RAJALAKSHMI
ENGINEERING COLLEGE
An AUTONOMOUS Institution
Affiliated to ANNA UNIVERSITY, Chennai

Department of ECE

GE19612 - Professional Readiness for Innovation, Employability and Entrepreneurship (Mini Project)

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Advanced Mobile Seismic Monitoring System

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OUTLINE

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Abstract

Advanced Mobile Seismic Monitoring System integrates deep learning with portable sensors for real-time seismic analysis. It uses a Recurrent Neural Network architecture for real time data analysis and processing which collects data from acclerometer and alerts on 2.4GHz spectrum in case of any anomaly. It empowers rapid event detection, aiding researchers and emergency responders in risk mitigation and disaster management.

Objective

- To develop a portable solution that integrates deep learning algorithms with seismic sensors for real-time analysis of seismic activity.
- To empower rapid detection and prediction of seismic events, enhancing situational awareness for researchers, emergency responders mainly focussing on disaster management.
- To achieve range of (approximately 200 acres) which ensures a comprehensive coverage of area.

Literature Survey

TITLE	YEAR	AUTHOR	TECHNIQUE
Volcano Seismic Signals Classification	2018	Manuel Titos	Neural Networks Link
Earthquake Detection	2023	Yongzhi Wang	Stack Normalized Neural Networks Link

Summary of Literature

- Authors from Jilin University and the University of Management and Technology explore seismic monitoring system development, likely focusing on instrumentation and electrical engineering aspects.

- Research published by Manuel Titos introduces the application of recurrent neural networks (RNN), long short-term memory (LSTM), and gated recurrent unit (GRU) models for detecting and classifying continuous volcano-seismic signals. The study demonstrates high accuracy in real-time monitoring of volcanic activity, showcasing the potential of deep learning in seismic event analysis.

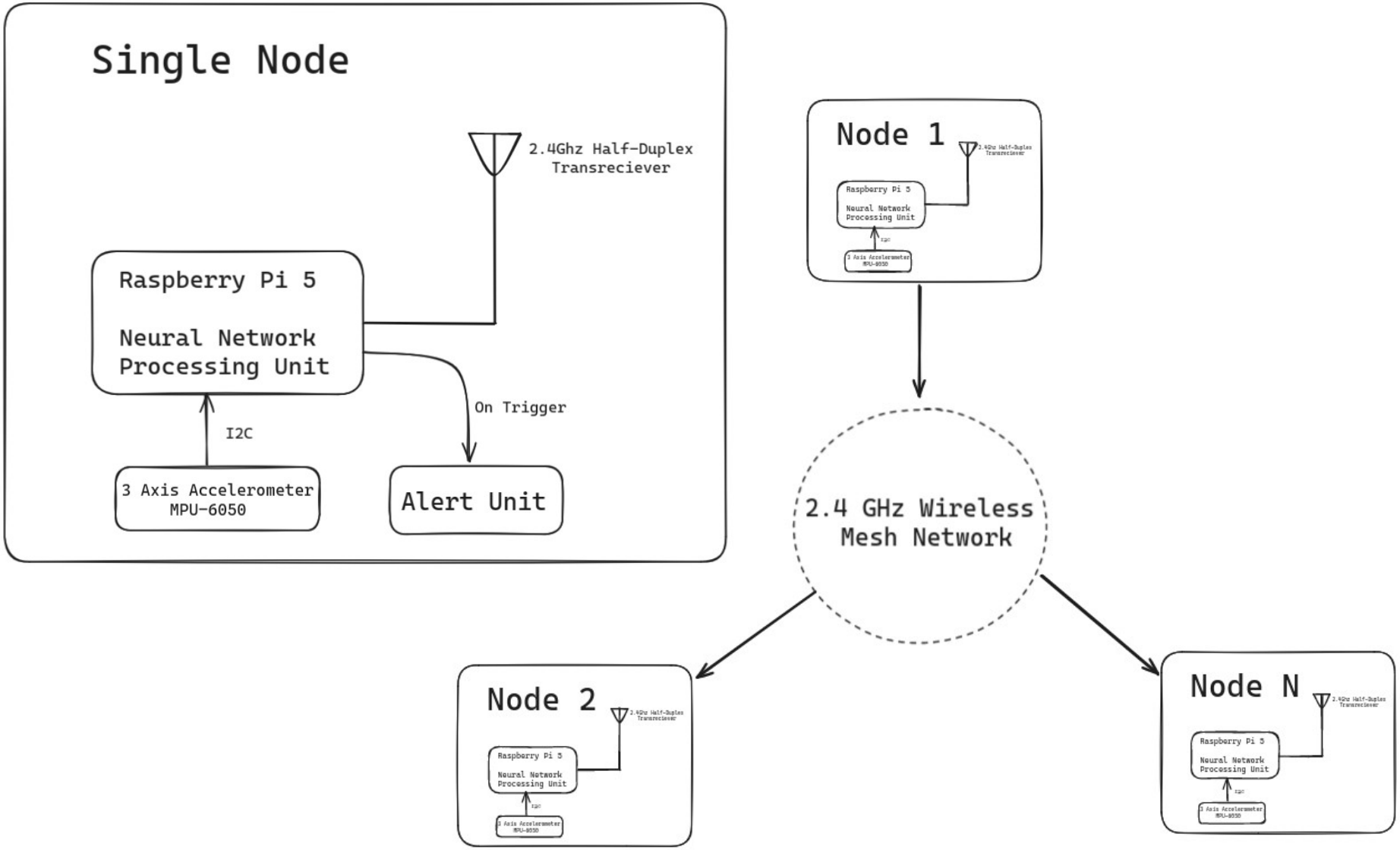
Proposed System

- Integrates hardware components, including the Raspberry Pi 5, MPU-6050 accelerometer module, and 2.4GHz (ISM band) antenna to create a seismic monitoring solution.
- **Raspberry Pi 5** serves as the central processing unit, providing computational power and connectivity for data analysis and transmission. Its compact size and low power consumption make it ideal for deployment in portable monitoring systems.
- **MPU-6050 accelerometer** module, the system can accurately detect and measure seismic vibrations in multiple axes.
- **2.4GHz antenna** facilitates wireless communication between monitoring nodes, enabling real-time data transmission and remote monitoring capabilities upto an optimum range of approximately 200 acres .

Novelty in Proposed System

- The proposed system introduces advancements in seismic monitoring by integrating deep learning techniques with **portable** sensors.
- This innovative approach enables **real-time analysis** of seismic activity with high accuracy and efficiency, empowering rapid detection and prediction of events.
- Uniquely suited for on-the-go monitoring, enhancing situational awareness and enabling **proactive risk mitigation** efforts, particularly in disaster management scenarios.

Block Diagram



Hardware/Software Requirements

Hardware Requirement

- Raspberry pi 5
- 2.4GHz Half Duplex Transreciever
- 3-axis Accelerometer

Software Requirement

- Linux Environment (server)

References

- https://www.mdpi.com/2076-3417/13/14/8121
- https://ieeexplore.ieee.org/abstract/document/8481708