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INTELLIGENT AUTOMOBILE MONITORING SYSTEM USING EVENT DATA RECORDER

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Abstract—this paper presents a wireless sensor network based mostly monitoring of automobile parameters as a single unit. In this project the device called EDR is used to collect the details during the accident and it is transmitted to the police station and to the nearest vehicle. The sensors are connected with the vehicle to identify all the parameters like count sensor, steering angle, speed, crash, seat belt weared or not. All these details are stored in the EDR and after during investigation it can be retrieved. It acts like a black box. At the time of crash, all these details are transferred to the police station, hospital and to the nearest Police Station. In this project the sensors like Speed, accelerometer, vibration sensor, are used to identify the different status of the vehicle and it is stored in the internal memory and can be retrieved later on.

Keywords—Event Data Recorder (EDR), PIC Microcontroller.

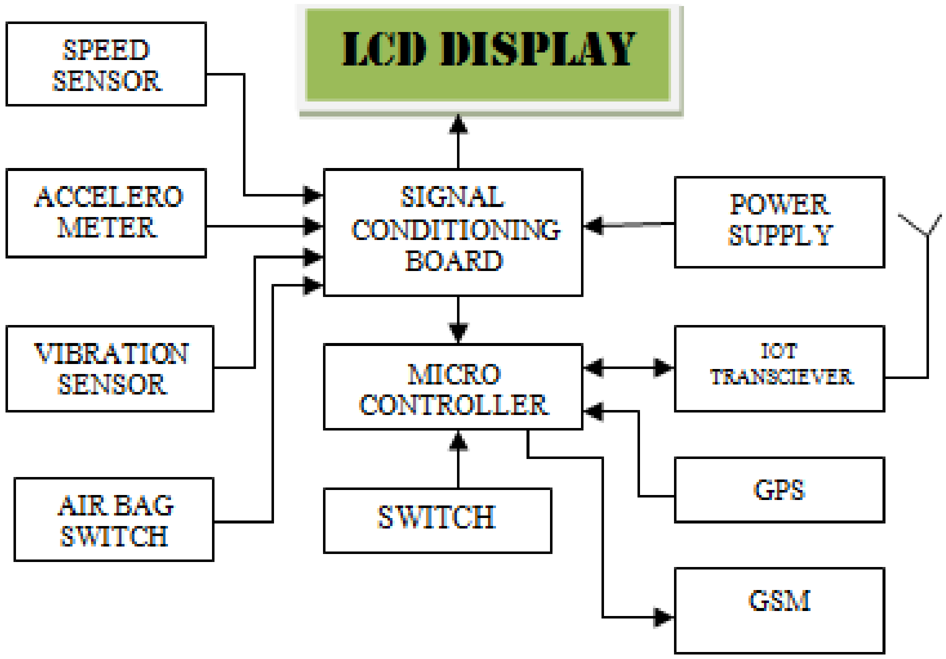
I. INTRODUCTION

It is observed that the majority of the accidents occur because of the driver's negligence of traffic and safety rules. Depending on the terrain, and other critical situations, speed restrictions may be imposed on drivers from time to time[1]. Therefore, a system monitoring the speed and different desired automobile parameters is put in within the automobile to warn the driver appropriately and also control if necessary. A device called EDR is used to collect the details during accident and it is transmitted to the Police Station. The sensors are connected to the micro controller of each of the vehicle. The output of the sensors are very low, it is amplified using signal conditioning board. The vibration sensor is used for the identification of crack and the values of sensor are transmitted to the Police Station. At the same time all the values are stored in the internal memory of the controller[2]. This device will act like a black box, which is safe during the accidents also. The IOT transmitter and receiver are used for the wireless communication. GPS sends location information to user mobile .Web server is used for fetching data in the PC, which is present in the police station or in hospital. The same information will be available in user's smart phone also.

