Mining Sensor Data for Power Saving Management

PhD Seminar LMU Munich

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July 28, 2014

Munich, Germany

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Some Research Questions

Understand Energy Demands:

- how are appliances being used in households?
- Can we identify and predict appliances usage patterns?
- Can we separate needs from “waste of energy” (saving opportunities)?

Promote Behavioral Change: how can we make consumers:

- aware of their energy consumption ?
- take energy-efficient decisions?
- change their behavior in order to make a more sensible use of energy?

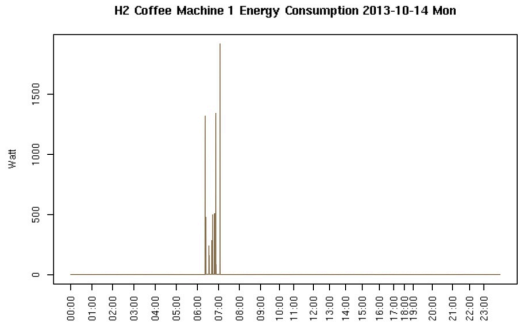
At the individual and community levels.

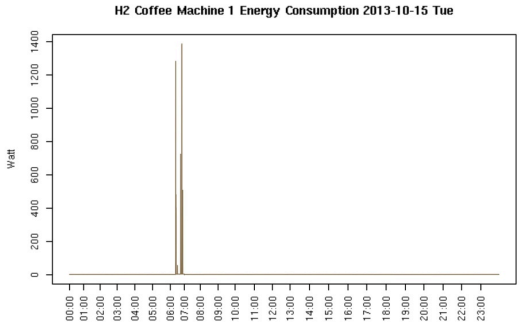
System

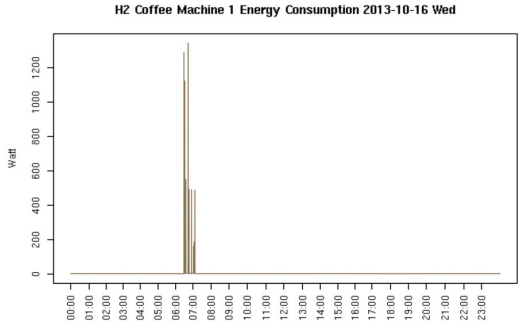
Household Gadgets
Energy Meter & Control
PLC Network
HomeServer
Wireless Network
Personal Mobile Devices
PowerIT
Device List
Tischlampe
Schlafzimmer
Kaffeemaschine
TV
Desktop PC
Mikrowelle

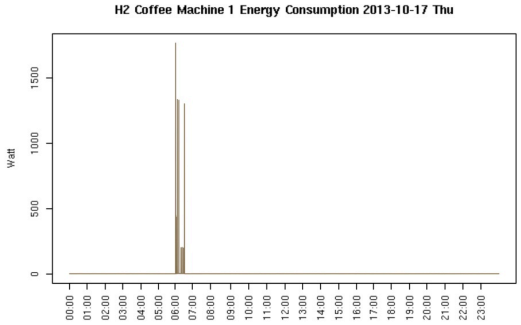
Understanding Energy Demands:

