ABSTRACT

Indonesia is a country with a high potential for earthquakes to occur, because from a geological perspective, Indonesia is located at the confluence of three major plates in the world, namely Eurasia, Indo-Australia and the Pacific. The occurrence of earthquakes is unpredictable, so they often result in a lot of losses ranging from damage to buildings or public facilities and even claiming lives. To minimize the losses that occur, we need a tool that can detect earthquake vibrations and provide information about earthquakes.

In this final project, researchers designed an earthquake vibration detection device using an accelerometer sensor to determine the state of the ground when it vibrates or is still. The Artificial Neural Network will classify whether the vibrations detected are "earthquake", "non-earthquake", or "truck" vibrations. Then the results from the sensor will provide information about the scale of the earthquake that occurred based on the MMI (Modified Mercalli Intensity) scale. The microcontroller that is integrated with the LoRa module will send earthquake data to the Antares IoT platform, earthquake data will be sent based on the category of whether it is an earthquake, non-earthquake or truck and the magnitude of the earthquake vibration on the MMI scale.

The results of the analysis show that the vibration parameters "earthquake", "non-earthquake", or "truck" can be classified by the Artificial Neural Network in Real-Time with a test accuracy of 95.56% on the MMI vibration scale (II – VI). The results also show that sending earthquake data using the LoRaWAN network from the node to the gateway has a transmission success rate of 100% and an average transmission delay of 0.041842516 seconds at a frequency of 921.2 MHz to 922.4 MHz according to the standard for LoRa usage in Indonesia.

Keywords **:** *Earthquake, Accelerometer Sensor, LoRaWAN, Artificial Neural Network, Modified Mercalli Intensity, Antares.*