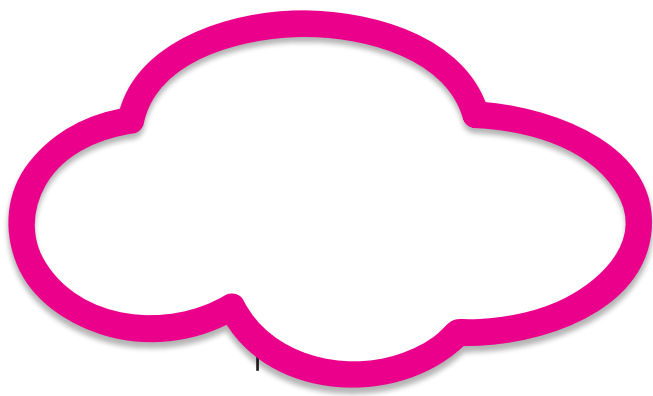




Getting a Week's Worth of Lighting System Data

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cloud
<http://54.69.58.101/>

Problem

The Energy Information Administration reports that, in 2012, 12% of total US electricity consumption was due to lighting in the residential and commercial sectors.

Researchers want to reduce this consumption. One approach is to better understand how people use their lights over weeks and months. However, instrumenting lighting systems to measure this long-term usage is very expensive, time-consuming, and cable-ridden.

Goals

1. Support long-term experiments; data must be gathered over weeks or months and automatically backed up on both hardware and software during the experiment.
2. The system must be easy-to-use; sensors must be wireless and the software must be usable by students, residents, and researchers alike.

DAQ



Solution

We are developing a system for instrumenting building lighting systems with thermocouples and luminosity sensors. Our system, called SCIO, comprises bluetooth data acquisition units (DAQs) and an accompanying software application (master).

With a pricetag of \$150, our Arduino-based DAQ comprises the hardware to measure temperature and luminosity, and the software to manage the experiments and ports.

Sensors:

- Type K thermocouple with MAX31855 Cold-Junction Compensated Thermocouple-to-Digital Converter
- Sharp GA1A1S202WP OPIC Light Detector

Software:

- Ports: The ports class gets data from the sensors and ferries this data to and from the memory class.
- Experiments: The experiments class starts and stops experiments and ferries experiment parameters to and from the memory class.
- Memory: Manages data in the EEPROM.



master

MINI SDI-12 COMMUNICATION PROTOCOL

- Abort Response. `iii,a<CR><LF>`.
- Acknowledge Active. `a!;iii,a<CR><LF>`.
- Break. `___!;iii,0<CR><LF>`.
- Configure Period. `OPn!;iii,0,n<CR><LF>`.
- Continuous Measurement. `aRn!;iii,a,<time>,<values>:<CR><LF>`.
- Start Measurement. `aMn!;iii,a,ttt,n<CR><LF>`.
- Send Data. `aD0!;iii,a,<time>,<values>:<CR><LF>`.

KEY: iii - DAQ ID, a - Port address, n - Number of measurements, ttt - Time to finish.

DAQ SOFTWARE

miniSDI-12 Protocol

Experiments

Ports

Sensors

Memory

Thermocouple

Luminosity

EEPROM

Thermocouple

Luminosity

DAQ HARDWARE

One Week of Data

