Intelligent System for Automobile Accident Prevention

Shubham Surse, Rushab Kumat, Akshay Kapade

Abstract— Now a day's accidents are increasing at a large pace. Road accidents claim a staggeringly high number of lives every year. Hence various technologies are being introduced to reduce the accidents. In this project, we provide means of accident prevention using eye blink and heart beat sensor wherein the vehicle is stopped immediately. We can't take care of ourselves while being less conscious. It was demonstrated that driving performance deteriorates with increased drowsiness and heart attacks resulting in crashes constituting more than 30% of all vehicle accidents. But the life lost once cannot be re-winded. If we adopt all the vehicles with automated security system that provides high security to driver then these 'Drink and Drive' accidents can be easily prevented. The main objective of this project is to develop a system to keep the vehicle secure and protect it by stopping the vehicle as soon as drowsiness and change in heart beat is detected.

Index Terms — Accident, Driving, Drowsiness, Heart Beat, Sensor , Vehicle , Life.

1.Introduction There are an estimated 375 million road users within the EU. Every year, over 1.4 million road accidents result in over 40,000 fatalities and 1.7 million injured. Moreover, the rising volumes of traffic cause problems such as congestion of the main roads and harmful effects on the environment and public health. Improving road safety, guaranteeing the efficiency of transport and making driving more economic and thus more environmentally friendly are the key challenges posed to road traffic today. These challenges are truly pan-European: they affect all 25 Member States and call for a European-level solution. The intensity of these problems varies from country to country due to different levels of infrastructure and vehicle safety, driver behavior and composition of the car fleet which in turn requires even deeper co-operation between all stake holders towards more harmonized regulations and infrastructures throughout Europe. There are several ways to tackle the problems, among others intelligent vehicle systems, caused by the increasing volume of traffic: 1) Educating and training the drivers 2) Enforcing road safety rules 3) Improving the physical road infrastructure 4) Improving vehicle safety e.g. by encouraging the use of Intelligent Systems in vehicles This Special Euro barometer report tackles the issue of Intelligent Systems in vehicles. The E-safety initiative was launched in 2002 recognizing the potential of using intelligent vehicle systems in order to increase road safety. It is a joint industry public sector initiative of the European Commission and the relevant European industries and other stakeholders. Its objective is to improve road safety and road transport efficiency through Intelligent Vehicle Safety systems. As its latest action, the European Commission presented "The Intelligent Car Initiative"3 in February 2006. This Communication tackles the reasons that slow down the use of intelligent systems. It is based on three pillars: 1. To coordinate and support the work of relevant stakeholders 2. To support research and development 3.To increase public awareness of these systems that is the main motivation behind this study. All proposed actions are based on a multi-stakeholder forum - the EC, the automotive industry, public authorities, the mobile communications industry, information technology sectors, road authorities etc. - because encouraging the use of intelligent systems cannot and should not depend on private business only. All the systems described in this report have a considerable potential to save lives but most of them have a limited market share or are not yet introduced to the market for various reasons. There are legal, budgetary and administrative barriers to be overcome. There is a need for stronger customer demand and a higher level of awareness of these safety functions. Finally, the highly competitive situation and high manufacturing costs lead to a situation.

Where this system offered only for high range cars An intelligent system is a machine with an embedded, Internet-connected computer that has the capacity to gather and analyze data and communicate with other systems. Requirements for an intelligent system include security, connectivity, the ability to adapt according to current data and the capacity for remote monitoring and management. we are created a breaking system for car which uses sensors and hydraulic system. In which we use sensors for Eye Blink and Heart Beat detection . we send output singnal of these sensors to the hydraulic system and breaking system actuate.

