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ACCIDENT DETECTION AND VEHICLE SAFETY USING ZIGBEE

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Abstract - *The motorcycle accident is a major public problem in many countries. Despite awareness campaign, this problem is still increasing due to rider's poor behaviors such as speed driving, drunk driving, riding with no helmet protection, riding without sufficient sleep, etc. The numbers of death and disability are very high because of late assistance to people who got the accident. These cause huge social and economic burdens to people involved. Therefore, several research group and major motorcycle manufacturers including have developed safety devices to protect riders from accidental injuries. However, good safety device for motorcycle is difficult to implement and very expensive.*

Key Words: PIC16F877a, Crash sensor, Ultrasonic sensor, LCD, Zigbee, GSM.

1. INTRODUCTION

The immediate effect of this situation is the dramatic increase of traffic accidents on the road, representing a serious problem in most countries. As an example, 2,478 people died in Spanish roads in 2010, and 34,500 people in the whole European Union died in2009. To reduce the number of road fatalities, vehicular Networks will play an increasing role in the Intelligent Transportation Systems (ITS) area. The integration of sensor capabilities on-board of vehicles, along with peer-to-peer mobile communication among vehicles, forecast significant improvements in terms of safety in the near future. Its applications such as road safety, fleet management, and navigation, will rely on data exchanged between the vehicle and the roadside infrastructure (V2I).

2. EXISTING SYSTEM

There are no Sensor networks available to detect and rescue the accident. Cannot track the vehicle.

2.1 DRAWBACKS IN EXISTING SYSTEMS

More time consumption. Automatic alert is not possible. Possibilities for traffic collision

3. PROPOSED SYSTEM

WSN are used to find the severity of accident. Renewable energy sources are used to charge the battery.

3.1 BLOCK DIGRAM

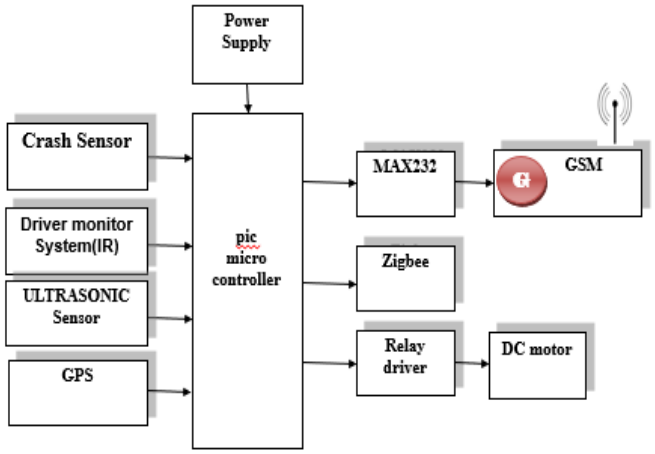

FIG 1: Block diagram of proposed system

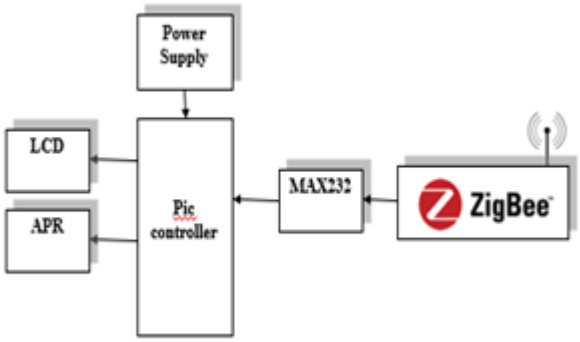

Fig 2: Other Car Section

3.2 CIRCUIT DIAGRAM

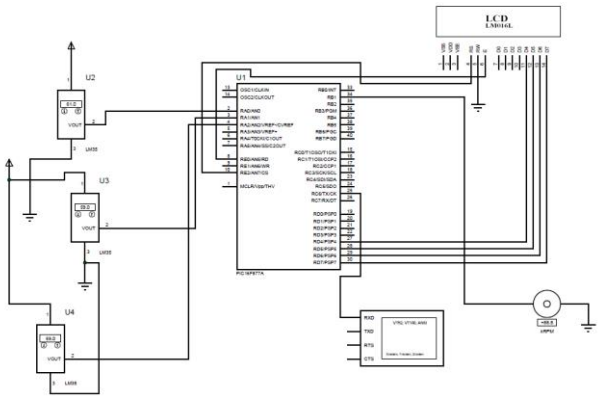

FIG :3 Circuit diagram of proposed system.

3.3EXPLANATION

To attain our proposed system need to use crash sensor, tilt sensor, GPS, GSM, Zigbee, solar panel, buzzer, battery, LCD. Crash sensor is used to find the accident. Tilt sensor is used to estimate the severity of accident. If accident is find it takes the coordination from GPS and send to the care center and also relatives with help of GSM and Zigbee. Accident occurs vehicle motor will stop automatically. On road section consist of Zigbee, LCD, buzzer, solar panel, battery. Generated power is stored in the battery. Received values are displayed in the LCD and buzzer will give intimation to the nearest people. Accident information will sent to the other vehicle through Zigbee device using ad-hoc method.

3.4 ADVANTAGES

Easy implementation. Reliable and efficient. Low cost and simple design.

