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Smart Helmet

Vikram Singh¹, Devank Saini², Diwanshu Purohit³, Dharamraj Saini⁴, Gaurav Sharma⁵, Chandan Kumar⁶

¹Assistant Professor, Department of Electrical Engineering, Swami Keshvanand Institute of Technology, Jaipur, Rajasthan.

^{2, 3, 4, 5, 6} IV year student, Department of Electrical Engineering, Swami Keshvanand Institute of Technology, Jaipur, Rajasthan.

Abstract: A Smart Helmet is a special idea which makes motorcycle driving safer than before. This is implemented using GSM and GPS technology. The working of this smart helmet is very simple, vibration sensors are placed in different places of helmet where the probability of hitting is more which are connected to microcontroller board. So when the rider crashes and the helmet hit the ground, these sensors sense and gives to the microcontroller board, then controller extract GPS data using the GPS module that is interfaced to it. When the data exceeds minimum stress limit then GSM module automatically sends message to ambulance or family members.

Keywords: GSM, GPS, Microcontroller, Vibration Sensor.

I. INTRODUCTION

The thought of developing this project comes to do some good things towards the society. Day by day the two wheeler accidents are increasing and leads to loss of many lives. According to a survey of India there are around 891 accidents occurring due to bike crashes per year. The reasons may be many such as no proper driving knowledge, no fitness of the bike, fast riding of bike, drink and drive etc. Sometime the person injured, the accident may not be directly responsible for the accident, it may be fault of rider, but end of the day it's both the drivers involved in the accidents who is going to suffer. If accidents are one issue, lack of treatment in proper time is another reason for deaths. According to the survey in India 891 accidents occur per year, nearly half the injured people die due to lack of treatment in proper time. Many reasons for this are: late arrival of ambulance, absences of pupil at the accident site to inform the family or to provide the victim with first aid. This is a situation we observe in our day to day life, in thought of finding some solution to resolve this problem we came up with this idea of giving the information about accident as soon as possible and in time. Because after all time matters a lot, if everything is done in time, at least we can save half the lives that are lost due to bike accidents. Simply leaving or ignoring the person may lead to death. In such situation, informing to ambulance or family members through mobile to rescue him for an extent.

The idea of this work is to give information about the rider meeting with an accident, it gives an information about location where he is met with an accident through GSM module to family members through a text message on their phone, so we have chosen GSM technology to give the information by sending SMS, using GSM module which has SIM card slot to place the SIM and send SMS.

A. Methodology

Smart helmet system is a cost effective assistive technology to provide security and safety of the bikers against road accidents. It includes Microcontroller 89s52, vibration sensor, GPS, GSM. The smart helmet works as soon as the biker meets with an accident. The jerk developed is acted on the vibration sensor which is taken as a input signal and is fed to OP-Amp. This signal is fed to the microcontroller which gives command to GPS to extract information about the latitude and longitude and tracks the location. After that with the use of GSM the message of occurrence of accident along with the location is send to the mobile of the rider's parents/guardian. And in this way the location of the occurrence of accident can be tracked and the needful help can be provided to the rider without much delay and the life can be saved.

B. Objective

The objective of project is to design intelligent helmet system which could save the life of the people who have met with an accident. The objective of the project are:

- 1) To make driving more safe GSM and GPS technology is used.
- 2) To design the circuit that can improve the safety of motorcyclists.
- 3) To develop a Smart safety helmet for complete rider.

C. Flowchart

The flowchart describes the functionality of the "Accident Detection". Vehicle starts/keep moving when accident takes place then

GSM module sends location using GPS to saved contact list. It uses intelligent wireless safety helmet system.

rider is conscious then ignition switch can be turned OFF to stop sending location. So a reset button is there in the circuit which is decided by the rider to turn it into off state if the driver is not conscious. If the rider is injured then a signal is send to family members and the emergency services showing the location of the person so the help can be provided as soon as possible.