2 Methodology :

2.1 Setup Diagram:

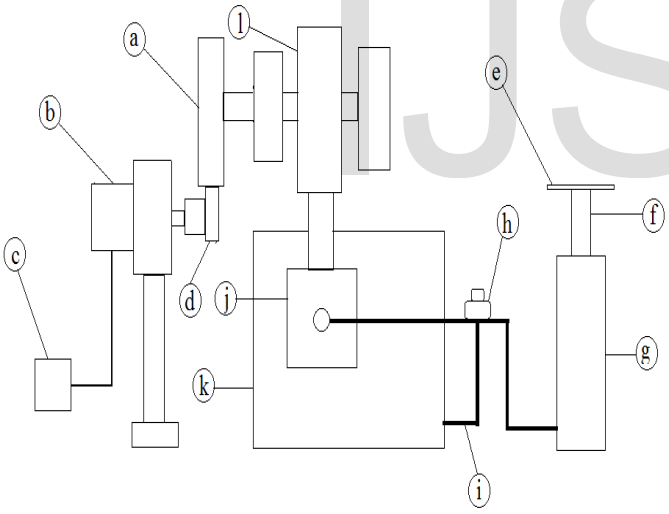

Fig2.1: Setup Diagram

2.2 Components of System:

a=Gear Lines, e=Dead Weight, i=Fluid Lines,

b=motor, f=Piston, j=Axial Piston Pump,

c=Sensors, g=Cylinder, k=Reservoir,

d=Pinion, h=Valve, l=Cam.

2.3 Execution of System:

As the DC motor is actuated by 12V DC signal the input shaft starts rotating. Accordingly the gear mounted on input and output shaft also starts rotating with reduction in speed and increased torque. As the wheel shaft rotates the spring –cam mechanism is actuated. According to cam profile the suction and delivery of oil starts. When the cam pushes the spring, oil is sucked by the pump and conversely delivery is done when the cam doesn't apply any force on spring. The single acting cylinder receives the pressurized oil from the rod end of cylinder and piston is lifted upwards.

2.4 Electronic Part of System:

2.4.1 Heart Beat Sensor:

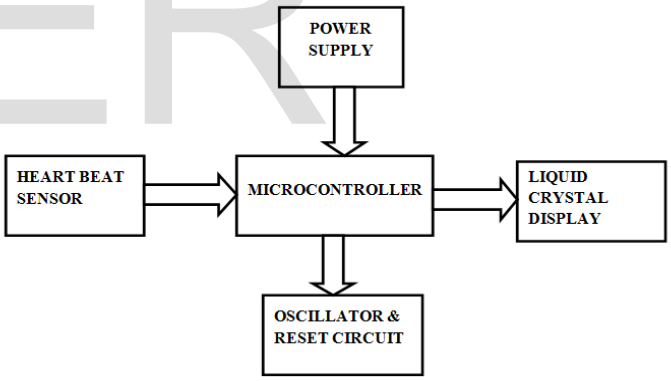

Fig2.4.1 Block Diagram of Heart Beat Sensor

2.4.1.1 Working:

So in order to detect the pulse we will pass light (using an LED) from one side of the finger and measure the intensity of light received on the other side (using an LDR). Whenever the heart pumps blood more light is absorbed by increased blood cells and we will observe a decrease in the intensity of light received on the LDR. As a result the resistance value of the LDR increases. This variation in resistance is converted into voltage variation using a signal

conditioning circuit usually an OP-AMP. The signal is amplified enough to be detectable by the microcontroller inputs. The signal given to the microcontroller input will look somewhat like shown in the image above in an oscilloscope. The microcontroller can be programmed to receive an interrupt for every pulse detected and count the number of interrupts or pulses in a minute. The count value of pulses per minute will give you the Heart rate in bpm (Beats per Minute). We get count of heartbeat on LCD after each 30 seconds.

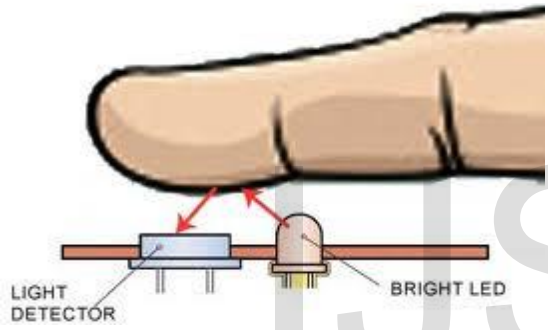

Fig. 2.4.1.1 Heart Beat Sensor

2.4.2 Eye Blink Sensor:

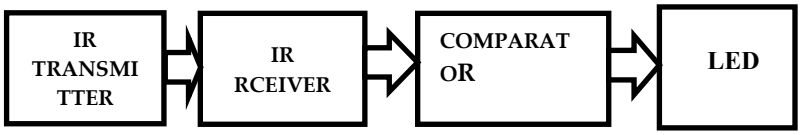

Fig.2.4.2 Block Diagram of Eye Blink Sensor

2.4.2.1 Operation Of Sensor:

1] Power on: When supply is turned on, RED LED glows.