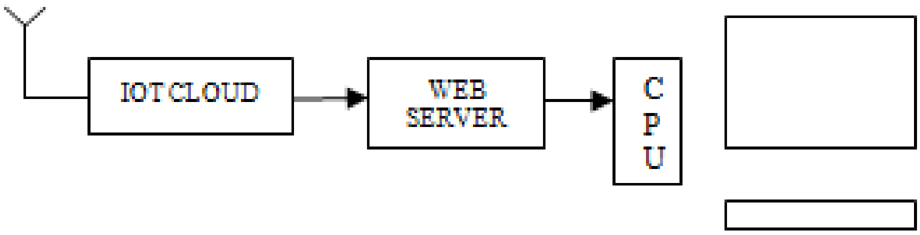
II. BLOCK DIAGRAM

A. BLOCK DIAGRAM

1. In Vehicle



2. In Police Station/ Hospital



B. REQUIREMENTS

1. Hardware Requirements

a. PIC Microcontroller

PIC microcontroller is the first RISC based microcontroller fabricated in CMOS (complementary metal oxide semiconductor) that uses separate bus for instruction and data allowing simultaneous access of program and data memory. The main advantage of CMOS and reduced instruction set computing combination is low power consumption resulting in a really tiny chip size with a small pin count. The main advantage of CMOS is that it's immunity to noise than different fabrication techniques. Various microcontrollers offer different kinds of memories. EEPROM, EPROM, FLASH etc. are a number of the memories of that FLASH is the most recently developed. Technology that's utilized in pic16F877A is flash technology, so that data is retained even when the power is switched off. Easy Programming and Erasing ar alternative options of PIC 16F877A[3].

b. Vibration Sensor

Vibration sensor is employed originally as a vibration switch because of its high sensitivity; it's sensitive surroundings vibration and usually used to observe the close vibration strength. The Vibration module supported the vibration detector SW-420 and Comparator LM393 to watch if there's any vibration that on the far side the threshold. The threshold will be adjusted by the on-board potentiometer. When this no vibration, this module output logic LOW the signal indicate LED light, And the other way around. No shock, vibration switch was closed conduction state, output of low output, the inexperienced indicator light. Shock, vibration switch instantly disconnected, the output-side output high, the green light doesn't shine. The output will be directly connected to the microcontroller through the microcontroller to observe high and low, thereby detecting whether the vibration environment, played the role of the police.

c. Potentiometer

A potentiometer (colloquially called a "pot") is a three-terminal resistance with a sliding contact that forms an adjustable voltage divider. If solely 2 terminals are used (one aspect and also the wiper), it acts as a variable resistor or rheostat. Potentiometers are ordinarily used to control electrical devices like volume controls on audio instrumentation. Potentiometers operated by a mechanism are used as position transducers, as an example, in a joystick. Potentiometers are seldom used to directly control vital power (more than a watt). Instead they're used to regulate the amount of analog signals (e.g. volume controls on audio equipment), and as management inputs for electronic circuits.

d. GPS

This is a standalone GPS receiver with built-in antenna. It is build around MTK3329 GPS chipset, if in your project you need a small footprint GPS then this can be for you. It measures only 16mm x 16mm x 6mm and can also be connected to USB without any extra bridge IC.In this project GTPA010 is used. The main power voltage is kept between 3.2 to 5.0V[4].

Some of the other Hardware components are Speed Sensor, LCD display, IOT Modem, Control Switch, Accelorometer, PC, Power Supply.

2. Software Requirements

a. Embedded C Programming

The main plan of writing program in C language is to break a bigger problem down into many smaller pieces. Suppose it's necessary to write a program for the microcontroller that's going to measure temperature associated show results on an LCD display. The process of measuring is performed by a detector that converts temperature into voltage. The microcontroller uses its A/D device to convert this voltage (analogue value) to variety (digital value) that is then sent to the LCD via many conductors. Accordingly, the program is split in four components that you just ought to undergo as per the subsequent order: 1. Activate and set built-in A/D converter; 2. Measure analogue value; 3. Calculate temperature; 4. Send data in the correct type to LCD display. As seen, the higher programming languages like C modify you to resolve this problem easily by writing four functions to be executed cyclically and over and over again.

b. MPLAB IDE

Microchip includes a large suite of software and hardware development tools integrated within one software package known as MPLAB Integrated Development environment (IDE). MPLAB IDE is a free, integrated toolset for the event of embedded applications on Microchip's PIC and dsPIC microcontrollers. It is known as an Integrated Development environment, or IDE, because it provides a single integrated environment to develop code for embedded microcontrollers.

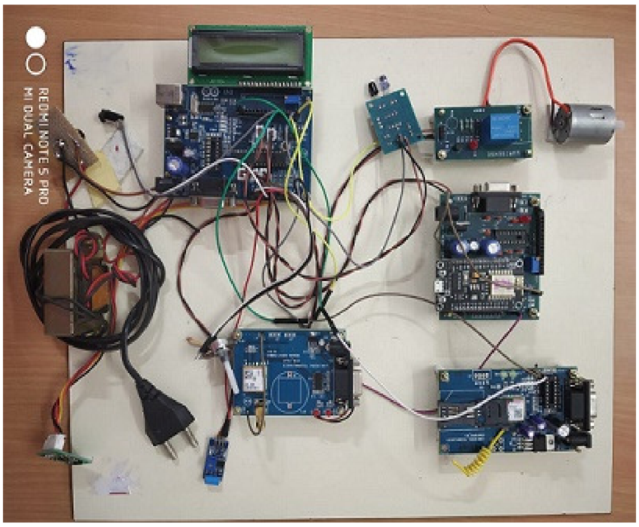
MPLAB IDE runs as a 32-bit application on MS Windows, is easy to use and includes type of free software package elements for quick application development and super-charged debugging. MPLAB IDE also serves as a single, unified graphical user interface for extra micro chip and third party software and hardware development tools. Moving between tools may be a snap, and upgrading from the free software simulator to hardware rectify and programming tools is finished in an exceedingly flash as a result of MPLAB IDE has the same user interface for all tools.

