Advanced Real-time Grid Energy Monitor System (ARGEMS)

ARGEMS supports the transition towards higher penetrations of rooftop photovoltaics (PV) and other DERs by addressing utilities’ need for greater situational awareness near the edge of the electric grid.

High performance:
- Numerous metrics including RMS voltage and current (total and fundamental), real and reactive power, total harmonic distortion, and frequency reported as fast as 60 Hz or single cycle
- Hybrid processing for real-time data analytics: field programmable gate array (FPGA) with one or more 110 MHz 32-bit soft-core processors and a 1.5 GHz 64-bit quad core CPU
- Website with device status and plotting/visualization of both real-time and historical data
- Low latency data reporting (typically <100 ms, including communication to server)
- Hardware ready for waveform capture (32 kHz internal sampling)* and phase measurement unit (PMU) functions using onboard high-precision GPS time reference (±10 ns)*

Flexible:
- Split single-phase or three-phase voltage and current measurement up to 480Y/277V, with optional neutral current measurement
- Supports Rogowski and traditional current transducers (CTs)
- Multiple communication options: LTE 4G wireless (150 Mbps upload), WiFi, Gigabit Ethernet, and RF Mesh IP over Wi-SUN PHY
- Publish/subscribe messaging (AMQP and MQTT) and concurrent software functions for highly configurable, near real-time processing and controls
- Numerous application programming interfaces (APIs) to retrieve real-time and historical data
- Micro SD slot for onboard data storage
- Over-the-air configuration and programming*
- Modular hardware design for easy customization

Robust, safe, and secure:
- IP67-rated enclosure and connectors
- Supercapacitor power back-up to record grid blackouts
- Data retention and timestamping at multiple levels (device, gateway, and server) to mitigate intermittent communications, with automatic upload when communications are restored
- Options for Transport Layer Security (TLS) and Advanced Encryption Standard (AES)*
- Electrical isolation for lab use

Low cost:
- Wireless mesh networking to allow numerous devices per commercial wireless data line
- Anticipated retail price of $800 per unit (CTs, communications, and power supplies included) and less than $8/mo/device operational cost

Easy to install:
- Designed for pole-top use, with compact enclosure (6" × 5" × 4") and integrated mounting flanges
- Removable connectors for each phase
- Internal antennas

* Requires further software development

Last update: 7-Aug-19
Advanced Real-time Grid Energy Monitor System (ARGEMS)

Web Interface

Accessible at argems.soest.hawaii.edu with user ID “ARGEMS” and password “demo18". Note that the login may change without notice and the system may be down for periodic maintenance.

Contact: Kevin Davies, Hawaii Natural Energy Institute, University of Hawai’i at Mānoa (kdavies@hawaii.edu)

Last update: 7-Aug-19