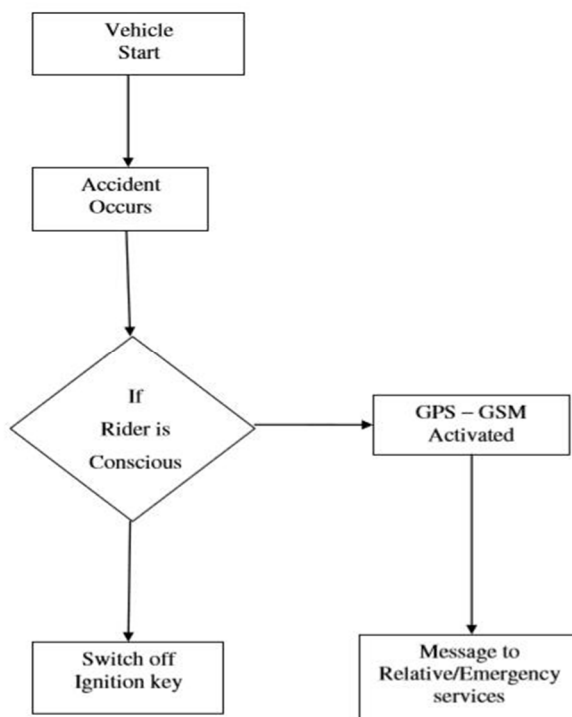


Fig-1: Flowchart of Smart Helmet

D. Block Diagram

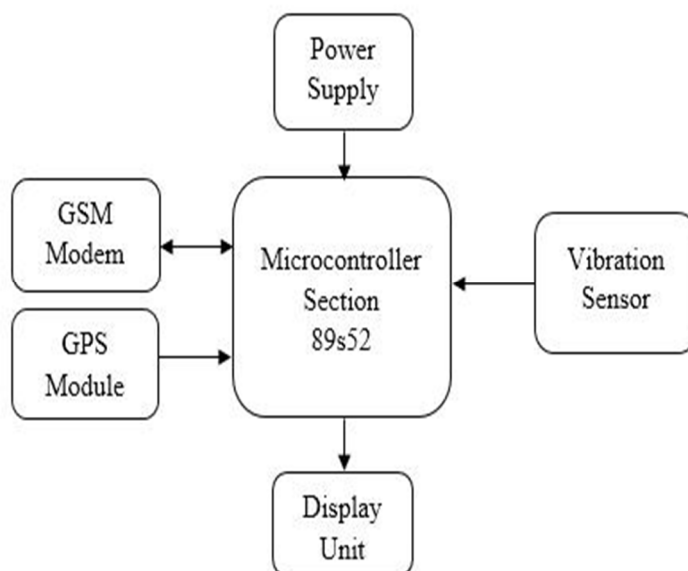


Fig-2: Block Diagram of Smart Helmet

E. Circuit Diagram

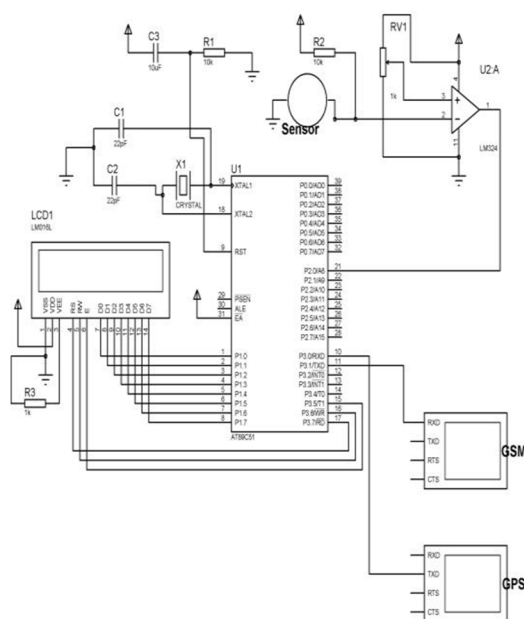


Fig-3: Circuit Diagram of Smart Helmet

When the system is switched on, LED will be on indicating that power is supplied to the circuit. The system applied when the motorcyclist had a crash, the helmet hits the ground and the vibration sensor detects the vibrations that were created when the helmet hits the ground. The microcontroller detected the accident occurred using vibration sensor which is placed in the helmet. After the microcontroller detects the accident occurrence, it will send Short Message Service containing information about the accident and location of the accident using GSM and GPS modules. The GPS receives the location of the accident. This message sent to a mobile number through a message. This message received by using GSM modem present in the circuit. This message contained the latitude and longitude value and the position of the vehicle can be estimated. The GPS and GSM module was running by using the microcontroller. Microcontroller 89s52 is used in the circuit which is the modern version of microcontroller 8051. Programming software is installed in the microcontroller for its working and the output of it is shown on the LCD display. There is the reset button by which the rider can control if the signal has to be send to family members or not depending upon the accident.

II. COMPONENTS

A. Vibration Sensor

The vibration sensor with certain range of frequency is fixed in the vehicle. It operates at frequency 315 MHz. In case the vehicle crash with another vehicle or to any other obstacle, the vibration sensor detects whether the frequency generated due to vibration is within the range or not. If it is greater, it reports as accident and activates the auto dialer. Meanwhile if rider turn OFF ignition switch then message to relatives can be avoided.

