Accident Detection in Two Wheelers Using Sensors

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Abstract— The main objective of this project is to design a smart two wheeler accident detection system to minimize road accidents for human safety. This vehicle enables parameters of sensing mechanism which will without any manual handling sends messages to personal contacts with the details of where the vehicle mate with an accident using GSM/GPRS system. Sensors senses multiple parameters and merge all the calculated results in the smart vehicle which is connected to microcontroller eventually detects any accident which had occur and then send text SMS with the help of GSM technology to the owner's personal contacts as well as to local ambulance and police station.

Keywords: GSM Module, GPS Modules, Microcontroller, Limit Switch, Accelerometer

I. INTRODUCTION

One of the most leading cause of fatality is vehicle accidents. Time gap between accidents occurred at the location and medical emergency services to get information and reach till the accident location plays an important factor in increase in chance of rate of survival factor. By decreasing the time gap of reaching information to emergency facilities and by getting the accurate location where accident has occurred which increases the mortality rate.

With the help of accident detection device emergency services will be able to tract the current traffic rate and the shortest distance to reach till the site of accident by using GPS and as well as will be notified at the quickest possible time . Limit switch which is connected with microcontroller will sense the impact parallel activity GPS will trace accident location and with the help of GSM alert will be send along with the tracked location in the form of longitude and latitude from buffers to emergency services and contact numbers predefined in program.

II. LITERATURE SURVEY

At present criteria, we cannot detect where the accident has occurred and hence no information related to it, leading to the death of an individual. The research works going on for tracking the position of the vehicle even in dark clumsy areas where there is no network for receiving the signals. In this project GPS is used for tracking the position of the vehicle, GSM is used for sending the message and the Microcontroller controller is used for saving the mobile number in the EEPROM and sends the message tout when an accident has been detected. From the past event and the existing approach the below Drawback are been noted:
1) Manual system is adopted.
2) Tracking of accident is a crucial process in the system.
3) Required medical attention cannot be given to the needed person.
4) Life loss and property loss were not stopped in large scale. Considering all the drawbacks into account we

have formulated a proposed system which covers all the above mentioned drawbacks.[1]

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4) Life loss and Property loss were not stopped in large scale. Considering all the drawbacks into account we have formulated a proposed system which covers all the above mentioned drawbacks. ☐ A Automated system is used once the accident occurs.
   – This system gives the Latitude and Longitude of the system accident occurred area without any
   – More Human life can be saved using this automated system.[2]

Nowadays we are able to track vehicles using many applications which helps in securing personal vehicles, public vehicles, feet units and others. Furthermore there is a rapid increase in the occurrence of the Road accident. This paper is about a system which is developed to automatically detect an accident and alert the nearest hospitals and medical services about it. This system can also locate the place of the accident so that the medical services can be directed immediately towards it. The goal of this paper is to build up a Vehicle accidental monitoring system using MEMS, GPS and GSM Technology. The system comprises of accelerometer, MCU, GPS & GSM Module support in sending message. The accelerometer is used to detect fall and Threshold Algorithm are used to detect accident. Short Message will contain GPS [Latitude, Longitude] which helps in locating the vehicles.

III. PROPOSED METHODOLOGY AND DISCUSSION

This system is very efficient and hence worthy to be implemented. Accident detection and messaging system can be fitted in vehicle (Ambulance, Police or to the communication device of the near and dear) and they are informed about any such untoward incident at the go. Accident detection and messaging system is execution simple as the system makes use of GSM & GPS technologies. GPS is used for taking the coordinate of the site of the accident while GSM is used for sending the message to phone. To make this process all the control is made using Arduino whereas LCD is used to display the accident.

A. Microcontroller:

1) Peripheral Features:-
– Timer0: 8-bit timer/counter with 8-bit presale.
– Timer1:16-bit timer/counter with presale, can be incremented during SLEEP via external crystal/clock.
– Timer2: 8-bit timer/counter with 8-bitperiod register, presale and postscaler.

