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RESEARCH ARTICLE

AUTOMATIC VEHICLE ACCIDENT DETECTION SYSTEM USING GPS AND ZIGBEE

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ABSTRACT

In modern world technology has changed the human lives more comfortably. The advent of technology has also leads to upturn in traffic vulnerabilities and the road accidents takes place often but still very less accident makers are identified. In majority of the cases the vehicle which made accident will easily escape and it is difficult to keep in track of these vehicles and the victims who bruised in the accident were depends only on the mercy of others to rush them to hospital which might causes certain delay to rescue. Our project will provide an optimum solution to these drawbacks. When the accident was stuck between two vehicles in aparticular location, the vibration sensor which is attached with the vehicles will detect the signals and sends it to PIC microcontroller. Microcontroller sends the alert message simultaneously to the police control room and ambulance support server via zigbee communication where zigbee module is placed to all the mobile towers. We are added up another Proof to identify the reason of the Accident through the driver's profile using magnetic striped license. Using our tracking system we can keep track of the vehicle by periodically using GPS. So after receiving the alert, the police can easily track the accident makers and the victims can be saved instantly.

INTRODUCTION

The high demand of automobiles has also increased the traffic hazards and the road accidents. Life of the people is under high risk. That is mainly due to the lack of best emergency facilities available in our country. An automatic alarm device for vehicle accidents is introduced in this paper. This design is a system which can detect accidents in significantly less time and sends the basic information to first aid center within a few seconds covering geographical coordinates, the time and angle in which a vehicle accident had occurred.

This alert message is sent to the rescue team in a short time, which will help in saving the valuable lives. A Switch is also provided in order to terminate the sending of a message in rare case where there is no casualty, this can save the precious time of the medical rescue team. When the accident occurs the alert message is sent automatically to the rescue team and to the police station. The message is sent through the zigbee module and the location of the accident is detected with the help of the GPS module. This application provides the optimum solution to poor emergency facilities provided to the roads accidents in the most feasible way.

Literature survey

At present criteria we cannot detect the accident has occurred and hence no information related to it, leading to the death of an individual. Depending only on camera/video footage, we can track the vehicle which made accident. But this system is not efficient to find out the vehicle especially in night time. One of the drawbacks of this system is that cameras are placed in limited areas only. There no existing system is available to track the vehicle, which made accident using the regular monitoring system. By this project implementation we can detect the position of the vehicle where the accident has occurred so that we can provide the first aid as early as possible. This project introduced a new concept of magnetic striped license similar to ATM card. It is used access the vehicle by swiping the card in the device. When the accident occurred, information of the driver can be stored in the microcontroller by using embedded c language and passed via zigbee communication to the server. Therefore the police can easily detect the misbehaviour drivers.

System Implementation

The prototype model of an automatic vehicle accident detection system using Zigbeeand GPS module will be made in the following steps:

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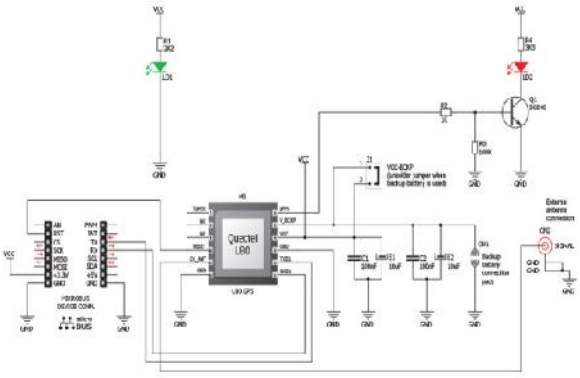
- Complete layout of the whole set up will be drawn in form of a block diagram.
- A Vibration sensor will first sense the occurrence of an accident and give its output to the microcontroller.
- The GPS detects the latitudinal and longitudinal position of a vehicle.
- The latitudes and longitudes position of the vehicle is sent as alert via Zigbee.
- The Vehicle driver's details is pre-saved in the EEPROM using magnetic striped license.
- Whenever an accident has occurred, the exact position is detected and a alert message has been sent to the ambulance and police control server via zigbee communication.

