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A Concurrent Intelluctual Vehicle for Refuge in Embedded Systems

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Abstract: In modern era accidents are happens often. As per the recent statistical analysis shows that, India is one of the major countries getting more number of accidents. we have a rough idea for the accident factors such as drowsiness, inexperience, intoxication through drink or drunk, recklessness etc…There are lot of technologies are available to prevent and control the accidents. The aim of this paper to curtail the accident by using sensor detection. The main issues to be considered in this paper such as heartbeat monitoring, eye blink monitoring, alcohol monitoring and enhance the usage of hand brake system. In this project the overall mechanism is controlled by CAN protocol. Here the driver physiological status has to be measured by heartbeat detector. The eye blink sensor continuously monitors the driver's drowsiness and intimate to reduce the speed of vehicle. Further it recognize drivers head pose (HP) i.e., nodding and shaking by using MEMS, also the alcohol consumption of the driver are detected by alcohol detector. Promote the hand brake system has been implemented, i.e., the brake applied in hand using a single button, instead of leg. This system provides better detection with high accuracy when compared to available systems.

Key words: Alertness detection % Hand brake system % CAN % Sensors

INTRODUCTION

Driver drowsiness is recognized as an important factor in the vehicle accidents. *"Driving to save lives, time and money in spite of the conditions around you and the actions of others."*- This is the slogan for Defensive Driving. Vehicle accidents are most common if the driving is inadequate [3]. These happen on most factors if the driver is drowsy or if he is alcoholic. It was demonstrated that driving performance deteriorates with increased drowsiness with resulting crashes constituting more than 20% of all vehicle accidents. But the life lost once cannot be re-winded. Advanced technology offers some hope avoid these up to some extent [1].

Accidents, tragically, are not often due to ignorance, but are due to carelessness, thoughtlessness and over confidence. William Haddon (Head of Road Safety Agency in USA) has pointed out that accidents were associated with numerous problems each of which needed to be addressed separately [2]. Human, vehicle and environmental factors play roles before, during and after a trauma event. Accidents, therefore, can be studied in terms of agent, host and environmental factors and epidemiologically classified into time, place and person distribution [1].

There are several contribution factors for accidents such as fatigue, distraction, alcohol and drug usage, speeding, heedlessness etc. These are causes inattention, at last the result is road fatalities. There are several technologies are accessible to control and prevent the accidents. But in certain circumstances those systems got failure due to inaccuracy.

Projected Work: This Paper presents Intellectual Vehicle for refuge, using sensors. The Driver drowsiness detection is identified by Eye blink rate, which is happened during long sleep. i.e., the eye is fully closed or half closed or fully opened. Also during drowsiness HP (Nodding, Shaking) happens usually. These Head movements can be detected by MEMS. The physiological approach of the driver can be detected using heart beat sensor. Because during driving period most of the people have the heart beat problem, this will avoid the major accidents [3]. This sensor periodically monitors the heart beat rate of the driver. Also it identified whether the driver has consumed alcohol or not, this can be detected by using alcoholic sensor. In this paper a new system is promoted i.e., Hand brake system instead of using leg, we can use hand for stop the vehicle. This is mainly for physically challenged persons or short persons.

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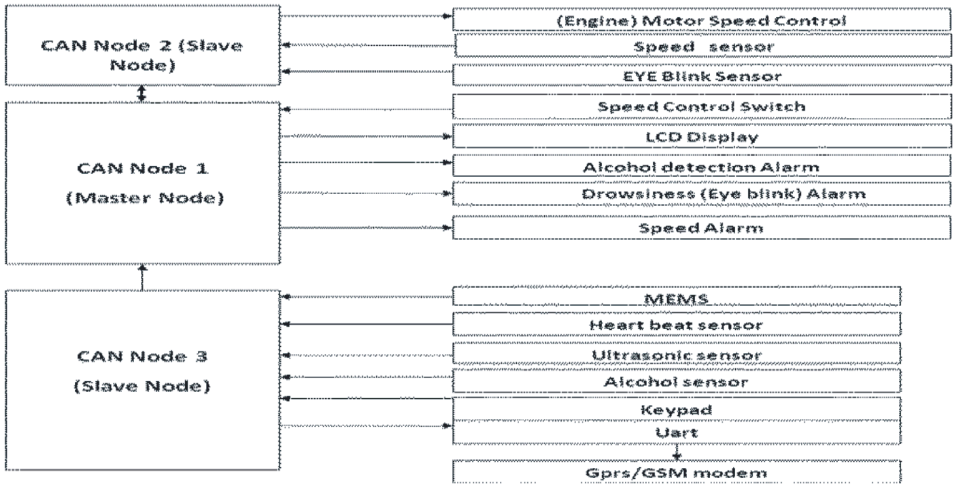

