

Overview:

Standard electric meters were developed decades ago and are still used today, despite many technological advances in the last several years. Along with these technological advances, Americans have become accustomed to having access to large amounts of data, but due to the nature of the standard electric meter, data regarding the usage of power is severely limited. For the power companies, data from the meters is minimal and control of the electric grid is limited to manual operation, costing them time and money.

As the cost of electricity becomes higher and higher, electricity use in buildings is becoming a bigger concern and people have few inexpensive or simple ways to monitor this. Of the options available, most only address part of the whole problem, giving some information to the consumer and none to the power company or vice-versa. Additionally, most systems only provide a limited amount of information.

Our system addresses both issues, providing more information to both the power company and consumer in a simple, intuitive manner.

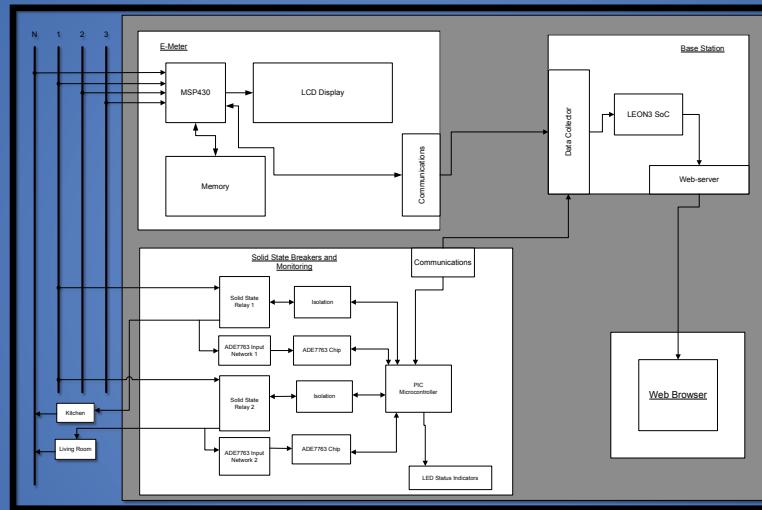
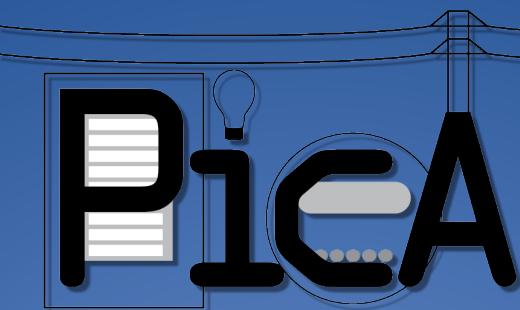


MSP430 Development Board

E-Meter:

The E-Meter is centered around a TI MSP430F47197 MCU tailored for metrology. Its duties include:

- Monitoring current for up to 3 phases.
- Monitoring voltage for up to 3 phases.
- Detecting tampering with the meter.
- Packaging measured data for transmission to base station.



System block diagram

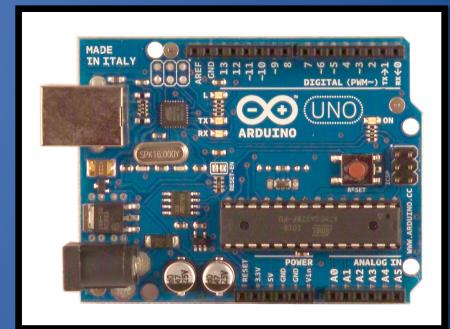
Solid-State Breakers:

The solid state breakers provide the real-time circuit monitoring and control. Each breaker consists of a solid-state relay, and an ADE7763, each controlled by a microcontroller. Each breaker:

- Monitors voltage and current to measure usage.
- Contains a configurable setting for the trip value.
- Automatically reports status (on/off/trip) and can be remotely reset.
- Packages data for transmission to the base station.



Xbee Radio



Arduino UNO Development Board

Base Station:

The Base Station is centered around a SPARC V8 LEON3 processor. Its duties include:

- Gathering measurements from other PICA devices.
- Analyzes the measurements for user-relevant information.
- Hosts the information on an internal web server.
- Provides a means to control the other PICA devices.