

# EARTHQUAKE DETECTOR USING ARDUINO ALARM SYSTEM

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## ABSTRACT

*This study introduces a quake indicator that makes use of an Arduino board and a sensitive vibration device that can detect extremely small tremors. When necessary, the components can provide quick readiness and help with taking preventive measures against earthquakes.*

*demonstrates the Earthquake Indicator Block Diagram. The vibrator, alarm system, threshold setting, power supply, LCD screen, GPS module, and GSM module are all connected to the Arduino MEGA board through Arduino. The vibration measurements are handled by the Arduino Board, a microcontroller that is coupled to hardware. When the vibration readings exceed a specific threshold, an alarm system buzzes [3]. The Arduino is given a 12V power source, and the user is given warning notifications through an LCD display. The microcontroller in the Vibrator module, which is connected to the Arduino MEGA board, processes the vibrations' sensitivity.*

**Keywords.** Earthquake detection, Arduino, MEMS accelerometer, Alarm System, Early warning.

## 1. INTRODUCTION

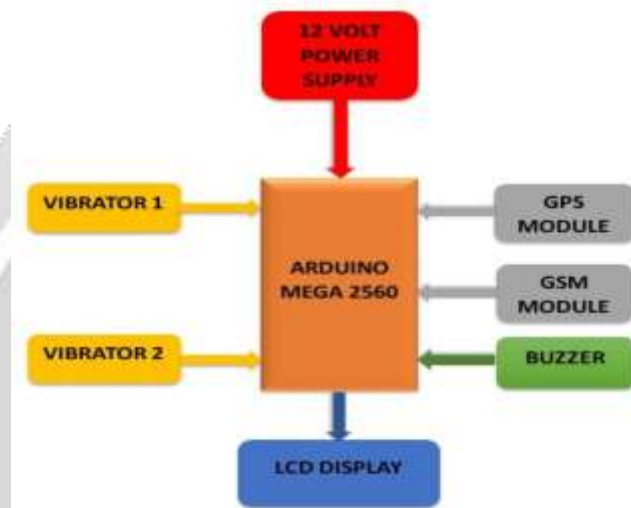
Significant catastrophic events include earthquakes. The rapid arrival of energy in the Earth's interior is causing earthquakes, which most usually manifest as rocks exploding after being subjected to stresses that exceed their flexible breaking point. When two of the earth's outer layers rub up against one another, an earthquake is caused. As a result, the quake's odd position and prognosis for various places may help to lessen the havoc that it caused due to the tremors. In this research, a sensitive vibrator that can detect vibrations and a small regulator Arduino Mega is used to create a quake pointer. Vibrators are quite susceptible to earthquakes. The simple voltage produced by vibrators is identical to a forced speed increase [1][2]. [Any vibration caused by a change is detected by the vibrator, which then notifies the miniature regulator. The vibrator is connected to the Arduino Uber Simple to Advanced Convertor (ADC) pins. A light, which serves as both a warning and an indicator of seismic tremor, appears when elements in the center of a tremor are large enough to pass a value known as edge esteem. Although the alert can be used for modern purposes, it can also be used for family rules. The LCD has been added as a device for advising caution, making the framework effective and simple to use.

A GSM module is included so that any earthquakes brought on by the tremor may be informed to the client's mobile phones. To pinpoint the precise location where the earthquakes are caused, a GPS module is also provided.

Execution, Results, Conversations, and End make up this essay.

## 2. IMPLEMENTATION

demonstrates the Earthquake Indicator Block Diagram. The vibrator, alarm system, threshold setting, power supply, LCD screen, GPS module, and GSM module are all connected to the Arduino MEGA board through Arduino. The vibration measurements are handled by the Arduino Board, a microcontroller that is coupled to hardware. When the vibration readings exceed a specific threshold, an alarm system buzzes [3]. The Arduino is given a 12V power source, and the user is given warning notifications through an LCD display. The microcontroller in the Vibrator module, which is connected to the Arduino MEGA board, processes the vibrations' sensitivity. The vibrator module is also equipped with a sensitivity tuner, which is used to modify the vibration's sensitivity. A 16x2 LCD is connected using the 4-wire technique and has lighting and disparity control enabled on Arduino pins.



### A. Arduino UNO

The finest board for learning electronics and coding is the Arduino UNO. The most durable board you may choose if this is your first time fiddling with the platform is the UNO.



### B. Buzzer

A buzzer or beeper is a mechanical, electromechanical, or piezoelectric (short for piezoelectric) auditory signaling device. Buzzers and beepers are frequently used as alarm clocks, timers, and train horns, and to validate human input such as mouse clicks or keyboards.



### C. Vibration sensor

The seismic mass is linked to a piezoelectric crystal, which serves as the vibration sensor. The crystal is stressed when the apparatus or machine being studied vibrates, which causes it to produce an electric signal that is subsequently translated into useful data.



### D. Plywood

A substance known as plywood is created by adhering thin "plies" or layers of wood veneer together while rotating the wood grain of the neighboring layers by up to 90 degrees. It belongs to the same group of produced boards as medium-density fiberboard (MDF), oriented strand board (OSB), and particle board (chipboard). It is an engineered wood.



### E. Jumper wire

An electrical wire, or group of them in a cable, with a connector or pin at each end (or sometimes without them - simply 'tinned') is known as a jump wire (also known as a jumper, jumper wire, or DuPont wire), and it is typically used to connect the parts of a breadboard or other prototype or test circuit, internally or with other machinery or components, without soldering.