2] IR transmitter: When IR rays are emitted from LED, it moves in the direction it is angled. When any obstacle interferes in the path, the IR rays get cut and it produces secondary wavelets which propagates mostly in return direction or in a direction opposite to that of the primary waves, which produces the net result like reflection of IR rays. The IR transmitter and receiver are placed such that whenever the eyes are closed, the infrared rays are reflected back towards the receiver.

2] IR Receiver: The IR receiver is connected to a comparator. Whenever the infrared rays are received by the IR receiver then this signal is compared with the reference signal of the comparator. The IR receiver is connected to the inverting terminal of the comparator. Now, if the output of the IR receiver is higher than the reference signal then the comparator produces low output which is given to the pin 1.7 of the micro-controller.

3] Comparator:

Comparator LM358 compares two analog signals and produces a one bit digital signal**.** Initially the red led is in on state, after processing from comparator if the eye remains close the led switches to of state otherwise it continues its on state

3. Hydraulic System

3.1 Hydraulic Circuit:

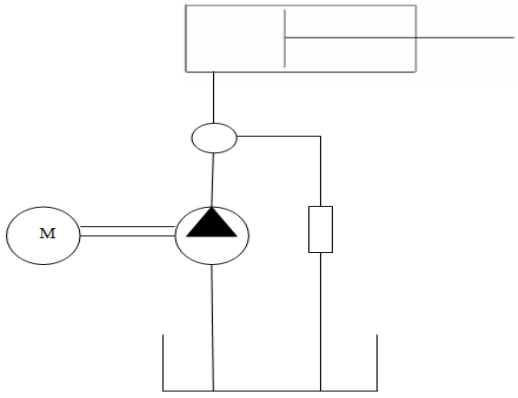

Fig3.1: Hydraulic Circuit

Single acting cylinder is used with tee and valve is used with two sections. DC motor is used. Which has specification of power 10 watt, speed 60 rpm .

4. Actual Model:

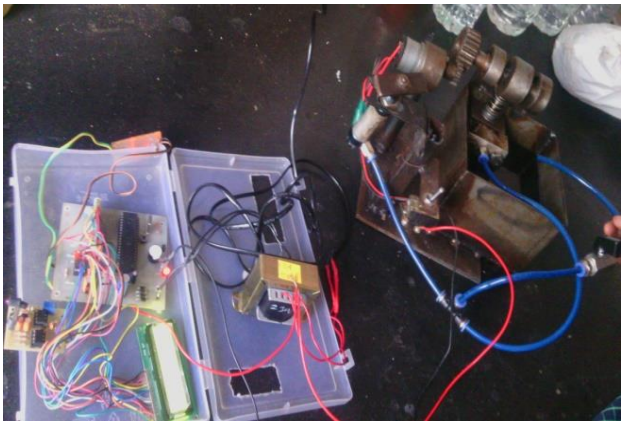

Fig.4.1 Actual Model

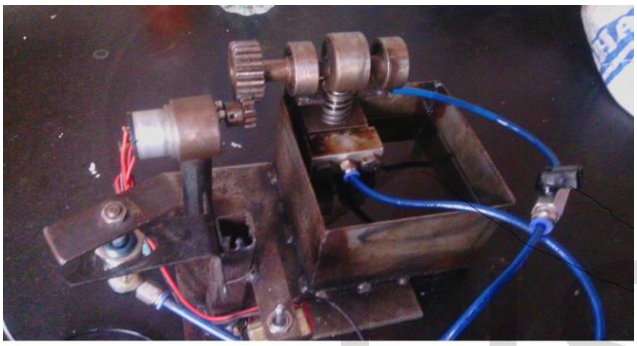

Fig.4.2 Actual Model

5. Experimentation:

5.1 Readings:

Sr. No	Heart Beat Rate (Bpm) (Beats Per Minute)	Time For Eye Blink Detection (T1) (S)	Time For Motor Start To Cylinder Actuation (T2) (S)	Total Time (T=T0+T1+T2) (S)
1	72	1	50	81
2	83	1	57	88
3	67	1	60	91
4	66	1	51	82
5	79	1	55	86
6	82	1	56	87
7	78	1	62	93
8	88	1	65	96
9	85	1	58	89
10	93	1	69	90

Table1.Reading Table

Where T0=Time lag to measure heart beat=30S

5.2 Sample Calculation:

1) T = T0 + T1 + T2

= 30 + 1 + 50
= 81 sec.

