



Enabling Real-Time Structural Integrity Insights with IIoT-Based Monitoring System



Cloud-enabled IIoT platform for structural health monitoring



Real-time data collection & visualization from edge sensors



Scalable, cloud-native data processing & analytics



Enhanced fault detection & predictive maintenance capabilities

Client

A company specializing in large-scale asset monitoring with patented structural health monitoring systems, featuring multimodal non-destructive testing and comprehensive infrastructure analysis.

Business Need / Challenges

Manual inspection methods were slow, resource-intensive, and lacked actionable insights for proactive maintenance. The client required a cloud-enabled solution to collect, transmit, and analyze real-time structural health data from distributed sensor networks, for:



Integrating multiple sensors and edge devices for real-time data streaming



Ensuring reliable data collection and secure transmission across remote and distributed assets



Implementing scalable cloud data pipelines for near real-time analytics



Providing intuitive dashboards for faster assessment and decision-making

Solution

Innominds developed an end-to-end IIoT-based structural health monitoring solution combining edge intelligence, secure cloud infrastructure, and real-time analytics:



Edge data processing on ESP32 embedded devices running FreeRTOS for continuous monitoring



Secure AWS IoT Cloud integration for scalable data ingestion and processing



DynamoDB-based storage for real-time querying and actionable insights



Angular-based web dashboard for intuitive health visualization of monitored structures



Remote device configuration, BLE-based Wi-Fi provisioning, and predictive maintenance analytics

Value Delivered



Real-time structural integrity insights for faster anomaly detection



Scalable, cloud solution for remote, and distributed asset monitoring



Reduced operational downtime through predictive maintenance



Ready for field deployment across tunnel and port infrastructure

Tools & Technologies Used

ESP32 FireBeetle | FreeRTOS | Arduino IDE | React | Python | AWS IoT Core | DynamoDB | Edge Intelligence | Cloud-Native Analytics | IIoT | Application Development



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