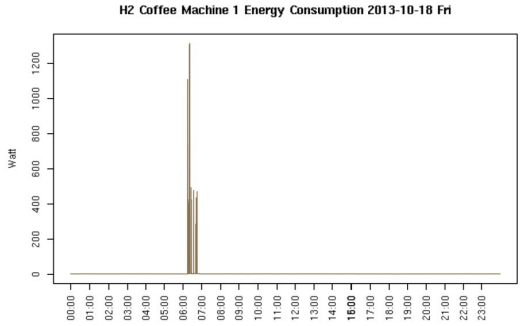
Coffee Machine Energy Use

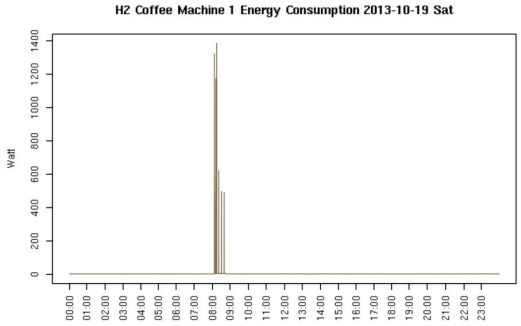












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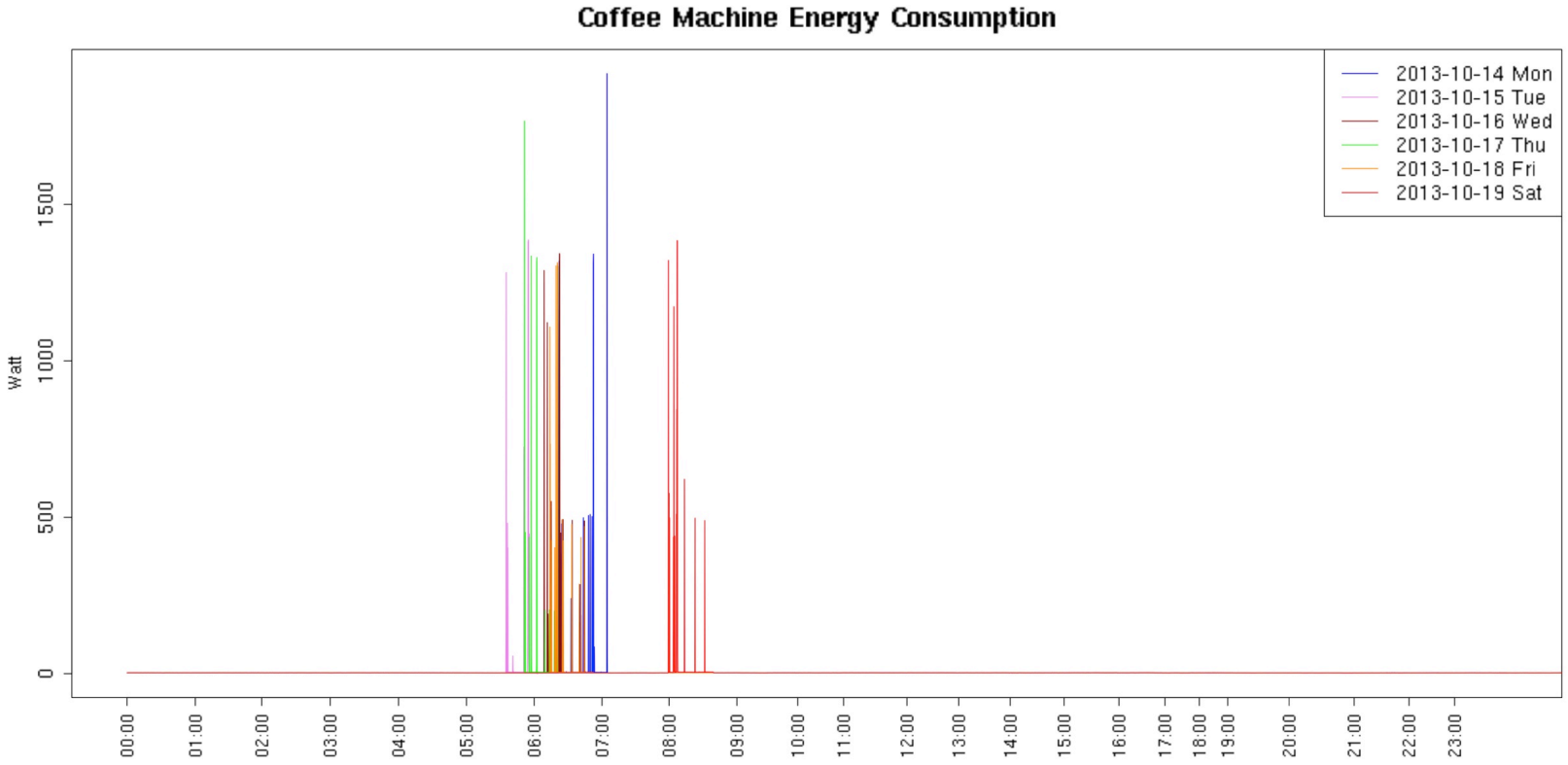
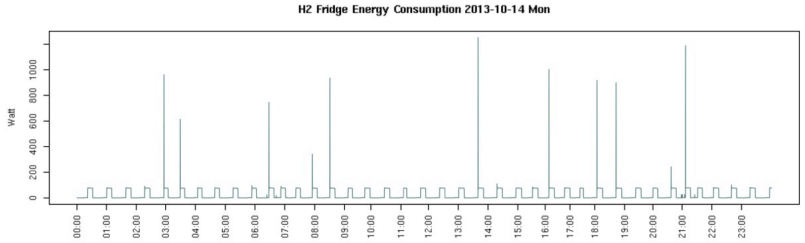
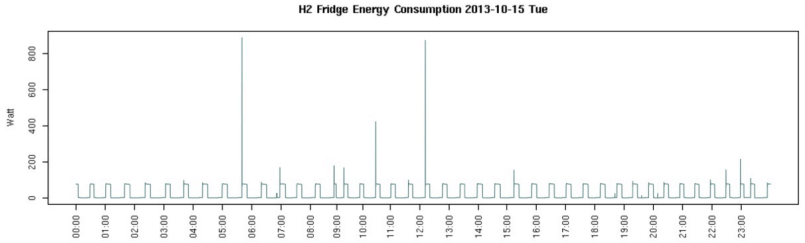
Coffee Machine Energy Use