If we consider velocity of vehicle 12.5 m/s then we get stopping time near about 1 sec.
Therefore total time from sensor actuation to stop the vehicle can be calculated as
T* = T + 1=81+1=82sec

6. Conclusion:

This project is very useful to avoid accidents caused due to drowsiness and Heart stroke. With the aid of this project, we can avoid such kind of accidents claiming in the lives of many. Therefore it is expected that future research will look into this area.

It is due to the driver's fatigue, traffic accidents keep with a yearly increasing of a high rate. This study shows the new fatigue and Heart attack detection techniques using eye blink, Heart Beat sensors. In this Technique the fatigue will be detected immediately and regular traps the events driver and third party. Through research presented in this study, we propose an intelligent car system for accident prevention and making the world a much better and safe place to live.

7. Future Scope:

1. This setup can be extended for alcohol detection and stopping the vehicle safely.

2 .The vehicle taken care by Autopilot system can be implemented using more sensors and technology.

3. The system generate a signal to inform nearest Medical/ Ambulance/ Police help through satellite communication system.

4.GPS tracking system for detection of accidents or to find out position of vehicle after accident.

5. Sway detection system can also implemented.

6. By using wire-less technology such as Car Talk2000 if the driver gets a heart attack or he is drunk it will send signals to

7. Vehicles nearby about this so driver become alert.

8. Also, GSM module can be introduced in the circuit which would indicate the Police Department that an accident has occurred.

8. Acknowledgement:

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9. References:

[1]Causes%20of%20road%20accidents%20in%20India%20statistics.%20People%20died,%20rank,%20top%20states%20%20%20Currentweek.com.

[2]Use of Intelligent Systems in Vehicles (Fieldwork: June - July 2006, Publication: December 2006]

[3] Z Tian, H Qin, Real-time driver's eye state detection. Proceedings of the IEEE International Conference on Vehicular Electronics and Safety, October 2005, 285–289.

[4] W Dong, X Wu, Driver fatigue detection based on the distance of eyelid. Proceedings of the IEEE International Workshop on VLSI Design and Video Technology (IWVDVT '05), May 2005, Suzhou-China, 397–400.

[5] Q Ji, X Yang, Real-time eye, gaze, and face pose tracking for monitoring driver vigilance. Real-Time Imaging 8(5), 357–377 (2002).

[6] LM Bergasa, J Nuevo, MA Sotelo, M Vázquez, Real-time system for monitoring driver vigilance. Proceedings of the IEEE Intelligent Vehicles Symposium, June 2004, 78–83

[7] L Fletcher, L Petersson, A Zelinsky, Driver assistance systems based on vision in and out of vehicles. Proceedings of the IEEE Symposium on Intelligent Vehicles, 2003, 322–327.

[8] T Brandt, R Stemmer, B Mertsching, ARakotonirainy, Affordable visual driver monitoring system for fatigue and monotony. Proceedings of the IEEE International Conference on Systems, Man and Cybernetics (SMC '04), October 2004 7, 6451–6456

[9] NHTSA, Evaluation of techniques for ocular measurement as an index of fatigue and the basis for alertness management (National Highway Traffic Safety Administration, Washington, DC, USA, 1998).

[10] L Hagenmeyer, in Development of a multimodal, universal human-machine-interface for hypovigilance-managementsystems,Ph., Ed. By D. thesis (University of Stuttgart,Stuttgart, Germany, 2007).

[11] G Longhurst, Understanding Driver Visual Behaviour (Seeing Machine, Canberra, Australia).

[12] Taylor J. In: Medical aspects of fitness to drive, Medical Commission on Accident Prevention. London UK, 1995.

[13] Tunstall-Pedoe H, Kuulasmaa K, Amouyel P, Arveiter D, Rajakangas AM, Pajak A. Myocardial infarction and coronary deaths in the World Health Organisation Monica Project. Circulation 1994; 90: 583–612.

[14] Grattan E, Jeffcoate GO. Medical factors and road accidents. Br Med J 1968; 1: 75–9.

[15] Herner B, Smedby B, Ysander L. Sudden illness as a cause of motorvehicle accidents.

Br J Ind Med 1966; 23: 37–41.

[16] Hossack DS. Death at the wheel: A consideration of cardiovascular disease as a contributory factor to road accidents.

[17] Atmel 8-bitMicrocontrollerwith 4K Bytes Flash AT89C51 © Atmel Corporation 2.