Fig. 1: Block Diagram for Overall Process

These overall process is controlled by the CAN (Controller Area Network) Protocol. These Sensors are all connected to the CAN protocol. It will act as Master and Slave.

Block Diagram

Flow of Operation: CAN is a protocol which works like a master-slave. It's similar to JK flip flop. CAN can be interface with 128 devices but it can communicate only with 2 or 3 devices at a time. This is the general working principle of CAN. In the above shown block diagram CAN1 is the master node where CAN2 and CAN3 are slave node (i.e.) sensors in slave node 2 and slave node 3 acts according to the command given by Master Node 1. In case of speed sensor it going to detect the speed of the vehicle [4]. If the vehicle goes at high speed then the Master will instruct to give the speed alarm and then speed control switch reduce the speed to average level. As same as eye blink sensor followed the similar principle. The normal eye blink rate is 17blinks/sec. If the eye blink reduced the limit means the driver feels sleepy subsequently the information will be sent to Master. In that case the buzzer is operated and the relay is on afterward brake is applied directly. Next the alcohol sensor used to detect the alcohol consumption of the driver. The alcohol exceed the 70 ppm means and the alcohol alarm is on. Similar scenario is followed in case of heart beat sensor functionality. MEMS, is a sensor that is used for Head pose of the driver. The new approach is introduced in this project i.e Handbrake system. The keypad is mainly used to enhance the usage of handbrake. When ever the brake is needed, the driver will press the key in hand itself, the brake is applied automatically.

Sensor Modules: The Sensor modules sense the Eye blink, alcohol, heartbeat, ultrasonic, speed and MEM S.*A. Eye Blink Sensor(9008)*

It plays important role in this project since it is used to detect the drowsiness of the driver. The eye blink sensor which can be fixed to the drivers eye to monitor the blinking rate. i.e. It looks like a spectacles. It measures the blinking rate of the driver's eye continuously and displays it in the LCD. The normal eye blinking rate for adults should be 17 closures/min. if the eye blinks count decreases that means the driver is sleepy, in that case the sensor will intimate to the master node to give drowsiness alarm to vigilant the driver and passengers. After that the relay is turns on and the brake is applied directly.

MEMS: A micro-electromechanical system (MEMS) is used in this project to monitor the head pose (Nodding, Shaking) of the driver, The MEMS can be fixed in the driver's head part, whenever driver feels sleepy, nodding and shaking are happens, at that time the MEMS detect the vibrations of the head movement and it will send the intimation to Master node through slave node 3, at that moment due to the relay on, the brake will be applied directly.

Alcohol Sensor (MQ-3): The alcohol sensor will detect the alcohol depends on human breath i.e if the driver has consumed alcohol, it will be identified by his breath and the sensor will display on the LCD regularly. The sensor is placed in front of the driver. The alcohol sensor MQ-3 is selected in this system due to its high sensitivity in detection and has good resistance to disturb of gasoline, smoke and vapor. The sensor able to detect BAC with different concentration and classified the range of BAC

detected into a few level. The Average alcohol threshold value is 70 ppm. Deduce the driver has inspired alcohol followed by it is detected by the Alcohol sensor. Sensor gives in sequence to the slave node 3 then it conceded to Master node, at that time it will instruct the sensor to the to give alcohol detection alarm. Subsequently the emergency brake is applied.