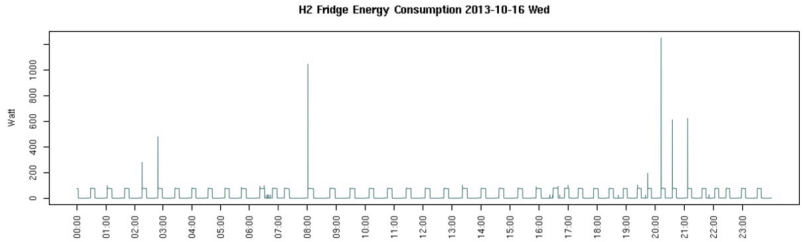


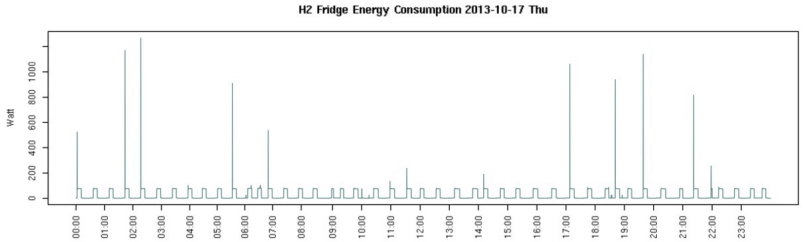
Understanding Energy Demands:

