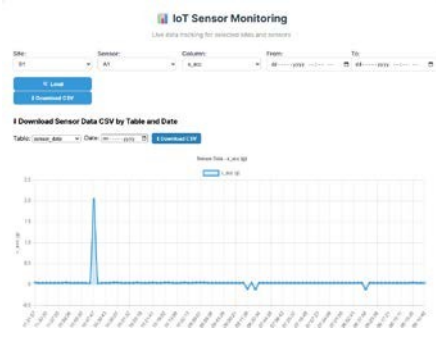


REAL-TIME TILT AND VIBRATION MONITORING SYSTEM WITH WIRELESS RECEIVER

Technology in Brief

The system consists of wireless sensor (transmitter) units, a receiver unit, and a Python-based server for real-time monitoring of vibration and tilt. Sensors measure three-axis acceleration and inclination and operate in dual modes: high-frequency (up to 10 Hz) with ~2 km range, and low-frequency with extended range up to ~5 km using LoRa communication. Designed for harsh environments (IP-67 enclosure, -20°C to 50°C), the system operates in the license-free 865–868 MHz band in India, enabling long-range communication without internet dependency. The receiver unit supports four channels (865–868 MHz), each accommodating up to 2 sensors (total 8 sensors). Data is stored locally and transmitted to a cloud server via Wi-Fi using REST APIs in JSON format for real-time visualization and analysis.

Specification	
General: - LoRa Frequency support: at 865 to 868 MHz - Power Source: Solar or battery - Hardware: ESP32 and DTDS LoRa Modules - Server: Python based Flask Server with API Transmitter Unit - Operating temperature range: -25 to +40°C (tested) - Operating voltage: 3 to 3.3 V - Sensitivity: 0.000083 g/LSB - Measurement range: ± 2.4 g - Tilt resolution: 0.0057° Tri axial - LoRa transmission range: 10Hz for 2 KM (Tested) - Rated power of sensor: 0.67W - IP 67 protected Receiver unit - Channel: 4 (for different frequency) - Storage: 16 GB - Connectivity: WiFi - IoT: Support HTTP and REST API - Operating voltage: 5 Volt	 Receiver Unit  Transmitter Unit  Dashboard
End Product(s)	Tilt and Vibration Monitoring Unit, Receiver unit and Dashboard with API
License/Commercialization	NA
TRL	8
Environmental Impact	The system is energy efficient, ecofriendly, requires minimal infrastructure, supports renewable power, and aids in disaster risk reduction while operating reliably in harsh environments.

Setup - Equipment required	NA
Linkedin Video Link	
Youtube Video Link	