- Two Capture, Compare, PWM modules.
- Capture is 16-bit, max. Resolution is 12.5ns.
- Compare is 16-bit, max. resolution is 200ns
- PWM max. Resolution is10-bit | 10 -bit multi-channel Analog-to-Digital converter.
- Synchronous Serial Port (SSP) with SPI (Master mode) and I2C (Master/Slave).
- Universal Synchronous Asynchronous Receiver Transmitter (USART/SCI) with 9-bit address detection.
- Parallel Slave Port (PSP) 8-bits wide, with external RD, WR and CS controls (40/44-pinonly).
- Brown-out detection circuitry for Brown-out Reset (BOR).

2) Core Features:-
- High performance RISCCPU
- Only 35 single word instructions to learn
- All single cycle instructions except for program branches which are two cycle
- Operating speed: DC - 20 MHz clock input DC - 200 ns instruction cycle
- Up to 8K x 14 words of FLASH Program Memory, Up to 368 x 8 bytes of Data Memory(RAM)
- Up to 256 x 8 bytes of EEPROM Data Memory
- Pin out compatible to thePIC16C73B/74B/76/77
- Interrupt capability (up to 14sources)
- Eight level deep hardware stack
- Direct, indirect and relative addressing modes
- Power-on Reset(POR)
- Power-up Timer (PWRT) and Oscillator Start-up Timer(OST)
- Watch dog Timer(WDT)with its own on-chip RC oscillator for reliable operation .
- Programmable code protection.
- Selectable oscillator options.
- Low power, high speed CMOSFLASH/EEPROM technology.
- Fully static design.
- In-Circuit Serial Programming (ICSP) via two pins.
- Single5VIn-CircuitSerialProgrammingcapability.
- In-Circuit Debugging via two pins.
- Processor read/write access to program memory.
- Wide operating voltage range: 2.0V to5.5V.
- High Sink/Source Current: 25mA.
- Commercial, Industrial and Extended temperature ranges.
- Low-power consumption:
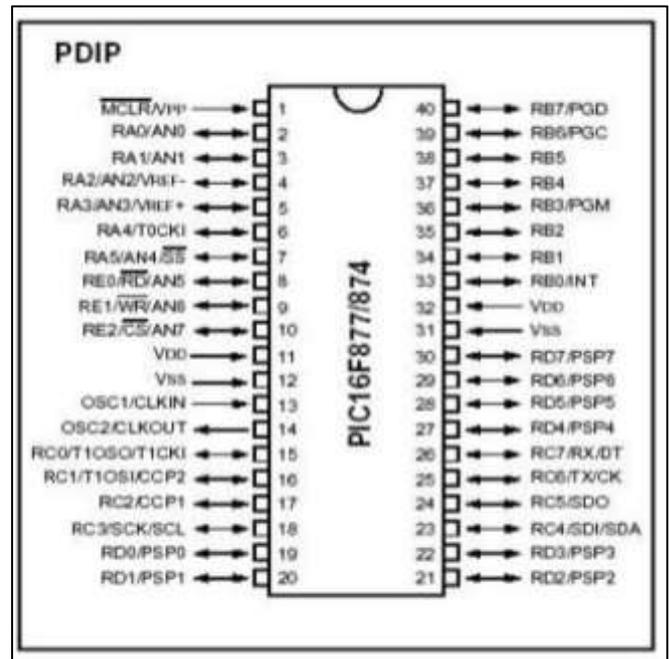- < 0.6 mA typical @ 3V, 4MHz
- 20 A typical @ 3V, 32 kHz

Fig. 1: PIC16F877/874

B. SENSORS

1) Limit Switch:-

In electrical engineering a limit switch is a switch operated by the motion of a machine part or presence of an object.

They are used for controlling machinery as part of a control system, as a safety interlocks, or to count objects passing a point. A limit switch is an electromechanical device that consists of an actuator mechanically linked to a set of contacts. When an object comes into contact with the actuator, the device operates the contacts to make or break an electrical connection.

Limit switches are used in a variety of applications and environments because of their ruggedness, ease of installation, and reliability of operation. They can determine the presence or absence, passing, positioning, and end of travel of an object. They were first used to define the limit of travel of an object; hence the name "Limit Standardized limit switches are industrial control components manufactured with a variety of operator types, including lever, roller plunger, and whisker type. Limit switches may be directly mechanically operated by the motion of the operating lever. A reed switch may be used to indicate proximity of a magnet mounted on some moving part. Proximity switches operate by the disturbance of an electromagnetic field, by capacitance, or by sensing a magnetic field.