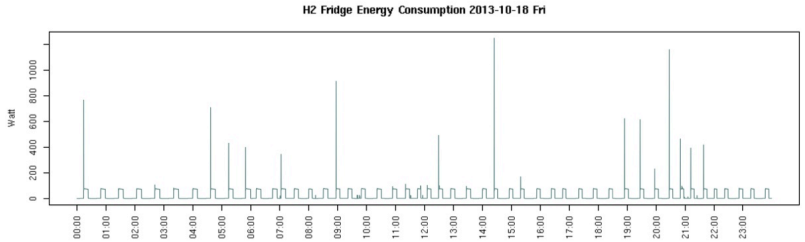
Fridge Energy Use

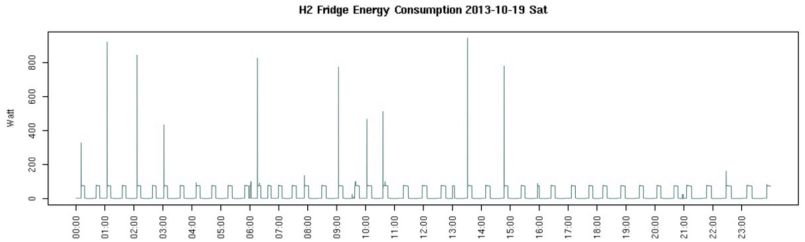






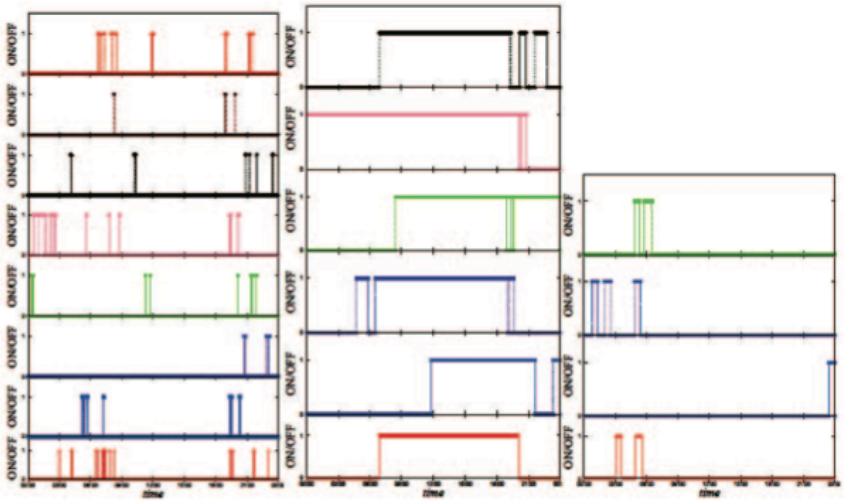




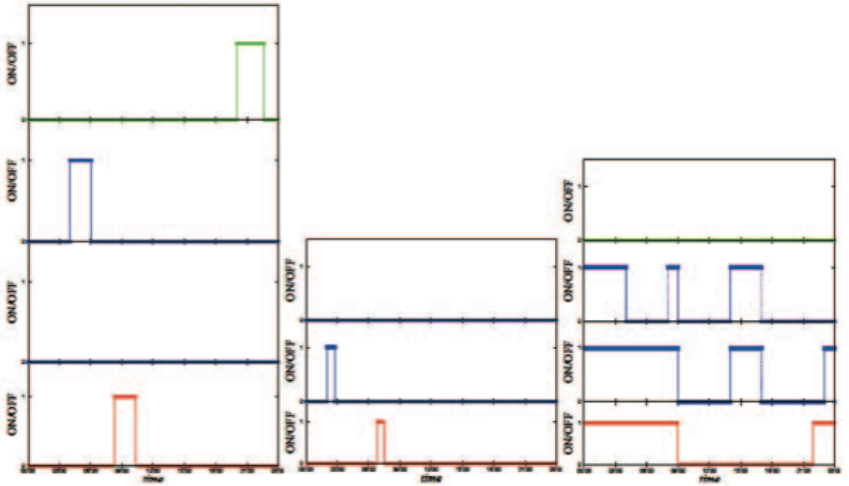


Understanding Energy Demands:

