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EARTHQUAKE DETECTOR

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ABSTRACT

An earthquake (also known as a tremor or temblor) is the result of a sudden release of energy in the Earth's crust that creates seismic waves. Earthquakes are recorded with a seismometer, also known as a seismograph. The moment magnitude of an earthquake is conventionally reported, or the related and mostly obsolete Richter magnitude, with magnitude 3 or lower earthquakes being mostly imperceptible and magnitude 7 causing serious damage over large areas. Intensity of shaking is measured on the modified Mercalli scale. Here we are presenting arduino based An Earthquake Detection using Sensing Element to reduce its destructive losses.

***Keywords*: Earthquake, Mercalli Scale, Microcontroller, Richter magnitude, Seismic Waves**

I. INTRODUCTION

An earthquake is an unpredictable natural disaster that causes damage to lives and property. It happens suddenly and we cannot stop it but we can be alerted from it. In today's time, there are many technologies which can be used to detect the small shakes and knocks, so that we can take precautions prior to some major vibrations in earth. Here we are using Accelerometer to detect the pre-earthquake vibrations. AccelerometER is highly sensitive to shakes and vibrations along with all the three axes. Here we are building an Arduino based Earthquake Detector using Accelerometer.

II. COMPONENT USED

2.1 Arduino UNO

2.2 Accelerometer ADXL335

2.3 16x2 LCD

2.4 Buzzer

2.5 BC547 transistor

2.6 1k Resistors

2.7 10K POT

2.8 LED

2.9 Power Supply 9v/12v

2.10Berg sticks male/female

2.11 Pin Description of accelerometer:

2.11.1Vcc 5 volt supply should connect at this pin.

2.11.2 X-OUT This pin gives an Analog output in x direction

2.11.3 Y-OUT This pin give an Analog Output in y direction

2.11.4 Z-OUT This pin gives an Analog Output in z direction

2.11.5 GND Ground

2.11.6 ST This pin used for set sensitivity of sensor

III. WORKING

Working of this Earthquake Detector is simple. As we mentioned earlier that we have used Accelerometer for detecting earthquake vibrations along any of the three axes so that whenever vibrations occur accelerometer senses that vibrations and convert them into equivalent ADC value. Then these ADC values are read by Arduino and shown over the 16x2 LCD.

First we need to calibrate the Accelerometer by taking the samples of surrounding vibrations whenever Arduino Powers up. Then we need to subtract those sample values from the actual readings to get the real readings. This calibration is needed so that it will not show alerts with respect to its normal surrounding vibrations. After finding real readings, Arduino compares these values with predefined max and min values. If Arduino finds any changes values are more then or less then the predefined values of any axis in both direction (negative and positive) then Arduino trigger the buzzer and shows the status of alert over the 16x2 LCD and a LED also turned on as well. We can adjust the sensitivity of Earthquake detector by changing the Predefined values in Arduino code.

