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Earthquake Early Warning Technology

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Abstract- *Today, Earthquake is a very large problem which causes loss of lives and property. Our project is a small step to save these losses by giving information about earthquake before it strikes; this device will depend on the motion in3-D.As the motion in any of the three dimensions occurs LED display will start showing the figures here arduino is the central system which can be software tunable and we can implement signal processing through procedure where we can define the limits of Motion in 3-D by testing the data of earthquake from Indian meteorological department, how much magnitude of earthquake is calamitous setting those figures as upper limit in algorithm if figures of motion in any of the three dimensions is greater than the fixed upper limit figure LED light will start to glow and buzzer will start ringing and we receive message through GSM. This three dimension motion will be detected by the MPU6050 sensor.*

Key words: **GSM Module, MPU6050, Vibration Sensor**

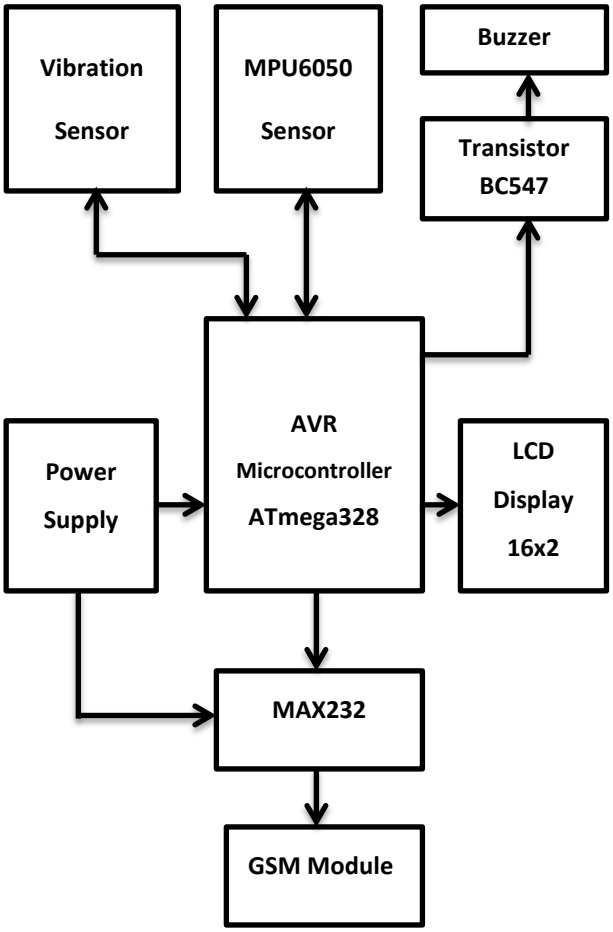
1. INTRODUCTION

An earthquake is an unavoidable and unpredictable natural phenomenon that causes damage to lives and property. We cannot stop this phenomenon but we can stay alert and aware using technology. This project is an initiative, to be stay alert and aware before the earthquake come. Technology we use in this module is very cheap and handy, all the components are easily available in the market and less power consuming, so that a user do not have any problem to run the device 24*7 for all 365 days. This module contains Arduino chip as a central component of device, MPU6050 sensor is the brain of module which detects all the motions in 3-D, inductor and capacitors to match the impedance with the input impedance of module so that it cannot damage the device, transistor used for switching this circuit, wires for connections, LED and BUZZER used as an output indicator, LCD display to get the output figures of motion in 3-D, all the components to complete the desired circuit. Now this device is to be mounted in the buildings. After a disaster occurs, immediate action is taken to protect staff, visitors and collections and sending alert text messages to concern authority using SMS alert and also buzzer and led light will aware the members of building about the earthquake with all the parameters so, that they can evacuate. Earthquake is the trembling caused in the surface of the earth, which is caused by the immediate energy release plates in the lithosphere layer of the earth which is resulted into creating waves referred to as the seismic waves. Earthquake is caused by a vibration that occurs on the earth surface. It is the shaking of the earth surface that is referred to as the earthquake. Finally buzzers will ringing and led will glow and also humans receive alert message through SMS.

2. OBJECTIVE

- To design wireless system for earthquake detection.
- To predict the earthquake.
- To convey the alert message to user with the help of GSM module.
- To achieve quick transmission of data using GSM.
- To accomplish real time monitoring of data.
- To prevent loss of life, damage buildings and also other properties etc.

3. BLOCK DIAGRAM



3.1 BLOCK DIAGRAM DESCRIPTION

AVR MICROCONTROLLER ATMEGA328

It is a microcontroller board which contains microchip ATMEGA328P. It has 14 digital pins and 6 analog I/O pins. To program this board Arduino IDE software is used. A type B cable is used to join computer and Arduino board. An external source between 7-20 volts can be used to power this board. The microchip ATMEGA328P is pre-programmed. we used Boot-loader to upload new code in this microchip. It has flash, EEPROM storage of 32 kb. Boot loader is used 0.5kb of this 32kb. Operating voltage of this board is 5v. It consists of 2kb SRAM memory. Weight is around 25g. 6 of the digital pins give PWM output. This board has several facilities for communication with other microcontrollers. There is a library software serial, which allows serial communication for all digital pins. There is no essential to press the reset button before an upload since this board allows to reset by software. This board is work as brain of this project.

MPU6050

3-Axis Module is a three axis accelerometer sensor module based off of ADXL integrated circuit. It is a three axis x, y and z accelerometer. It has low noise and power consumption. The sensor has a full sensing range. It can measure the static acceleration of gravity in vibrate-sensing applications, and also dynamic acceleration resulting from motion, shock, or vibration. There is an on-board 5V voltage regulator to power the ADXL so power provided should be between 3 and 5V DC. AVR microcontroller this is a modified Harvard architecture 8bit RISC single chip microcontroller. The magnitude of the program memory is generally indicated in the naming of the device itself (e.g., the ATmega64x line has 64 KB of flash and the ATmega32x line has 32 KB.)

LCD DISPLAY

Liquid crystal display (LCD) is used to display EARTH is detected or not. And magnetic axes are shown in this display.

GSM MODULE

Global System for Mobile communication is a digital mobile telephony system and other parts of the world. LTE stands for Long Term Evolution. LTE is a mobile network technology that is being deployed by mobile operators on both the CDMA (code division multiple access) technology paths and GSM technology. Depending on the spectrum available, live Long Term Evolution networks can provide very quick data speeds of up to 100Mbps in the downlink and 50Mbps in the uplink.

BUZZER AND LED

Buzzer makes an alarming sound when an Earthquake is detected an LED glows Red.

4. CONCLUSION

The main purpose of this project is to detect the unusual vibrations and generate the alert when the limit exceeds. This can be beneficial for emergency response planning. It is going to implement by with the help of both hardware and software and thus its implementation is not so difficult and economical. Emergencies can come without warning at any time. Emergencies are the source of risk and then have the possibility of producing an undesired event.

After a disaster occurs, instant action is taken to protect staff, visitors & collections and convey alert text messages to concern authority by SMS alert. Contact names and phone numbers must be recorded for sending alert SMS. Direction indicator using AVR microcontroller has proved to be an economical as well as user-friendly product. Very cheap Power requirements of the system. Safety measures are required for this product and also it can be simply operated by the user.

5. REFERENCES

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