ECG and Driver Monitoring System Based on Wireless Transceiver

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Abstract:- we go to monitor the health condition of the driver while driving. We using ECG, Vibration sensor, and Eye blink & Force sensor with the help of this sensor we continuously scan his health and through transmitter we can obtain his/her driving condition. ECG is used for to monitor the heart beat rate, as like weather he is drowsy or be active which is detected by the Eye blink sensor. By using Force sensor exactly we can detect either he is drug injected or not .when these parameter is detected & cross the threshold value, then automatically the vehicle will shut down and if accidents occur airbag will be activated. we can hence prevent the major accidents.

Keywords: ECG, Vibration, eye blink, driving, heart rate, threshold, vehicle, health, Transmitter, Receiver, Monitor

1. INTRODUCTION

Electrocardiogram (ECG) is the most undisputed and widely accepted tool to detect and diagnose them.. Nevertheless, methods and systems to acquire an ECG signal with good enough quality in a fast and easy-to-use manner, so that they can be used in domestic or other non-clinical environments, are nowadays far from common.[1]

There have been millions of people who have been robbed of their lives by the mistakes of other drivers. According to the National Highway Traffic Safety Administration, there are about 43,000 people killed in a car accident each year in the U.S. In addition to the fatal accidents, roughly about 2.9 million of people are injured in car accidents. .

Driving is a privilege. If you are alert today, someone is going to be alive tomorrow. Driving safely means that you and others on the road will live longer. In conclusion, there are many reasons why safe driving is important.

Accident records from previous years provide ample evidence for increasing numbers of accidents in correlation with increasing numbers of registered motor vehicles in Germany as shown in fig(a). Although fatalities have been on a substantial decrease for a number of reasons.

About 85% of the accidents were caused by certain inadequate behavior of the driver like inadequate speed (20.3 %) mishap when timing (14.1 %) yield errors (14.1 %) insufficient safety distance (9.9 %) incapacity (8.1 %).[2] While there's nothing that can really prepare anyone for the shock of being involved in car accident, there are important steps you can take following an accident to ensure that you and your vehicle are well taken care of.
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Table 1 Index of road accidents in Germany

year	Accidents
1975	1,265,060
1980	1,684,261
1985	1,840,295
1986	1,935,595
1987	1,977,501
1988	2,022,455

2. SYSTEM ARCHITECTURE AND HARDWARE IMPLEMENTATION

In this paper, we use hardware components like ECG, Force, vibration, Eye blink Sensors, Atmel 89s52 microcontroller which is 8 bit, Dual In Line Package with 40 pin, ADC 0809 with 8 channel multiplexer, Airbag ,relay, Uart and Zigbee for its wide use in wireless networks.

In this paper, the Bridge rectifiers are used to give the power supply to the hardware circuit. and step down transformer is used with rectifiers to reduce power supply. The inputs from the ECG, Eye Blink and Force sensors are given to ADC. we are using only 3 inputs from 8 inputs to ADC. from ADC the inputs are given to Atmel Microcontroller.

we know, the sensors we are using are analog ,so to convert it to digital we use Analog to Digital Converter. Based on inputs from ADC and microcontroller, vibration sensor is works, i.e to enable the vibration and activate the Airbag. relay acts as a switch for activating/deactivating the airbag and from there the information regarding it will be sent to Zigbee which is further transmitted to Receiver through ZIgbee to Pc. Force ,Ecg and Vibration sensors are placed in a steering wheel, while Eye Blink sensor near the Eye for monitoring closed eye.