III. SYSTEM DESIGN

The power supply output is given to micro controller and other circuit also; the design of the power supply is mainly because of the micro controller, the micro controller work in DC Source with a voltage of +5V. As we are getting the line voltage VL has 230V in AC source, so it is not possible. This power supply designs an output of +5V DC to activate the micro controller[5]. The signal conditioning board controls the signals from speed sensor, accelerometer, vibration sensor and air bag switch. The signal from the sensors are amplified for further processing. GPS used to detect the location of the accident place. Micro controller process the overall signals and produces the output in LCD Display. It further sends the notification to Police Station and the nearest user. The program for micro controller are written using Embedded C in MPLAB IDE software[6].

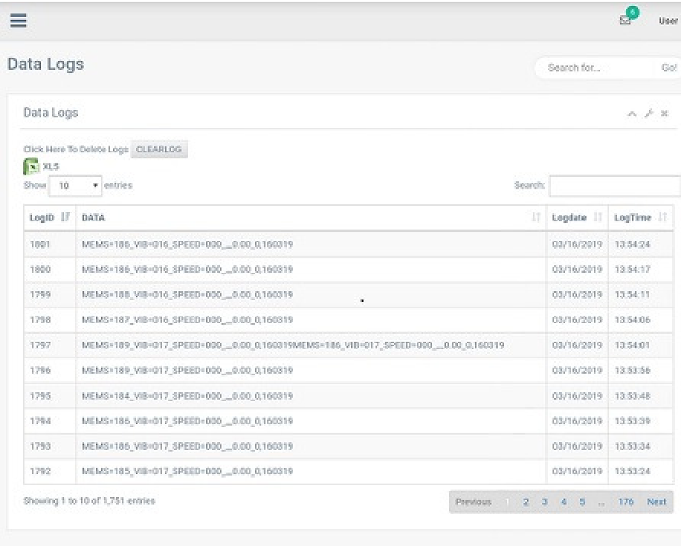
IV. DEMO SYSTEM SETUP

In order to verify the theoretical analysis model, a demonstration system was designed and implemented. The system hardware diagram is shown below[7]. After the power is turned on, hang it in the middle of the vehicle and the demonstration system starts working.



The event data recorder acts like a black box. The sensors monitor the various activities of the vehicles such as the speed, vibrations and the direction of the vehicle. The datas are stored in the cloud instantaneously using IOT and can be viewed in the webpage.

The speed of the vehicle and the location are stored in the webpage and can be viewed any time. A message is also sent to the registered mobile number regarding the accident.



LogID	DATA	Logdate	LogTime
1801	MEMS=186_VIB=016_SPEED=000__0.00_0,160319	03/16/2019	13:54:24
1800	MEMS=186_VIB=016_SPEED=000__0.00_0,160319	03/16/2019	13:54:17
1799	MEMS=188_VIB=016_SPEED=000__0.00_0,160319	03/16/2019	13:54:11
1798	MEMS=187_VIB=016_SPEED=000__0.00_0,160319	03/16/2019	13:54:06
1797	MEMS=189_VIB=017_SPEED=000__0.00_0,160319MEMS=186_VIB=017_SPEED=000__0.00_0,160319	03/16/2019	13:54:01
1796	MEMS=189_VIB=017_SPEED=000__0.00_0,160319	03/16/2019	13:53:56
1795	MEMS=184_VIB=017_SPEED=000__0.00_0,160319	03/16/2019	13:53:48
1794	MEMS=186_VIB=017_SPEED=000__0.00_0,160319	03/16/2019	13:53:39
1793	MEMS=186_VIB=017_SPEED=000__0.00_0,160319	03/16/2019	13:53:34
1792	MEMS=185_VIB=017_SPEED=000__0.00_0,160319	03/16/2019	13:53:24

V. CONCLUSION

A wireless network demo system with monitoring and collecting information is designed and theoretical analysis results are verified.

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