Heartbeat Sensor (1157): HR measures the number of heartbeats per unit of time. Normal heart rate should be 72 beats / min and for the checking times it should have at least one beat [5]. HR sensor can be obtained at any place on the human body, being an accessible parameter to be easily acquired. Heartbeat sensor senses the heart rate of the driver regularly and displays it [9]. If the heartbeat of the driver has exceed their threshold value, i.e. it goes above 72 it indicate to the master node the buzzer is operated. Simultaneously the brake is applied.

Speed Sensor (T852f098): Speed sensor is used in this project to detect the speed of the vehicle and displays it. It can be also used to control the speed of the vehicle. Average threshold speed should be 70. In this the same principle is used. Whenever the vehicle goes at high speed like above 100 or 120kms, the speed alarm will intimate in that case speed control switch is operated. i.e. it automatically reduce the speed and comes to the average level.

Ultrasonic Sensor (UM30): This can be implement by connecting ultrasonic sensors in front of the vehicles. Here the sensor used in the series is UM30. It will give the distance between the present vehicle and the vehicle which is coming in the opposite and rear direction [6]. The distance is constantly monitored by a sensor. When any of the sensed value can be detected i.e. eye blink, heart rate or alcohol got exceed their threshold value, it give corresponding buzzer to aware the driver and passenger. After that brake is applied.

RESULTS

The software simulation of the paper can be viewed through the Proteus ISIS 7 professional simulator. The results are i) Eye blink detection, Heart rate monitoring, Alcohol detection and Ultrasonic measurements. ii) Handbrake system.

Eye Blink, Alcohol, Heart Rate, Ultrasonic Monitoring: In this Eye blink, alcohol, Heartbeat and ultrasonic sensors are connected. The prediction analysis system uses DC motor instead of vehicle engine [4]. The DC motor is connected to the master section. The three LED's (green, yellow, red) are connected in the same port. The LCD display shows the level of sensors. Each has a certain threshold value. It is the stage in which the recognition of the driver is started. In this all sensors will start its work [7]. The eye blink sensor calculates the eye blinking rate of the driver and displays it in the LCD. Normal eye blinking rate for adults should be 17blinks/min [8]. The circuit checks the value or every 100microsecs [4]. Heart rate sensor senses the heart beat rate of the driver and displays it. Normal heart rate should be 72 beats / min. [4]. As same as the alcohol detector identifies whether