Appliance Usage Patterns



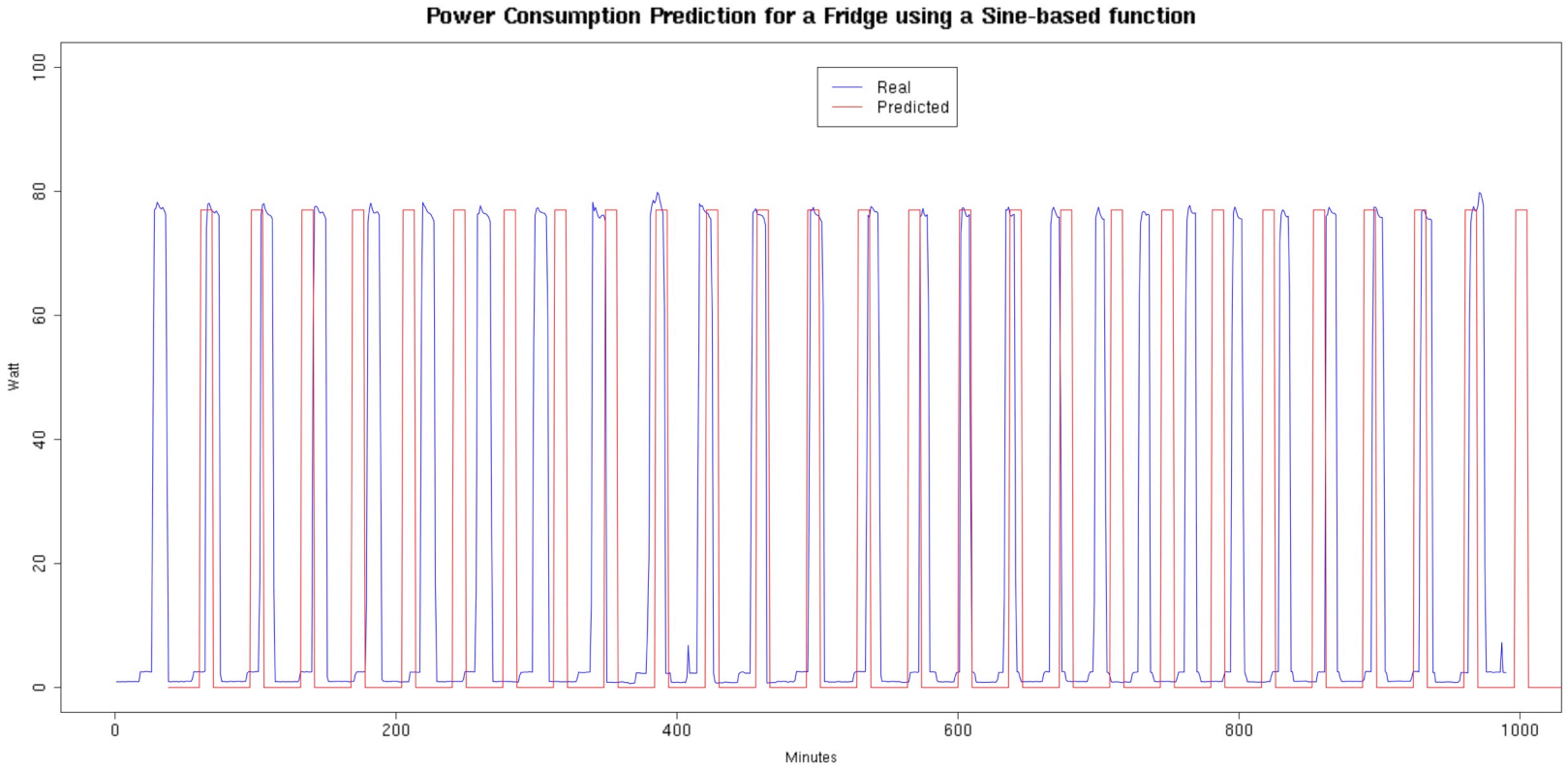
(a) Microwave. (b) Light. (c) Wash-Dryer.



(d) Dish-Washer. (e) Oven. (f) Air-Conditioned.