Miniature snap-action switch may be used for example as components of such devices as photocopiers, computer printers, convertible tops or microwave ovens to ensure internal components are in the correct position for operation and to prevent operation when access doors are opened. A set of adjustable limit switches are installed on a garage door opener to shut off the motor when the door has reached the fully raised or fully lowered position. A numerical control machine such as a lathe will have limit switches to identify maximum limits for machine parts or to provide a known reference point for incremental motions.

Fig. 2: Limit Switch

2) ACCELEROMETER:-
a)　　　DISCRIPTION:-.

The accelerometer is a small, thin, low power, complete 3-axis accelerometer with signal conditioned voltage outputs. The product measures acceleration with a minimum full-scale range of ±3 g. It can measure the static acceleration of gravity in tilt-sensing applications, as well as dynamic acceleration resulting from motion, shock, or vibration .The user selects the band width of the accelerometer using the C X , C Y , and C Z capacitors at the X OUT , Y OUT , and Z OUT pins .Bandwidths can be selected to suit the application, with a range of 0.5 Hz to 1600 Hz for the and Y axes, and a range of 0.5 Hz to 550 Hz for the Z axis .The ADXL335 is available in as mall, low profile, 4 mm×4 mm × 1.45 mm, 16-lead, plastic lead frame chip scale package (LFCSP_LQ).

b)　　　FEATURES:-
- 3-Axis sensing
- Small, low profile packing
- 4 mm* 4 mm* 1.44 mm LFCSP
- Low power : 350 μA (typical)
- Single-supply operation : 1.8 V to 3.6 V
- 10,000 g shock survival
- Excellent temperature stability
- BW adjustment with a single capacitor per axis
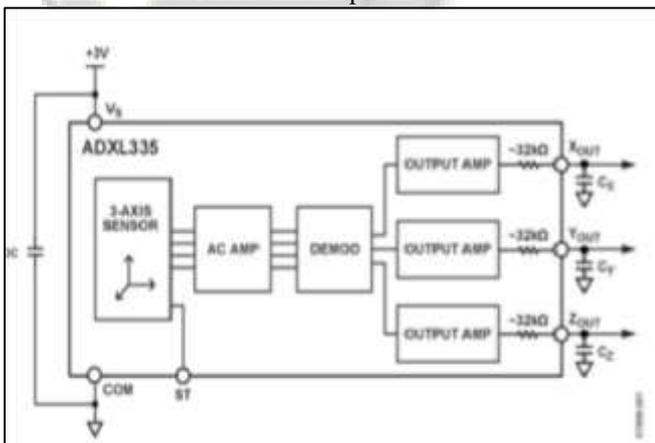- RoHS/WEEE lead free complaint

Fig. 3: Accelerometer

C. GSM MODULES:-

A GSM module or a GPRS module is a chip or circuit that will be used to establish communication between a mobile device or a computing machine and a GSM or GPRS system's (Global System for Mobile Communications, originally Grouped Special Mobile), is a standard developed by the European Telecommunications Standards Institute (ETSI).It was created to describe the protocols for second-generation (2G) digital cellular networks used by mobile phones and is now the default global standard for mobile communications – with over 90% market share, operating in over 219 countries and territories. General Packet Radio Service (GPRS) is a packet oriented mobile data service on the 2G, 3G and 4G cellular communication system's global system for mobile communications (GSM). GPRS was originally standardized by European Telecommunications Standards Institute (ETSI) in response to the earlier CDPD and i-mode packet-switched cellular technologies. It is now maintained by the 4th Generation Partnership Project (4GPP).