GPS module

The GPS is used in vehicles for both tracking and navigation. Tracking systems enable a base station to keep track of the vehicles without the intervention of the driver where, as navigation system helps the driver to reach the destination. Whether the navigation system or tracking system, the architecture is more or less similar. When an accident is occurred in any place the GPS system tracks the position of the vehicle and information to thepolice and ambulance support via zigbee.



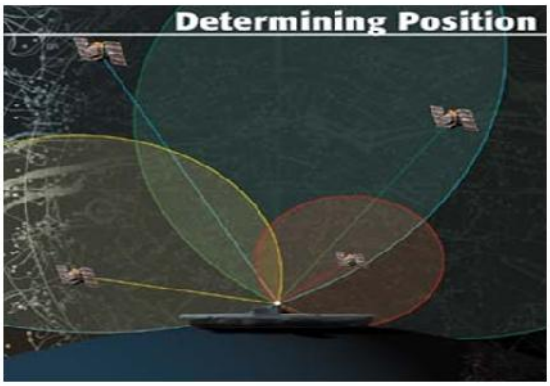


Fig. 1 GPS

Zigbee

Zigbee is a wireless technology developed as an open global standard to address the unique needs of low-cost, low-power wireless M2M networks. The protocol was designed to provide an easy-to-use wireless data solution characterized by secure, reliable wireless network architectures. When the vibration sensor detects the signal, it activates the GPS which detects the exact accident location and the vehicle details are passed to the server via Zigbee.

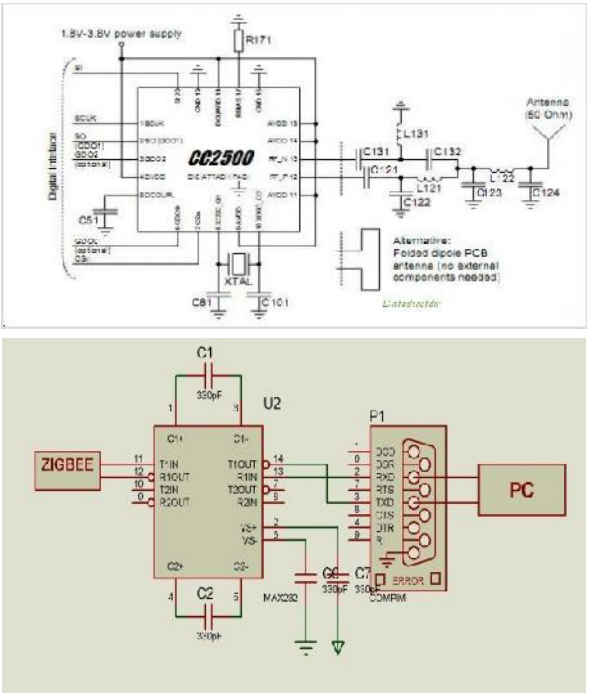


Fig. 2 Zigbee

Proposed system

In this project we proposed the design, development and deployment of GPS (Global Positioning System) & ZIGBEE based Vehicle Tracking and Alert System which allows traffic police control station to track vehicles which made accident, in real-time and provides an alert system. Nowadays all the new vehicle consist of vibrating sensor and GPS system . The main objective of this project is to detect the vehicle accident and transmit the location of the accident with the information of victim and type of accident to the medical help centre and police control room. So medical help centre and police control room will get the exact location by the geographical co-ordinates transmitted via message with the help of map.

