Lab 3 – Day 4
Exploration of energy management

Thirds analysis of the Lab:

- Propose solutions to increase the lifetime of the IoT system
  - Should be autonomous
  - Should not require frequent battery changes

IoT Wireless Sensors and the Problem of **Short Battery Life**

By Carlo Canzioni, Keysight Technologies, Inc.

Wireless sensors provide great insight in applications like monitoring environmental conditions or industrial plants and machinery. Because they are simple to install, they can be deployed in a multitude of situations. In coming years, we will see an explosion of new uses for wireless sensors as the "Internet of Things," or "IoT," is widely deployed. But one of the factors that most limits the use of wireless sensors is their limited ability to do the job for a reasonable amount of time. When a wireless sensor's operation is fully dependent on a battery, and the battery is depleted, it becomes just a piece of junk.

WHEN A WIRELESS SENSOR'S OPERATION IS FULLY DEPENDENT ON A BATTERY, AND THE BATTERY IS DEPLETED, IT BECOMES JUST A PIECE OF JUNK. !!!

Thirds analysis of the Lab:

- Possible solutions:
  1. Activate the **heaviest sensor less frequently** (with a longer period)

  2. Increase **photovoltaic power production**
     - E.g., one more identical photovoltaic module connected in series/in parallel

  3. Increase **battery capacity**
     - E.g., one more identical battery connected in series/parallel
     - Consider that adding one battery or one PV module implies a different value of current/voltage depending on the connection
       - DC-DC converter efficiency may change!

  4. … Any other idea that comes to your mind!

Thirds analysis of the Lab:

- Bear in mind costs in your exploration:
  - Cost of one battery: $4.99
  - Cost of one PV module: $5.50
  - E.g., maximum additional cost: $11.00

- Compare possible solutions and the resulting lifetime
  - Longer irradiance trace available (Gmonths.mat)
    - Up to 3 months

Reminder

- Deadline: Feb 27th 23:59
  - No extension!