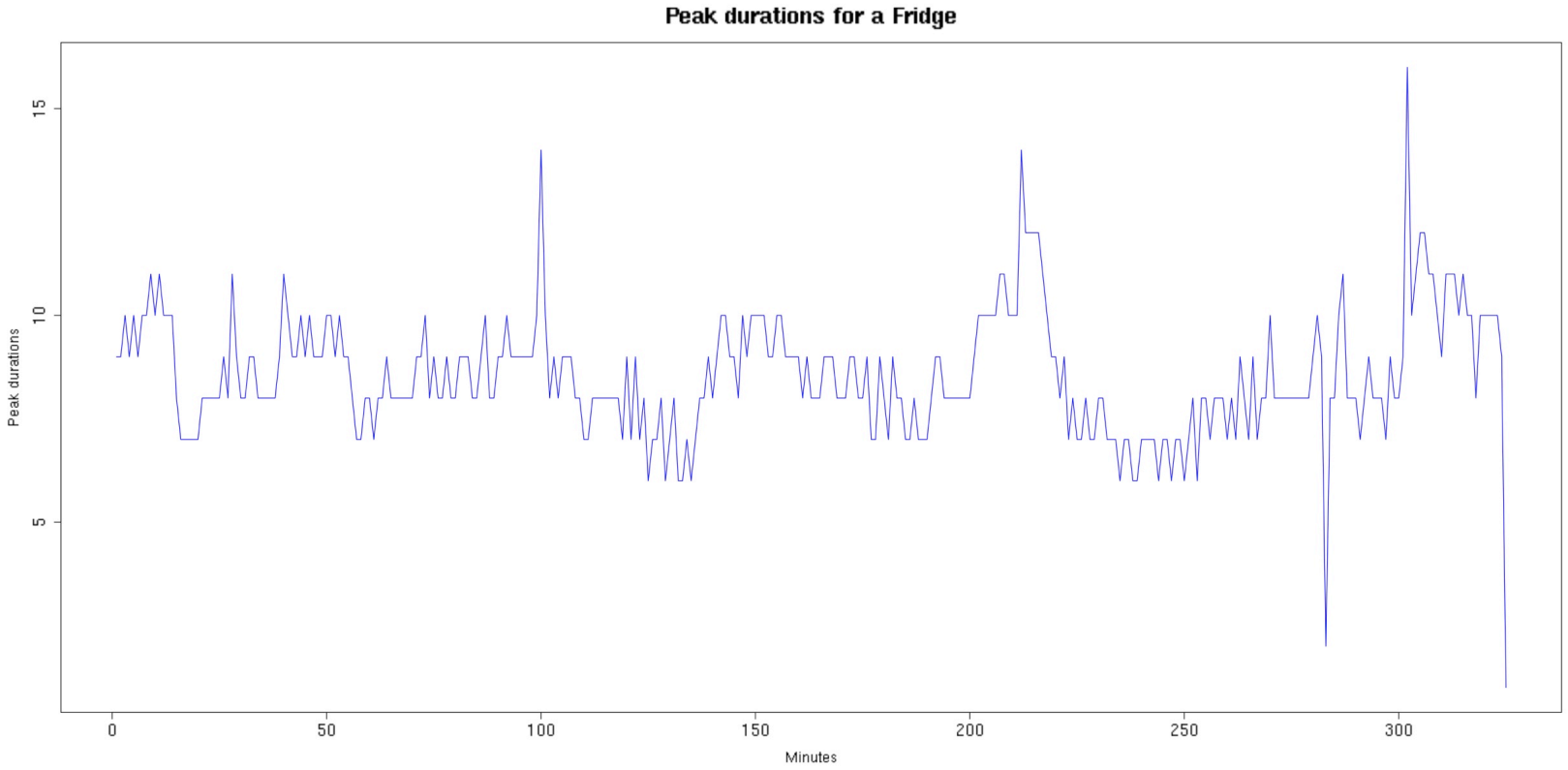
Understanding Energy Demands:

Energy-Consuming Predictability



Understanding Energy Demands:

Sensor Data Cleaning



Promote Behavioral Change (based on behavioral psychology)

How are new habits created?

- From motivation and repetition: e.g. use of feedback display to induce cooperative use of energy, peer pressure, and social capital incentives
- By controlling old habits (e.g. leave devices in stand by modes)

How can we measure behavior change?

- When behavior is changing there is a percentage of our actions that still follow the old behavior. The smaller this percentage is, the bigger is the change.

How can we sustain new habits?

- Habits are triggered by perception of contexts (e.g. preceding actions in a sequence)