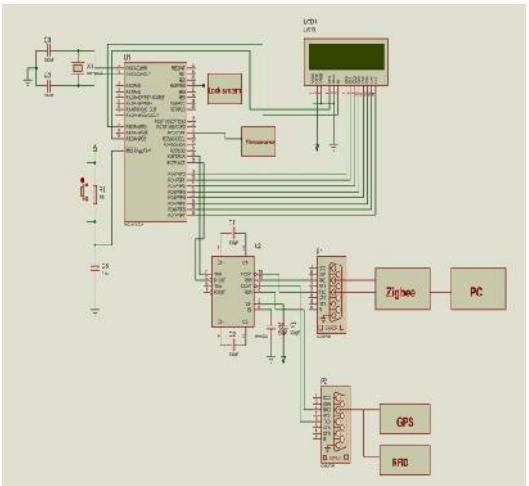


Fig.1 Schematic diagram of the system

Block Diagram

Vehicle section

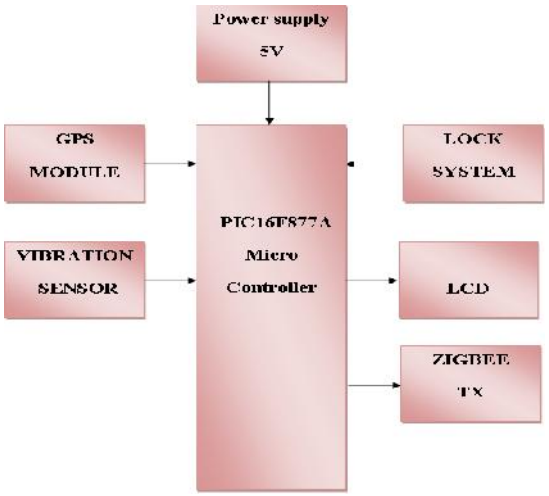


Fig. 3 Vehicle Section module

Whenever a collision is occurred the vibrating sensor ON and it will activate the GPS system. Simultaneously the zigbee module will send message to nearby traffic police control station. The message includes the location, vehicle owner details.

Host section

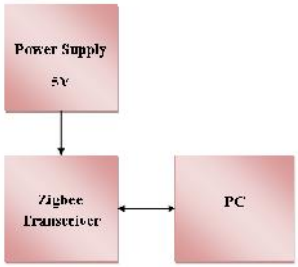


Fig.4 Host System

Using this information the police can trace the vehicle and identify the vehicle which made accident and trace the current location of that vehicle using GS. This system is a low cost and efficient tracking system. These details will help to find the person who made a accident.

Software Design

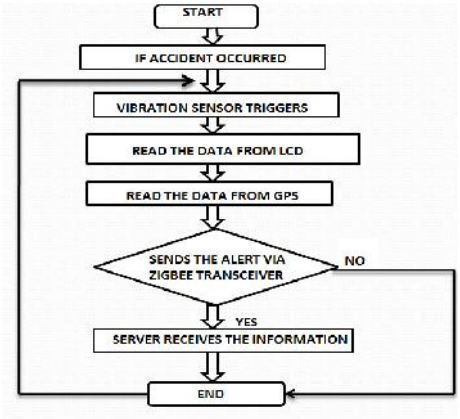


Fig.5 Flow chart of system

Software & Hardware Description

MPLAB IDE Software

MPLAB Integrated Development Environment (IDE) is a FREE, integrated toolset for the development of embedded applications employing Microchip's PIC® and dsPIC® microcontrollers. MPLAB IDE runs as a 32-bit application on MS Windows®, is easy to use and includes a host of free software components for fast application development and super-charged debugging.

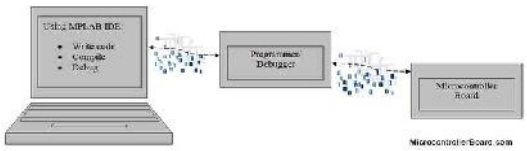


Fig. 6 MPLAB IDE Software

PIC

This system is a low cost and efficient tracking system. These details will help to find the person who made a accident. It is a High performance RISC CPU machine with the only 35 simple word instructions. Operating speed: clock input (200MHz), instruction cycle (200nS). Up to 368×8 bit of RAM (data memory), 256×8 of EEPROM (data memory), 8k×14 of flash memory. 2 8 bit timer and one 16 bit timer is available10bit multi-channel A/D converter Synchronous

