

Remote Asset Monitoring via Satellite

Industry: Renewable Energy

Ultra-low power consumption and data-efficient communication. Mastering the trade-off between power consumption, model accuracy, and communication cost is a classic "hard" Edge AI problem.

The Problem

An offshore wind farm needed AI to detect structural cracks using acoustic sensors. However, satellite bandwidth costs \$1,000s per GB, making it impossible to stream audio for cloud analysis.

Solution

The "Hard Tech" Solution: Klyff deployed a **"Decision-Triggered" Edge Pipeline**. The device runs a low-power "Wake-up" model locally. Only when a potential structural anomaly is detected does the high-fidelity model activate, compress the specific "event" data, and send a tiny (5KB) summary report via satellite.

1. Hardware

- **Edge Processor:** Ambiq Apollo4 Plus (ultra-low power sub-threshold technology) or Nordic nRF54 Series.
- **Communication:** Swarm M138 Satellite Modem (part of SpaceX) or Iridium Edge Pro.
- **Power:** Solar-harvesting PMICs (e.g., Analog Devices ADP5091).

2. Software

- **AI Framework: BrainChip Akida** (neuromorphic computing, which uses "spikes" to process data with 1000× less energy than traditional chips).
- **Compression: CBOR (Concise Binary Object Representation) or Protocol Buffers (Protobuf)** to minimize data size for expensive satellite links.
- **Connectivity: LoRaWAN** for local sensor clusters and **MQTT-SN** (for Sensor Networks) for the uplink to Klyff.

Results



99.8% reduction
in data transmission
cost.

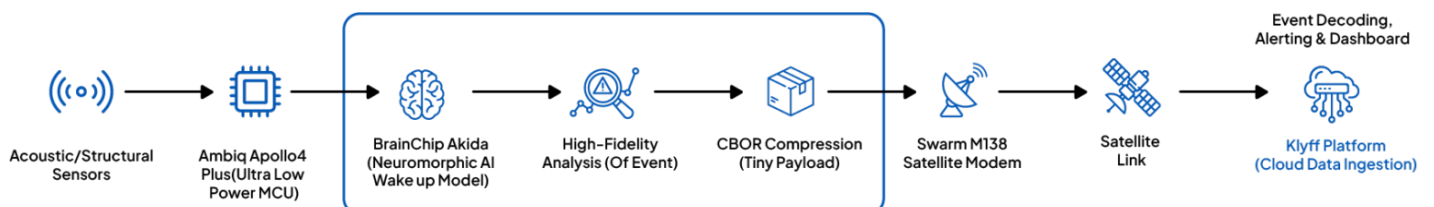


24/7
monitoring coverage.



Ultra low power consumption, high model accuracy and low communication cost.

Solution Flow



Klyff gives a significant advantage over traditional Cloud IoT

Feature	Traditional Cloud IoT	Klyff "Hard Tech" (Edge-First)	The Klyff Advantage
 Response Latency	200ms – 2 seconds (Cloud Round-trip)	< 10ms – 20ms (On-Device Inference)	10–50x Faster. Essential for high-speed safety stops and robotics.
 Data Transmission Costs	High. Constant streaming of raw sensor/video data.	Near-Zero. Only anomaly "events" are sent to the cloud.	90% Cost Reduction. Saves thousands in cloud egress and storage fees.
 Data Privacy & Security	High Risk. Raw sensitive data travels over the public internet.	Secure by Design. Raw data never leaves the device; only insights move.	GDPR/Union Compliant. Ideal for worker monitoring and IP-sensitive zones.
 Connectivity Reliance	System fails or "freezes" if Wi-Fi/4G drops.	100% Autonomous. Decisions continue even during network outages.	Critical Reliability. No downtime for remote mines or offshore assets.
 Hardware Efficiency	Heavy data logging drains battery and bandwidth.	Hardware-Optimized. Uses NPUs/FPGAs to run AI at 10,000x higher efficiency.	Extended Asset Life. Models run on ultra-low-power \$5–\$20 chips.
 Failure Detection	Reactive. Alerts you after a threshold is crossed.	Proactive. Identifies "micro-drifts" in machine behavior weeks earlier.	True Predictive Maintenance. Moves from "alerting" to "preventing."

Most IoT platforms are just "pipes" for data. Klyff is the **intelligence** at the end of the pipe. We focus on the **Silicon-to-Model optimization** unlike Cloud Dashboards

Let us help you with predictive maintenance

 sales@klyff.com

 www.klyff.com