearly detect drowsiness of the person by observing the experimental results of reduced heartbeat rate and reduced eye blink rate from the standard data. The histogram representation of eye blink and heartbeat rate sensor data is mentioned in the above diagram for the different age people.

VI. CONCLUSION

Once the successful implementation of the accident prevention system described in the above sections, if in case accident occurs by enabling the GSM module and IOT device accident is minimized. In future we want to implement image and video processing for the driver so that it can avoid the problem of sensor malfunctioning. Further a clear analysis should be done in detecting the drowsiness of the driver, if the person is suffering from high or low blood pressure and any health issues related to eye. These things can be addressed in future to design accurate accident prevention mechanism.

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