B. Crystal Oscillator

A crystal oscillator is an electronic oscillator circuit that uses the mechanical resonance of a vibrating crystal of piezoelectric material to create an electrical signal with a very precise frequency. This frequency is commonly used to keep track of time (as in quartz wristwatches), to provide a stable clock signal for digital integrated circuits, and to stabilize frequencies for radio transmitters and receivers. The most common type of piezoelectric resonator used is the quartz crystal.

C. GSM Module

GSM (Global System for Mobile Communications) is a standard developed by the European Telecommunications Standards Institute (ETSI) to describe protocols for second generation (2G) digital cellular networks used by mobile phones. A GSM modem is a specialized type of modem which accepts a SIM card, and operates over a subscription to a mobile operator, just like a mobile phone. From the mobile operator perspective, a GSM

modem looks just like a mobile phone. When a GSM modem is connected to a computer, this allows the computer to use the GSM modem to communicate over the mobile network. SIM300 module is a Dual-band GSM/GPRS engine that works on frequencies EGSM 900 MHz, DCS 1800 MHz.

It supports features like Voice, Data, SMS, GPRS and integrated TCP/IP stack. It is controlled via AT commands and enhanced AT commands and uses DC power i.e. 3.6 - 4.6 volts maximum and its current consumption in normal operation is 250mA that can rise to 1A while transmission. GSM shown in Figure obtains longitude and latitude from GPS and send SMS with the location.

D. GPS

The Global Positioning System (GPS) is a space based satellite navigation system that provides location and time information in all weather conditions, anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites. The system provides critical capabilities to military, civil and commercial users around the world. Here, GPS module provides latitude and longitude of place of accident which can be traced using android application.

E. Microcontroller

The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. The device is manufactured using Atmel's high-density non-volatile memory technology and is compatible with the industry-standard 80C51 instruction set and pin out.

The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional non-volatile memory programmer.

By combining a versatile 8-bit CPU with in-system programmable Flash on a monolithic chip, the Atmel AT89S52 is a powerful microcontroller which provides a highly-flexible and cost-effective solution to many embedded control applications.

III. PROJECT OVERVIEW



Fig-5: Accident Location

IV. RESULT

A. Accident Location

Once, vehicle unit shows "Accident Detected" then GSM sends location of accident with the help of GPS. It sends latitude and longitude continuously to saved SIM numbers till Ignition system is turned OFF.

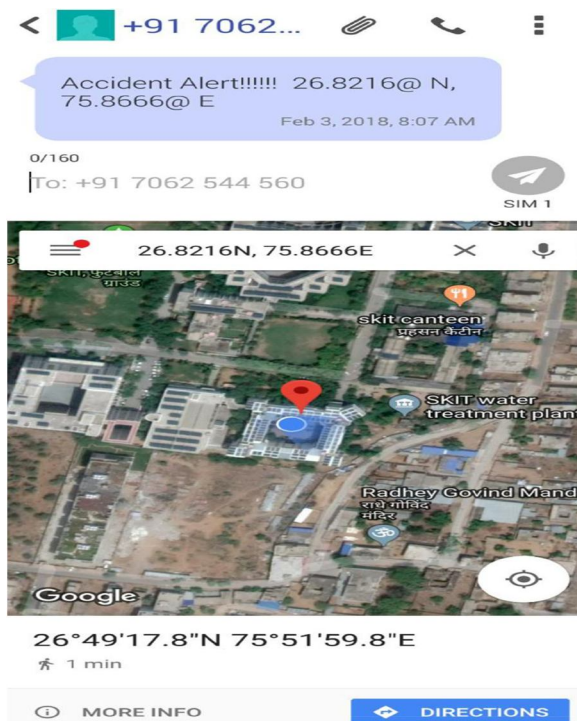


Fig-4: Schematic view of Smart Helmet

V. CONCLUSION

This project has a good real life scope, if it is implemented by the government. It can help to reduce lot of road accidents of two wheelers as it is the major cause of deaths in the whole world. It can also help to prevent the damage occurred to the vehicles by the accidents. So this helps in curbing the road accidents by implementing mandatory Helmet protection. This project here is undertaken keeping in view of traffic, the traffic rules and also the safety of people. Implementation of this type of project by the government saves a lot of time for the traffic police and most importantly saves the precious life of a person. Family members will be informed as well.

VI. FUTURE SCOPE

In future if there is a large demand of this type of helmets we can manufacture the whole circuit in printed circuit board, so that circuit becomes smaller and can be easily fitted into helmet. The circuit can also be powered by solar energy so that it uses green energy and does no harm to environment. The flexible solar panels can be fixed all along surface of helmet. This type of helmet technology can be implemented for the combat helmets used by the soldiers working under extreme temperatures.

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