2.1 Transmitter Section

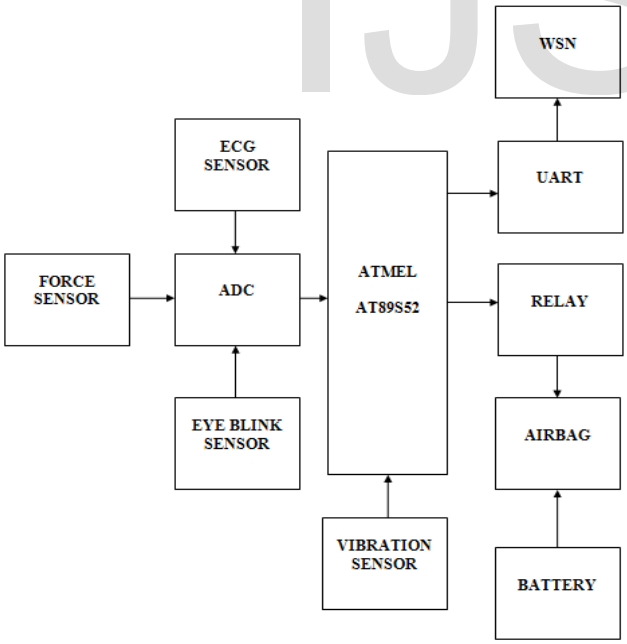

Figure 1 : Block Diagram of Transmitter Section

2.2 Receiver Section

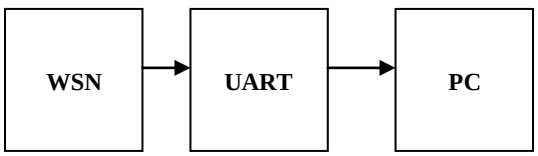

Figure 2: Block Diagram of Receiver Section

The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. The Idle Mode stops the CPU while allowing the RAM, timer/counters, serial port, and interrupt system to continue functioning. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory pro-grammar. By combining a versatile 8-bit CPU with in-system programmable Flash on a monolithic chip, the Atmel AT89S52 is a powerful microcontroller which provides a highly-flexible and cost-effective solution to many embedded control applications.

ADC has become a basic building block for most electronics systems. Among all kinds of ADCs, low to medium resolution, very high speed flash ADCs have applications in UWB systems, disk drivers and optical communications. Moderate resolution and relatively high speed flash ADCs are used in CCD image systems, digital video (e.g., HDTV), xDSL, cable modems and fast Ethernet, etc [3].

.The UART is basically used in between the slow and the fast peripheral devices for example: computer and printer or in between the controller and LCD. Due to this reason, UART is used mostly for the short distance, low speed and is of low cost.[4]

Universal Asynchronous Receiver Transmitter (UART) is used for asynchronous serial data communication between remote embedded systems. Standard UART cores [5],[6],[7],[8] utilize three mid-bit samples to decode the serial data bit and the sampling rate is derived from external timer module. But if the physical channel is noisy then data bits get corrupted during transmission and it leads to wrong data decoding at receiver.

An ECG system is used to detect process and display bioelectric signal that is obtained from our body. Since each portion of the ECG signal is directly related to an electrical cardiac event within the heart thus some abnormalities seen in the ECG can be traced to a particular disease in the heart.[9]. ZigBee is one of the radio communication standards and appropriate for the sensor network for the reason that its power consumption is lower than wireless

LAN and Bluetooth, its production cost is low and a network capacity is large. The low power consumption will be beneficial for a microwave power transmission system which stands up poorly to supplying a large amount of electric power wirelessly due to electromagnetic compatibility.[10]

ZigBee network applications are rapidly spread out to the many areas: the home automation, industrial control, and commercial fields, for example. Presently, a great deal of literature is focused on studying the network development and management. However, the dynamic structure of ZigBee network is changeable and configurable and lead to the ZigBee network management to be difficult and complex. Furthermore, the system reliability and efficiency of ZigBee network will play the key role and technology to achieve the requirement and stability of system performance.[11]

Vibration sensors can also be used to harvest otherwise wasted energy from mechanical vibrations. This is accomplished by using piezoelectric materials to convert mechanical strain into usable electrical energy. Two of the main parameters of a piezoelectric sensor are the sensitivity and the frequency range. The sensitivity of industrial accelerometers typically range between 10 and 100 mV/g; higher and lower sensitivities are also available. For most applications, a sensitivity of 100 mV/in/sec is satisfactory.

Eye ball sensor is a sensor which is used to sense the movement of eye. Eyeball Sensor which is a chip of a hands free pointing device and Telemedicine System which is remote diagnosis and data transmitting system. Technical Field The present invention relates to an eye tracker which does not require peripheral devices through imaging process of a user's eye images, can be implemented using a single chip and can perform an image processing of a pixel level, thereby ensuring high operating speed.

