

WG Tech Solutions Pvt Ltd

VOLTAGE / CURRENT ANOMALY DETECTION

Overview

The PSoC™ 6 / Edge - Voltage/Current Anomaly Detection application provides an advanced machine learning–based solution for monitoring electrical systems and identifying abnormal voltage or current behaviors in real time. Built on the PSoC™ 6 and PSoC™ Edge AI platforms, this solution leverages voltage and current sensors to capture and analyze electrical signal patterns, detecting anomalies that may indicate faults, overloads, or inefficiencies. By performing edge-based anomaly detection, it supports predictive maintenance, fault prevention, and energy management, ensuring reliability and safety in industrial and embedded environments.

Key Features

- **Real-Time Anomaly Detection:** Continuously monitors voltage and current waveforms to identify irregularities that signal potential issues.
- **Edge-Based ML Processing:** Executes anomaly detection algorithms directly on PSoC™ 6 / Edge devices for low-latency and offline operation.
- **Multi-Sensor Integration:** Supports both voltage and current sensors for comprehensive electrical behavior analysis.
- **Predictive Maintenance Enablement:** Detects early warning signs of equipment degradation to minimize downtime.
- **Adaptive Learning Capability:** Employs ML-based detection that adapts to changing load and environmental conditions.
- **Compact and Efficient Design:** Optimized for embedded applications with constrained computational resources.

Key Benefits

- **Fault Prevention:** Identifies abnormal electrical patterns before they cause system failures or costly damage.
- **Operational Efficiency:** Improves maintenance scheduling and asset performance through predictive analytics.
- **Energy Optimization:** Enables efficient energy monitoring and management in smart industrial systems.
- **Edge Intelligence:** Eliminates reliance on cloud computation, offering faster and more secure local decision-making.
- **Scalable Deployment:** Suitable for diverse applications ranging from small embedded systems to large industrial setups.

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- **Cost Reduction:** Minimizes unplanned downtime and extends equipment lifespan through early anomaly detection.

Use Cases

- **Industrial IoT Monitoring:** Detect voltage and current deviations in connected machines for continuous health assessment.
- **Smart Manufacturing:** Enable intelligent fault detection in production lines to ensure consistent operation.
- **Energy Management Systems:** Monitor electrical consumption and identify inefficiencies or overloading conditions.
- **Embedded Systems:** Integrate anomaly detection in compact devices for localized diagnostics.
- **Predictive Maintenance:** Use anomaly trends to forecast potential breakdowns and schedule timely maintenance.
- **Power Quality Analysis:** Evaluate waveform distortions and transient events in power distribution systems.

Specification and Compatibility

Sensor Settings – Voltage and Current

- **Sensors:** Voltage Sensor, Current Sensor
- **Sampling Rate:** Application-dependent (e.g., 10–100 kHz for typical monitoring)
- **Features Extracted:** RMS Value, Peak Voltage/Current, Frequency Spectrum, Harmonic Distortion
- **Processing Workflow:** Signal Acquisition → Feature Extraction → ML Inference → Anomaly Flagging