Serial Port (SSP) with SPI (master code) and I2C (master/slave) 100000 times erase/write cycle enhanced memory.1000000 times erase/write cycle data EEPROM memory

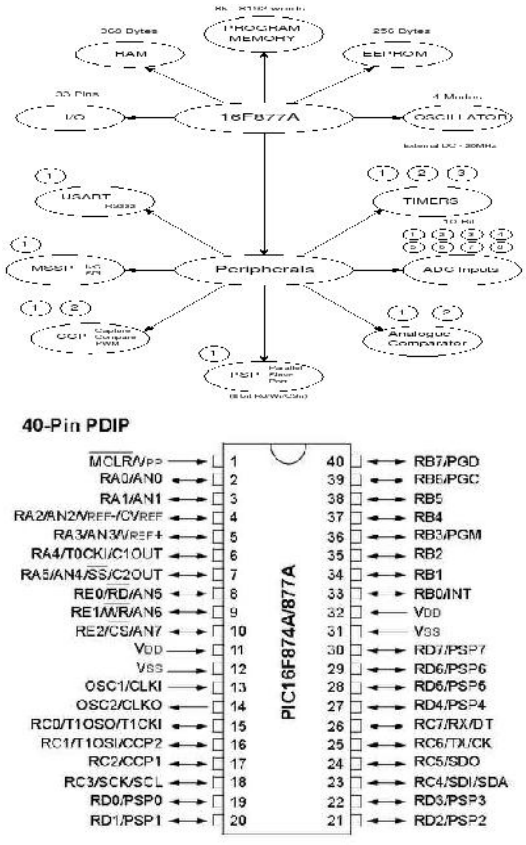


Fig.7 PIC16F877A

Vibration sensor

A capacitive vibration sensor or an accelerometer is formed from a capacitor one plate of which is a proof mass, with the other plate fixed to a substrate. Vibration sensors are utilized in a number of applications to measure acceleration and/or vibration activity

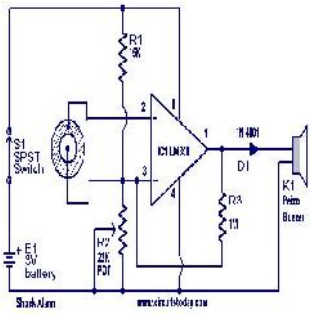


Fig.8 Vibration Sensor

Vibration sensors can be useful for monitoring the condition of rotating machinery, where overheating or excessive vibration could indicate excessive loading, inadequate lubrication or bearing wear.

LCD

LCD (Liquid Crystal Display) Screen is an electronic display module and find a wide range of applications. A 16×2 LCD display is very basic module and is very commonly used in various devices and circuits

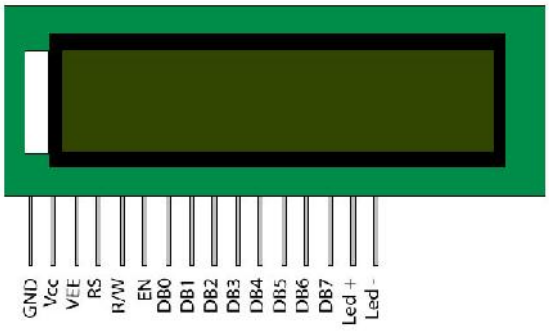


Fig 9 16×2 LCD display

Magnetic stripes

A magnetic stripecard is a type of card capable of storing data by modifying the magnetism of tiny iron-based magnetic particles on a band of magnetic material on the card. The magnetic stripe, sometimes called swipe card or magstripe, is read by swiping past a magnetic reading head.

MAX 232

The MAX232 is a dual driver/receiver that includes a capacitive voltage generator to supply TIA/EIA-232-F voltage levels from a single 5-V supply. Each receiver converts TIA/EIA-232-F inputs to 5-V TTL/CMOS levels. These receivers have a typical threshold of 1.3V, a typical hysteresis of 0.5 V, and can accept ±30-V inputs. Each driver converts TTL/CMOS input levels into TIA/EIA-232-F levels.