A Force Sensor is defined as a transducer that converts an input mechanical force into an electrical output signal. Force Sensors are also commonly known force transducers. Force sensors are designed to provide detailed data about forces and moments applied to their working surfaces. Their diverse applications are evident by their range in shape, size and capacity. The sensor you select must be appropriate for all loads and moments that will be applied to it, even those that will not be measured.

A relay is an electrically operated switch. Current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts. The coil current can be on or off so relays have two switch positions and they are double throw (changeover) switches. Relays allow one circuit to switch a second circuit which can be completely separate from the first. For example a low voltage battery circuit can use a relay to switch a 230V AC mains circuit. There is no electrical connection inside the relay between the two circuits; the link is magnetic and mechanical.

3. IMPLEMENTATION AND EXPERIMENTAL DESIGN RESULT

After implementation of the hardware, now comes the execution of the design. By using the sensors we get the values regarding the ECG, Force Eye blink sensors. the graphs between time and voltage are obtained for ECG and Force Sensors. while it shows eye blink detected if the driver closes his/her eyes .This can easily be understood by seeing the graphs as shown below. In Fig1,we can check the working of the ECG . In Fig 2, we go for EYE detection while in Fig3 we can see the working of Force Sensor.

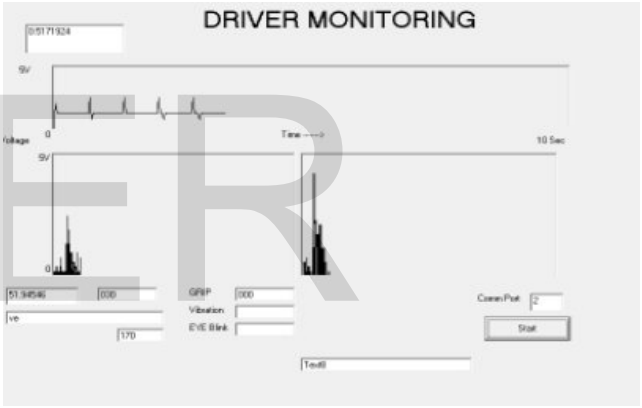

Figure 3 : Monitoring ECG Sensor

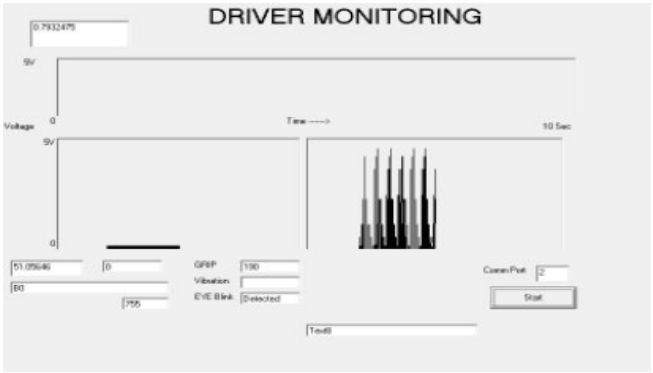

Figure 4: Monitoring EYE BLINK Sensor

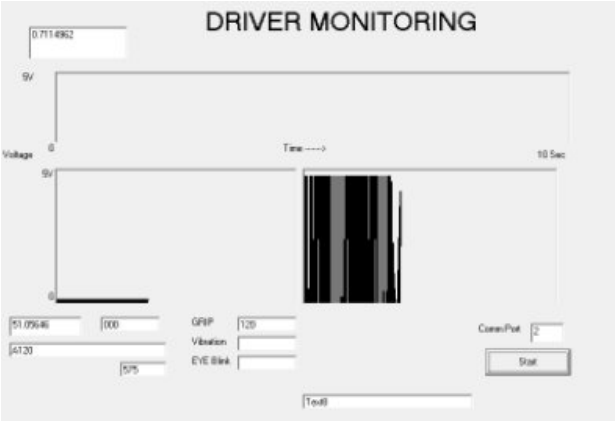

Figure 5: Monitoring Force Sensor

4.CONCLUSION

This paper presents the concept, the realization of driver adaptive monitoring and warning help for the driver. Its more outstanding functionalities are based on the use of Sensors about the driver environment and the modeling the driving situation, including the situation with respect to normative driver behavior, as well as modeling the types of danger considered. Force, ECG and Vibration sensors are placed in a steering wheel. The results and conclusions obtained provide an approach to the drowsiness detection problem and drug injected problem.

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