### 3. WORKING

Connect the Arduino board to your pc the usage of a USB cable.

Select the board and port from the Tools menu in the Arduino IDE.

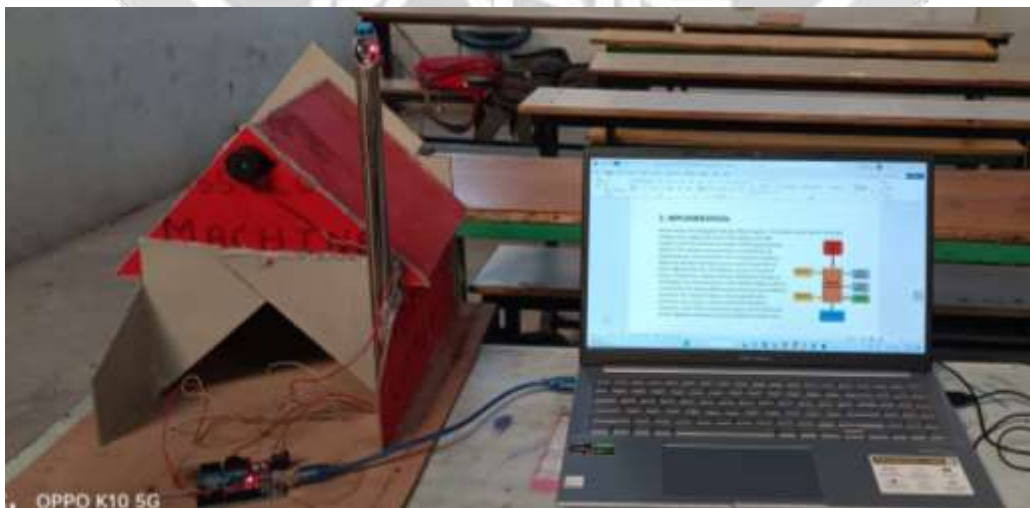
Upload the code to the Arduino board by clicking on the Upload button.

Testing the detector Once the code is uploaded successfully, the buzzer will sound if the magnitude of acceleration exceeds the edge cost.

To take a look at the detector, gently shake the accelerometer or tap it on a hard floor.

The buzzer ought to sound while the importance of acceleration exceeds the edge fee.

That's it! You have successfully constructed an earthquake detector using an Arduino alarm machine.



#### 4. COST ESTIMATION

Sr.no	Name of components used	Quantity	Cost of the component (Rs.)
1	Arduino UNO	1	790
2	Vibration Sensor	1	299
3	Plywood	5	200
4	Buzzer	1	50
5	Connecting Wire	1	99
6	Steel Pipe	1	60

**Total Cost = 1498 Rs**

#### 5. Results

The earthquake detector was successfully constructed and tested utilizing an Arduino and an alert system. Through the buzzer and LED, the detector was able to reliably identify earthquakes and alert people to them.

#### 6. ADVANTAGES

1. Cost-effective: The earthquake detection system is economical since Arduino boards are reasonably priced and easily accessible.
2. Arduino is adaptable, allowing users to modify the code, sensors, and alarm system to suit their individual requirements.
3. Simple to set up: Even those with little to no technical knowledge may build and program the seismic detector. Can be integrated with other systems: The Arduino board can be connected to additional systems to improve the earthquake detector's functionality.

#### 7. FUTURE SCOPE

The device will have a seismic sensor that can pick up even the smallest earthquake-related movements. When an earthquake is detected, the system may be configured to sound an alert. This might be a smartphone notification, an audio alert, or flashing lights.

1. Power backup: To guarantee that the earthquake detection system is still functional in the event of a power loss, a backup power source, such as a battery, may be included.
2. Data logging: The system might be set up to save seismic data over time, enabling users to track local seismic activity and spot trends.
3. Early warning system: In the case of an earthquake, individuals might take measures and evacuate using the earthquake detector system as an early warning system.

4. Safety for the general public: The earthquake detection system might be deployed in public areas like hospitals or schools to warn people and assist them in evacuating in the case of an earthquake.

5. Personal safety: By warning people and their families about potential risks and giving them time to take appropriate action, the system might be employed in households.

## 8. Conclusion

an earthquake detector that combines an Arduino with an alarm system is a dependable and affordable option. By combining this idea with a communication system that alerts emergency services to an earthquake, it can be further enhanced

## 9. REFERENCE

[1] Himu, MS, Josphin Subha, Kalyani Devi G, Karthika Sankaran, Naveen S Department of Electronics and Communication Engineering LBSITW, Trivandrum, Kerala, India.

[2] R.J. Geller, D.D. Jackson, and Y.Y. Kagan, and F. Mulargia, "Enhanced Earthquakes cannot be Predicted", Science, Vol 275, pp.1616-1620, 1997.

[3] Ronie Adhiraaj Gosh, "Earthquake Indicator Using Arduino", Electronics for you, Jan 2016.

[4] Sanjib Kalita, J.N. Borole, "Application of MEMS Accelerometer to Consume Electronics International Conference on Modeling and Simulation in Engineering and Technology. ICMSET-2014, pp188-190, Feb15-16

[5] Farine, M., N. Thorburn, and D. Mougnot. "General application of MEMS sensors for land seismic acquisition- is it time?", The Leading Edge, 23, pp246-250 2004

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