4. SIMUATION

4.1 SIMULATION RESULTS

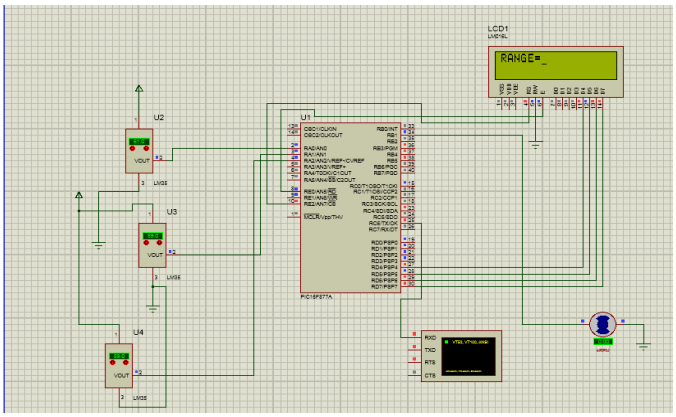

FIG: 4 SIMULATION OUTPUT

5. HARDWARE:

5.1 PIC16f877a

FIG: 5 PIC16f877a

The PIC16F877A features 256 bytes of EEPROM data memory, self programming, an ICD, 2 Comparators, 8 channels of 10-bit Analog-to-Digital (A/D) converter, 2 capture/compare/PWM functions, the synchronous serial port can be configured as either 3-wire Serial Peripheral Interface (SPI™) or the 2-wire Inter-Integrated Circuit (I^2C™) bus and a Universal Asynchronous Receiver Transmitter (USART). All of these features make it ideal for more advanced level A/D applications in automotive, industrial, appliances and consumer applications.

5.2 LCD

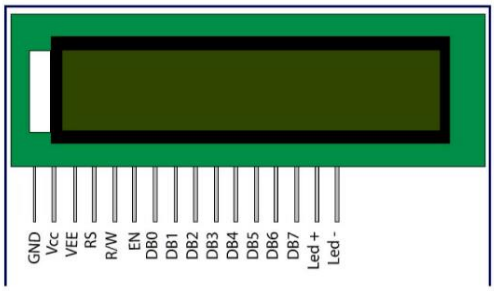

FIG:6 LCD Display

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on.

5.3 GSM modem

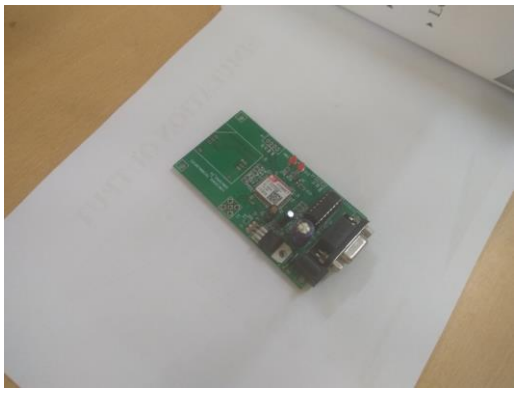

FIG:7 GSM MODEM

A GSM modem is a wireless modem that works with a GSM wireless network. A wireless modem behaves like a dial-up modem. The main difference between them is that a dial-up modem sends and receives data through a fixed telephone line while a wireless modem sends and receives data through radio waves. The working of GSM modem is based

on commands, the commands always start with AT (which means Attention) and finish with a <CR> character. For example, the dialing command is ATD<number>; ATD3314629080; here the dialing command ends with semicolon.

5.4 GPS

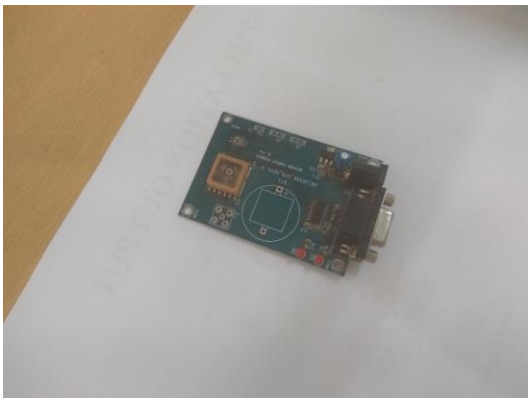

FIG:8 GPS.

The **Global Positioning System** (**GPS**) is a U.S. space-based global navigation satellite system. It provides reliable positioning, navigation, and timing services to worldwide users on a continuous basis in all weather, day and night, anywhere on or near the Earth. GPS is made up of three parts: between 24 and 32 satellites orbiting the Earth, four control and monitoring stations on Earth, and the GPS receivers owned by users. GPS satellites broadcast signals from space that are used by GPS receivers to provide three-dimensional location (latitude, longitude, and altitude) plus the time.

5.4 ZIGBEE

Fig 9 ZIGBEE

ZigBee is a wireless technology developed as an open global standard to address the unique needs of low-cost, low-power, wireless sensor networks. The standard takes full advantage of the IEEE 802.15.4 physical radio specification and operates in unlicensed bands worldwide at the following frequencies: 2.400–2.484 GHz, 902-928 MHz and 868.0–868.6 MHz.

6. CONCLUSION

The new communication technologies integrated into the automotive sector offer an opportunity for better assistance to people injured in traffic accidents, reducing the response time of emergency services, and increasing the information they have about the incident just before starting the rescue process. To this end, we designed and implemented a prototype for automatic accident notification and assistance based on V2V and V2I communications. The studied classification algorithms do not show remarkable differences, but we demonstrate that, if we are able to classify the accidents depending on the types of impacts, we can noticeably increase the accuracy of the system, especially for front crashes where the vehicle is usually the striking one. To this end, we developed a prototype that shows how inter vehicle communications can make accessible the information about the different vehicles involved in an accident. Moreover, the positive results achieved on the real tests indicates that the accident detection and severity estimation algorithms are robust enough to allow a mass deployment of the proposed system.

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