Fig. 4: GSM Modules

D. GPRS Receiver:-

- Meets or Exceeds TIA/EIA-232-F and ITU RecommendationV.28
- Operates from a Single 5-V Power supply with 1.0-μF Charge-Pump Capacitors
- Operates Up To 120kbit/s
- Two Drivers and Two Receivers
- -V Input Levels
- Low Supply Current. 8 mA Typical ESD Protection Exceeds JESD-222000-V Human-Body Model (A114-A)
- Upgrade With Improved ESD (15-kVHBM) and 0.1-μF Charge-Pump Capacitors is Available With theMAX202 Capacitors is Available With the MAX202
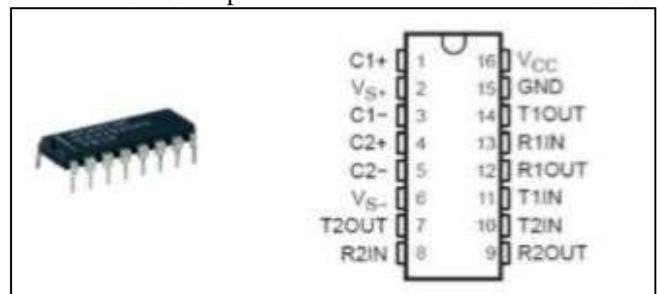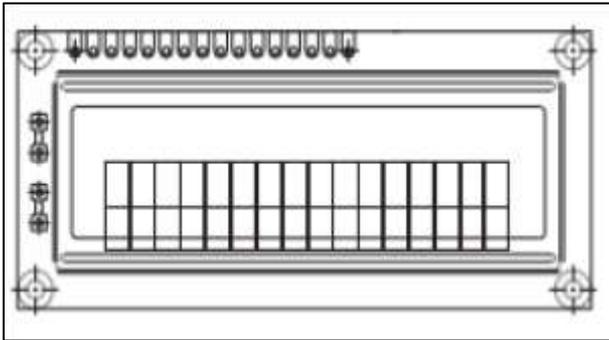

Fig. 5: GPRS Receiver

E. LCD Display:

1) FEATURES
- 5 x 8 dots with cursor
- Built-in controller (KS 0066 or Equivalent)
- + 5V power supply (Also available for + 3V)
- 1/16 duty cycle
- B/Ltobedrivenbypin1, pin2orpin15,pin16orA.K(LED)
- N.V. optional for + 3V power supply

IV. WORKING PRINCIPLE

Project Work:-

In electronic system it would be virtually impossible for package without in corpora tin printed circuit in there design. Printed circuit is metal foil conducting pattern serves as the connection medium for the electronic medium that are assumable on the opposite side of the board. Conducting materials available are silver, brass, aluminium, & copper. Copper is most widely used. The thickness of conducting material depends upon the current carrying capacity of circuit thus a thicker copper layer will have more current carrying capacity,

− It provides mechanical support for the components mounted on it.
− It provides necessary electrical interconnection.3. It acts as the heat sink i.e. it provides a conduction path leading to removal of most of the heat generated in the ckt..
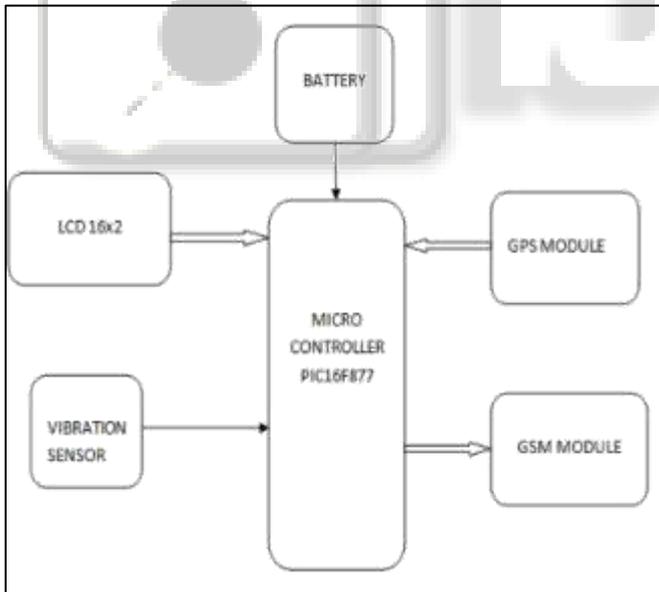
V. CONCLUSION

In modern cities, the volume of vehicles has increased drastically in recent years. This increased traffic has resulted in an increase in emergency response. We have shown that using a variety of different sensors can help in detecting a road accident more accurately.

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