IV. CIRCUIT DIAGRAM

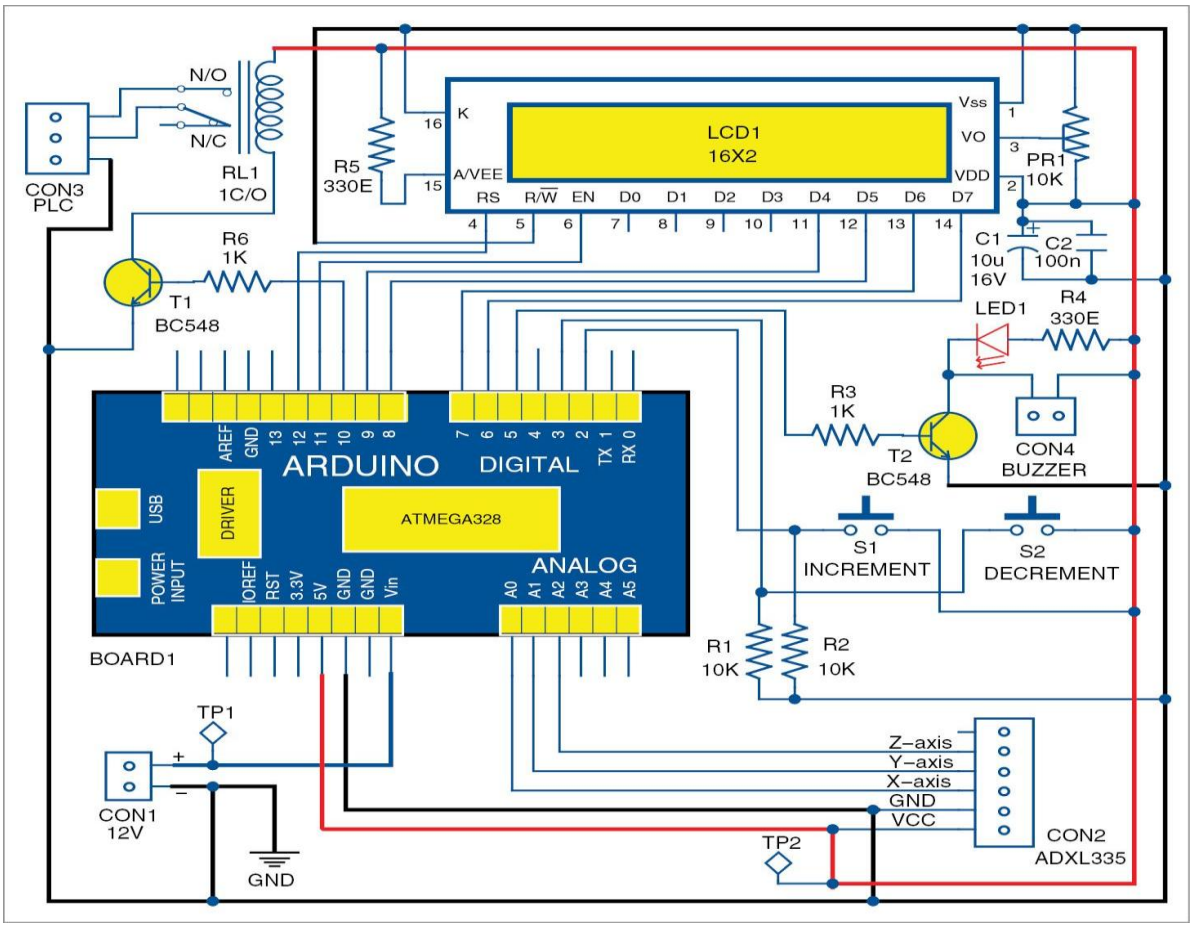

Fig. 1

Circuit of this Earthquake detector Arduino Shield PCB is also simple. In this project, we have used Arduino that reads accelerometer's analog voltage and convert them into the digital values. Arduino also drives the buzzer, LED, 16x2 LCD and calculate and compare values and take appropriate action. Next part is Accelerometer which detects vibration of earth and generates analog voltages in 3 axes (X, Y, and Z). LCD is used for showing X, Y and Z axis's change in values and also showing alert message over it. This LCD is attached to Arduino in 4-bit mode. RS, GND, and EN pins are directly connected to 9, GND and 8 pins of Arduino and rest of 4 data pins of LCD namely D4, D5, D6 and D7 are directly connected to digital pin 7, 6, 5 and 4 of Arduino. The buzzer is connected to pin 12 of Arduino through an NPN BC547 transistor. A 10k pot is also used for controlling the brightness of the LCD.

V. CONCLUSION

Thus to sum-up we have introduced this product with a view to reduce the destruction caused by earthquake, by alerting the people. It is economical and its price is quoted in such a way that it is affordable by every individual.We have presented a novel technique to solve the automatic detection and classification problem of earth tremor in a single step by using arduino based earthquake detection. In our system the majority of cases offers real practical benefits in the event of an earthquake to safeguard lives and resources.

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