Stay warm Save cash

Sustainability CodeCamp Spring -2016

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challenge

- People forget to turn off the heat when they leave for a trip.
- People forget to turn down the heat when they leave for work.
- When door is open a considerable amount of energy is wasted.

Idea and motivation

- Heating time scheduling (daily bases)

- Event handling (door/window opened)

- Presence detection (30min)
- Saving energy cost

Design plan

- The user at first define a schedule.
- When the door is open for more than a certain amount of time the heat will stop working.
- When the home is empty for 48h the heater will stop working.
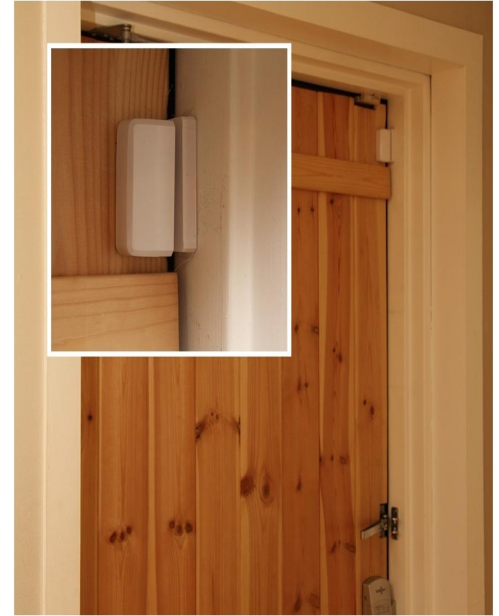
Technologies

- FHEM server hosted on a Raspberry Pi Model B
- FHT80b thermostat
- PIRI2 motion detector
- Opening window sensor
- Java/HTMLUnit
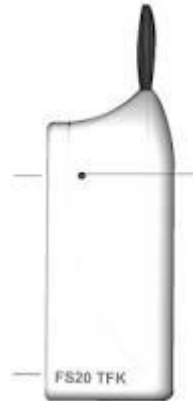
Future goals

- Detecting proximity of user and turning the heat up if the user is approaching in a certain radius.
- Providing better schedule by learning thermostats.
- Changing the heat base on the number of the people in the room.

Power Consumption

Reference example:

- 30m$_2$, 2.5m high appartement
- normal isolation
- outside temp: 10 degrees

Heating Constantly at 20 degrees: 1120 W

Heating at 16 degrees when outside: 672 W

Heating from 16 to 20 degrees: 448 W

Protocol :X10

- Invented in 1975 by Pico Electronics in Glenrothes, Scotland, the 10th project of the company.
- Powerline based signal transmission during each zero-crossing via 120kHz carrier
- 4 bits-house code+4 bits unit code+4 bits command code
- The wireless protocol operates at 310 MHz in the U.S. and 433.92 MHz in Europe

Protocol :X10

Limitations:

Low speed

Limited functionality

Lack of encryption

Interference

Losing of commands

Advantages:

Fast, simple deployment

Time-proven

Wide range of product