

WSN BASED ADVANCED VEHICLE SECURITY SYSTEM

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Abstract: *This research is basically on an electronic device which can be used at the time of emergency while driving a vehicle .It has embedded the concept of wireless communication i.e. Zigbee and GSM and many other sensors by the help of which immediate help can be delivered to the person who has met with an accident .The overall structure is based on the AT89S52 microcontroller. Also the key role of DTMF has been implied by the help of which appropriate user can control the security options of vehicle if it is theft. Research content uses the technology of Zigbee for the transmission of message to the other vehicle in the time of need of their help as well as for serving the prospective of safe and sound driving the functions like drivers alcohol detection, vehicle speed slowing and automatic car lock with collision detection is used. The GPS is also being used here for finding the exact car location so that it can be found if lost .*

Keywords: *Micro controller (LPC2148), Eye blink sensor, Alcohol sensor, GSM/GPRS, GPS Module, Dc motor (Engine)*

INTRODUCTION

In the recent years, the vehicle communication technology has gained the popularity in industrial field. By the use of V2P (vehicle to person)

communication and V2V (vehicle to vehicle) communication they can be used for the purpose of serving safety and security. The concept of vehicle communication is in existence due to the accidents caused because of human error or by lack of concentration on road while driving or by applying sudden brake on front vehicle on roads. Last year in India only during the time period of January to May 31, total accident in a city i.e. Delhi 325 lives were claimed in accidents. 14,000 cases of drunk driving were reported and 45,158 cases of speed over speeding were report only in capital city of India. Though the survey of indianexpress.com 16 deaths and 58 roads injures are reported in India in every hour with sharing of fatal accidents in the total being up from 18 per cent in 2003 to 25 in 2012". With another statistics by times of India, total vehicle thefts are 40 in a day in the capital city of India only. With the vehicle communication onboard the vehicle theft will reduce significantly because owner can reach the vehicle location simply through the help of vehicle communication. As per the previous works by Dr.S.S.Riaz Ahamed i.e. the role of ZigBee technology in future data communication system" briefs about how the implementation of this technology can be embedded with different aspects for better outcomes. [2]. Also the work by Soyoung Hwang and Donghui Yu explains the Remote

Monitoring and Controlling Systems concept Based on ZigBee Networks. Also the idea of the security in the vehicles has been attained from the work [6] of Rens van der Heijde from the reference Security Architectures in V2V and V2I Communication and the idea for the design of such advance device has been considered from the [10] Miller, J. M., & Nicastri, P. R. (1998). The next generation automotive electrical power system architecture: Issues and challenges. Proceedings of the 17th digital avionics systems conference, Bellevue, WA, USA, Session II, Book. In our work the basic difference is the combination of all this mentioned technology on-board by the help of ARM7 through which in less expenditure .

In this project we have two monitoring steps; by this we can provide a more accurate detection. For the detecting stage, the eye blink sensor always monitoring eye blink moment. It continuously monitoring eye blink moments and where collected data will be transmitted to a micro controller and the micro controller digitizes the analog data. If the warning feedback system is triggered, the micro controller makes a decision which alert needs to be activated. And the second application in this paper is to detect the alcohol detection and also to track the vehicle to find the culprit and in intimation to the Control Room with their location, and also the vehicle can be stopped. In this we use of GSM modem to trace the vehicle and also to inform to the control room. There is also an indicator is fixed in the front and back of the vehicle to show to the opposite vehicle by means of this the driver can able to identify that driver was drunk. The third application of the project is to provide security to the driver. ECG sensor is used to detect the pulse of the driver. The entire driving assistance system is shown in (fig.2). If the driver is in abnormal condition that is pulse rate of the person is high then the vehicle is stopped and the position of the vehicle is traced by GPS this information is sent to the concerned doctor.

PROPOSED HARDWARE SYSTEM

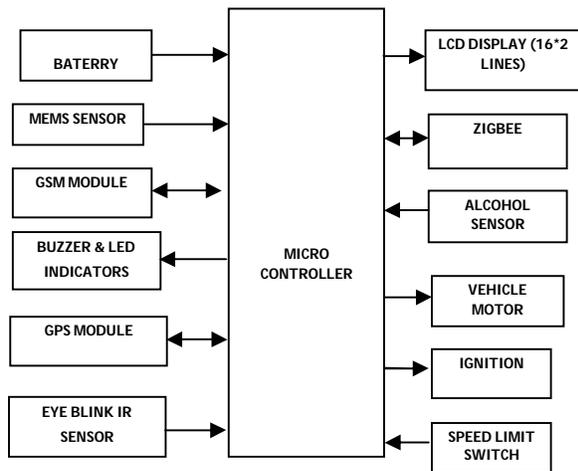


Fig.1.Block diagram

Monitoring Section:

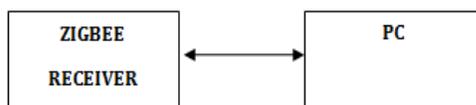


Fig.2.Block diagram

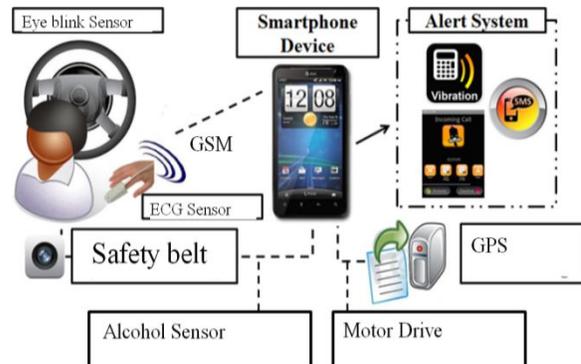


Fig.3.Driving Assistance System

THE HARDWARE SYSTEM

Micro controller:

This section forms the control unit of the whole project. This section basically consists of a Microcontroller with its associated circuitry like Crystal with capacitors, Reset circuitry, Pull up resistors (if needed) and so on. The Microcontroller forms the heart of the project because it controls the devices being interfaced and communicates with the devices according to the program being written.

ARM7TDMI:

ARM is the abbreviation of Advanced RISC Machines, it is the name of a class of processors, and is the name of a kind technology too. The RISC instruction set, and related decode mechanism are much simpler than those of Complex Instruction Set Computer (CISC) designs.

Liquid-crystal display:

Lcd is a flat panel display, electronic visual display that uses the light modulation properties of liquid crystals. Liquid crystals do not emit light directly. LCDs are available to display arbitrary images or fixed images which can be displayed or hidden, such as preset words, digits, and 7-segment displays as in a digital clock. They use the same basic technology, except that arbitrary images are made up of a large number of small pixels, while other displays have larger elements.

BOARD HARDWARE RESOURCES

Alcohol Sensor:

This alcohol sensor is suitable for detecting alcohol concentration on your breath, just like your common breathalyzer. It has a high sensitivity and fast response time. Sensor provides an

analog resistive output based on alcohol concentration. The drive circuit is very simple, all it needs is one resistor. A simple interface could be a 0-3.3V ADC.



Fig.4.Alcohol Sensor

Eye Blink Sensor:

The eye-blink sensor works by illuminating the eye and/or eyelid area with infrared light, then monitoring the changes in the reflected light using a phototransistor and differentiator circuit. The exact functionality depends greatly on the positioning and aiming of the emitter and detector with respect to the eye.

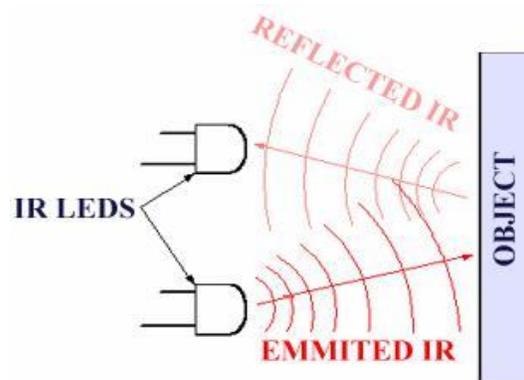


Fig.5.Eye Blink Sensor (IR Led's)

GPS:

Global Positioning System tracking is a method of working out exactly where something is. A GPS

tracking system, for example, may be placed in a vehicle, on a cell phone, or on special GPS devices, which can either be a fixed or portable unit. GPS works by providing information on exact location. It can also track the movement of a vehicle or person. So, for example, a GPS tracking system can be used by a company to monitor the route and progress of a delivery truck, and by parents to check on the location of their child, or even to monitor high-valued assets in transit. A GPS tracking system can work in various ways. From a commercial perspective, GPS devices are generally used to record the position of vehicles as they make their journeys. Some systems will store the data within the GPS tracking system itself (known as passive tracking) and some send the information to a centralized database or system via a modem within the GPS system unit on a regular basis (known as active tracking) or 2-Way GPS.

GSM

An embedded system is a special-purpose system in which the computer is completely encapsulated by or dedicated to the device or system it controls. Unlike a general-purpose computer, such as a personal computer, an embedded system performs one or a few pre-defined tasks, usually with very specific requirements. Since the system is dedicated to specific tasks, design engineers can optimize it, reducing the size and cost of the product. Embedded systems are often mass-produced, benefiting from economies of scale. Global System for Mobile Communication (GSM) is a set of ETSI standards specifying the infrastructure for a digital cellular service. The standard is used in approx. 85 countries in the world including such locations as Europe, Japan and Australia.

Motor Drive:

L293D is a dual H-bridge motor driver integrated circuit (IC). Motor drivers act as current amplifiers since they take a low-current control signal and provide a higher-current signal. This higher current signal is used to drive the motors.



Fig.6. Gear Motor

In its common mode of operation, two DC motors can be driven simultaneously, both in forward and reverse direction. The motor operations of two motors can be controlled by input logic at pins 2 & 7 and 10 & 15. Input logic 00 or 11 will stop the corresponding motor. Logic 01 and 10 will rotate it in clockwise and anticlockwise directions, respectively. Enable pins 1 and 9 (corresponding to the two motors) must be high for motors to start operating. When an enable input is high, the associated driver gets enabled. As a result, the outputs become active and work in phase with their inputs. Similarly, when the enable input is low, that driver is disabled, and their outputs are off and in the high-impedance state.

