Hands-on Data Communications Project
Background

• Non-Intrusive Load Monitoring (NILM)
  – enumerating the energy consumed by individual appliances
given an entire house power meter reading
  – an estimated itemized energy bill from an individual smart
  meter

• Non-Intrusive Load Monitoring Toolkit (nilmtk)

• NILMTK’s documentation
  http://nilmtk.github.io/nilmtk/master/index.html
Hands-on Data Communications Project

Objectives

• What exactly I expect from this project?
  – Collection of data using the selected smart plugs for a novel application
  – Comparative study with respect to communication protocols, data correctness, channel noise, power line interference, plug and modem synchronization problem, plug & play setup etc.
  – Prepare a research project report
  – Overarching goal is to submit the findings to a workshop/conference for possible publication (optional)

• IEEE IGSC: THE Sixth INTERNATIONAL GREEN and SUSTAINABLE COMPUTING CONFERENCE (IGSC’15)
  – http://igsc15.eecs.wsu.edu/
What is my novel application?

• Your Novel application: Open Source Data from Smart Plugs
  – Make the collected data compatible with NILM tool kit
  – Follow the specific formatting guidelines to make the datasets universally adaptable and accessible to other users/researchers
Devices

- **Z-wave Smart Metering and Communication:**
  - Z-Wave Smart Energy Power Strip

- **Insteon Energy Metering and Communication:**
  - iMeter Solo - INSTEON Power Meter (Plug-In)
  - PowerLinc Modem - INSTEON USB Interface (Dual-Band)

- **Enmetric System for Intelligent Plug load Management and Power Telemetry Communication**
  - Enmetric PowerPort
  - Enmetric Wireless Bridge
Devices

- SiteStage (previously was known as eMonitor)
  - Powerhouse Dynamics: Energy Management System
  - SiteSage for Homes M-24h Energy Monitor (formerly eMonitor 4-24)

- The Energy Detective Electricity Monitor


- Nest Lab [https://nest.com/](https://nest.com/)
More Devices

• Lucid — Makers of BuildingOS and Building Dashboard
  – http://www.luciddesigngroup.com/

• Panoramic Energy Management
  – http://www.panpwr.com/
Steps to Follow

• First browse many websites, spin-offs and companies in this building energy management area

• Decide and choose the smart plug device
  • Look into their website to find out how easy it will be to setup and collect data
  • I need to place the purchase order ASAP

• Decide on a tentative application
  • Send me your Hands on Data Project Plan with the device name, tentative title of the project and all team members name (a doc file is fine)
  • Finalize the application
  • Plan for the mid-semester project update after Spring break
Hands-On Data Communication Project Examples

• Can you help me to formulate a narrow topic? My research interest is activity recognition.
  – Use energy footprint of appliances in household for identifying ADLs (Activities of Daily Living)
  – Use energy signature to recognize activities of daily living (ADL) such as washing utensils, cooking, doing laundry, ironing, listening music, watching TVs, running on treadmill, studying etc.

• Can you help me to formulate a narrow topic? My research interest is HCI.
  – Create a database to store all the appliances energy data
  – Show their individual consumption in graphs, and include query for displaying the total consumption over a day, week or month etc.
More Hands-on Data Communications Project Example

• Open Source Smart Plug Data
  – Check NILMTK open source toolkit
  – Find out how your collected data could be integrated with this project

• Virtual Energy Auditing

• Faulty/Malfunctioning Appliance Detection

• Usability of Energy Disaggregation
Hands-On Project Immediate Deliverables

• Email me by the next class 2/24
  – A topic of interest with a tentative project title
  – Specific device you are planning to use
  – A cool application you have in mind
  – An abstract of the project (optional)
  – Please create a doc/pdf/text file

• Don’t forget to include the name of all the team members