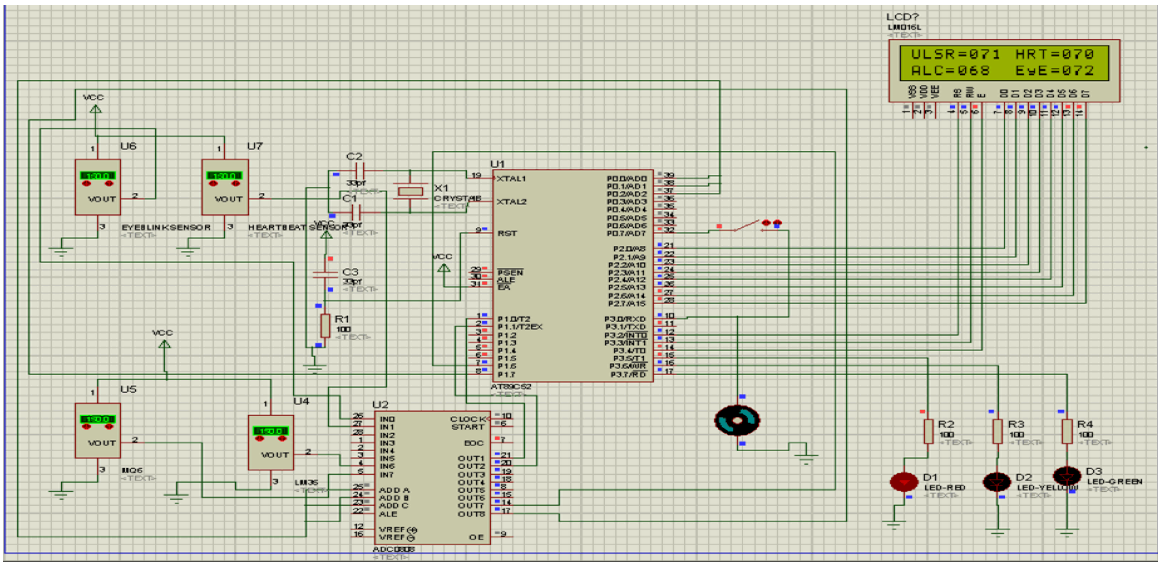

Fig. 2: The Eye blink, alcohol, heart rate & ultrasonic monitoring system

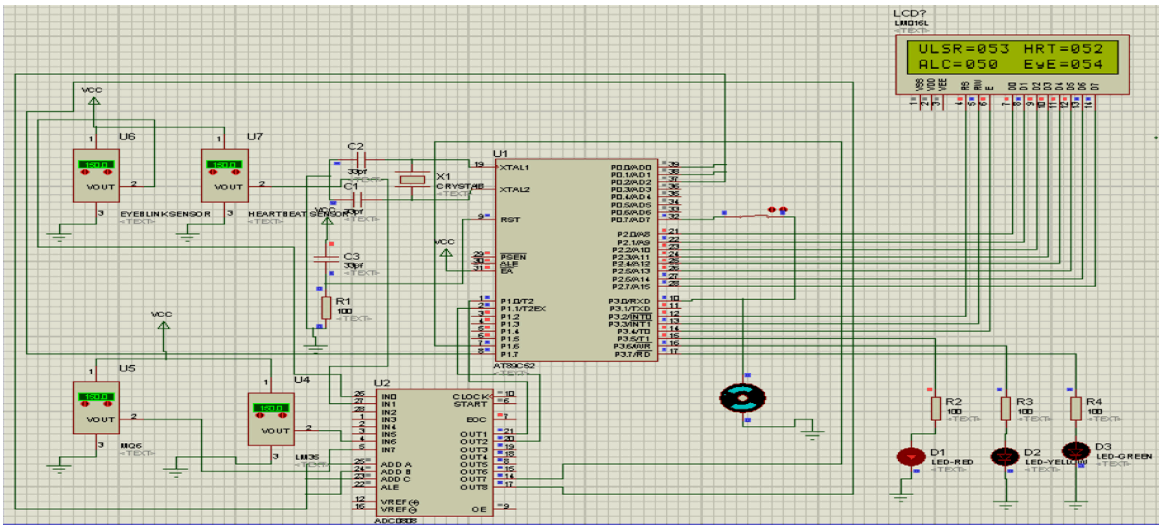

Fig. 3: Handbrake system

the driver inspired alcohol or not. The alcohol threshold valueis 70ppm >. If the green LED is glows that is the starting stage of the detection. If the yellow LED glows then it is at medium stage. If any of the values becomes abnormal, then the red LED intimate and give buzzer sound to alert the driver and passengers and automatically the motor is stopped i.e. the vehicle cannot be moved [12, 14, 15].

Handbrake: This schematic result shows that the brake will be applied in hand. Here the switch is added in the circuit. It connected in the port 2 of the controller [13]. Whenever the brake is needed we just press the switch in hand itself, subsequently the brake will be applied.

CONCLUSION

It is due to the driver's condition, accidents keep with a yearly increasing of a high rate. This project shows the new affirm of detection technique using various types of sensor. In existing system there are lot of techniques are available, like Facial detection algorithm and 2D, 3D matching algorithm detection to overcome those incidents. Yet there are certain circumstances, in which those system get failure.In proposed system has several advantages over existing system and they are compactness, configurable threshold limits and driver state can be identified easily using sensors. The sensors regularly monitor the state of the driver, if any abnormalities in the sensed values are detected and it will alert the driver due to buzzer. In future work we can apply the revealing system in aircraft in order to alert pilot and train besides. At present in R&D they are researching more advanced technologies to avoid the accidents everlastingly. During manufacturing the vehicles those upcoming accidents avoiding techniques are inbuilt in that. This will revolutionize the civilization greater.

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