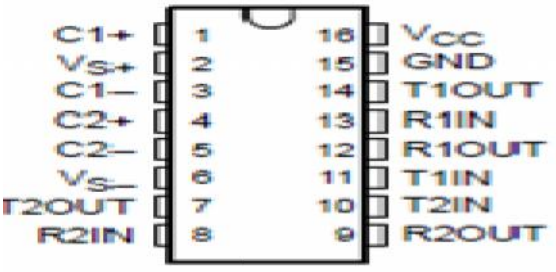


Fig.10 RS232

Power supply circuit

The hardware of project requires different power supplies 5v. The interfacing devices will get the supply from main microcontroller.

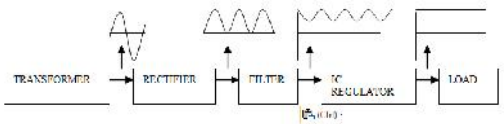


Fig .11 Power supply circuit

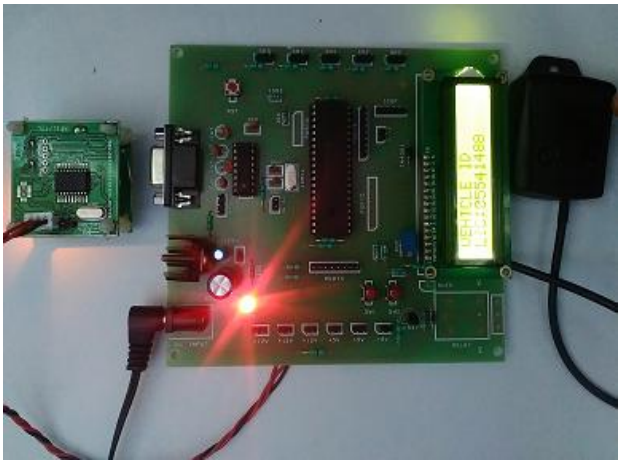


Fig. 11 Vehicle ID was displayed in the LCD using RFID reader

Applications

- Hit and run misbehavior drivers can be easily tracked
- Victims can be saved instantly
- Recovery of stolen vehicle

Advantages

- Sophisticated security
- Easy to operate
- Simple and reliable design

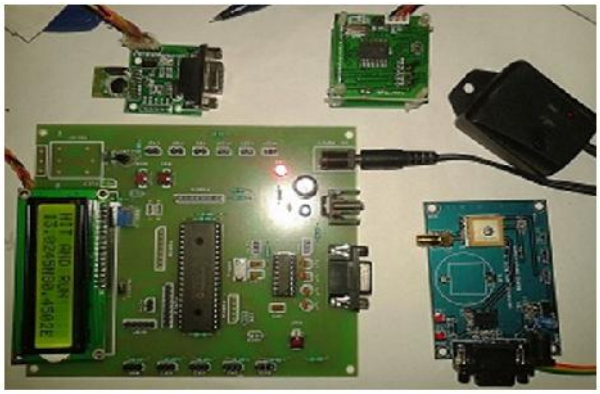


Fig.12 GPS tracks the location and the alert passed to server via zigbee

Limitations

Existing systems do not work if the system itself damaged in the vehicle accident. Also this system is not very effective in case of accident of heavy vehicles**.**

CONCLUSION

Automatic accident detection system using GPS and Zigbee is designed in this paper. When a accident occurs, it is sensed by vibration sensor. The alert including location of the accident obtained using GPS and the driver's detail, is sent via zigbee transceiver to the ambulance and police control server. It can overcome the problems of lack of automated system for accident location detection. Consequently, the time for searching the location is reduced and the person can be treated as soon as possible which will save many lives.

The vehicle driver's information and exact accident location are passed to both the traffic and ambulance control room. Thus the person who makes the accident would be tracked and detected easily by the traffic police. And the life of the victims can be saved by the ambulance service instantly without delay of time.

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