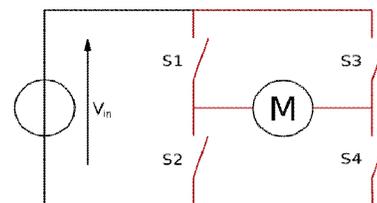


Fig.7. H-Bridge

MEMS:

Micro-Electro-Mechanical Systems (MEMS) is the integration of mechanical elements, sensors, actuators, and electronics on a common silicon substrate through microfabrication technology. While the electronics are fabricated using integrated circuit (IC) process sequences (e.g., CMOS, Bipolar, or BICMOS processes), the micromechanical components are fabricated using compatible "micromachining" processes that selectively etch away parts of the silicon wafer or add new structural layers to form the mechanical and electromechanical devices. MEMS promises to revolutionize nearly every product category by bringing together silicon-based microelectronics with micromachining technology, making possible the realization of complete systems-on-a-chip. MEMS is an enabling technology allowing the development of smart products, augmenting the computational ability of microelectronics with the perception and control capabilities of micro sensors and micro actuators and expanding the space of possible designs and applications. Microelectronic integrated circuits can be thought of as the "brains" of a system and MEMS augments this decision-making capability with "eyes" and "arms", to allow micro systems to sense and control the environment. Sensors gather information from the environment through measuring mechanical, thermal, biological, chemical, optical, and magnetic phenomena. The electronics then process the information derived from the sensors and through some decision making capability direct the actuators to respond by moving, positioning, regulating, pumping, and filtering, thereby controlling the environment for some desired outcome or purpose. Because MEMS devices are manufactured using

batch fabrication techniques similar to those used for integrated circuits, unprecedented levels of functionality, reliability, and sophistication can be placed on a small silicon chip at a relatively low cost.

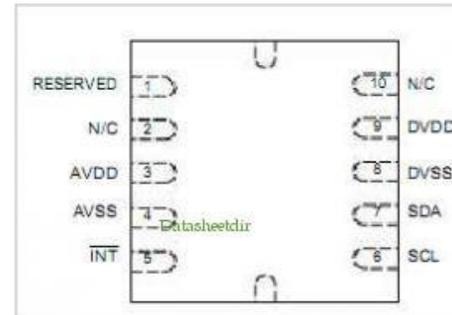


Fig.8: MEMS IC

ZIGBEE:

Zigbee modules feature a UART interface, which allows any microcontroller or microprocessor to immediately use the services of the Zigbee protocol. All a Zigbee hardware designer has to do in this case is ensure that the host's serial port logic levels are compatible with the XBee's 2.8- to 3.4-V logic levels.

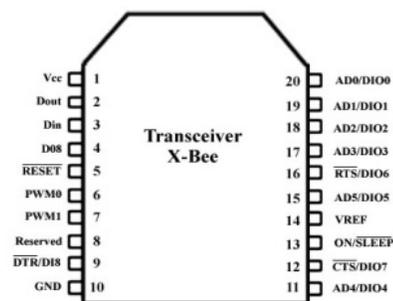


Fig.9: ZIGBEE pin diagram

The logic level conversion can be performed using either a standard RS-232 IC or logic level translators such as the 74LVTH125 when the host is directly connected to the XBee UART. The X- Bee RF Modules interface to a host device through a logic-

level asynchronous Serial port. Through its serial port, the module can communicate with any logic and voltage Compatible UART; or through a level translator to any serial device. Data is presented to the X-Bee module through its DIN pin, and it must be in the asynchronous serial format, which consists of a start bit, 8 data bits, and a stop bit. Because the input data goes directly into the input of a UART within the X-Bee module, no bit inversions are necessary within the asynchronous serial data stream. All of the required timing and parity checking is automatically taken care of by the X-Bee's UART.

Alcohol sensor:

Sensitive material of MQ-3 gas sensor is SnO₂, which with lower conductivity in clean air. When the target alcohol gas exist, the sensor's conductivity is higher along with the gas concentration rising. Please use simple electro circuit, Convert change of conductivity to correspond output signal of gas concentration. MQ-3 gas sensor has high sensitivity to Alcohol, and has good resistance to disturb of gasoline, smoke and vapor. The sensor could be used to detect alcohol with different concentration; it is with low cost and suitable for different application.



Fig: Alcohol sensor

CONCLUSION

Vehicle to Vehicle Safety Device is a device indulge with the recent technology and includes the methodology based on the combination of Zigbee, GSM and many other modules by the help of which immediate support can be provided to anyone in need of it. This project is microcontroller based project .As a part of As a part of studying the analysis circuits and programs were simulated on Micro vision 4 Keil ,Hardware implementations are done using PCB layouts and EXPRESS PCB. In this paper a brief description is provided by the medium of Block Diagram and Flow diagrams as well as the introduction of technology. Also the results and implementation is being discussed here.

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