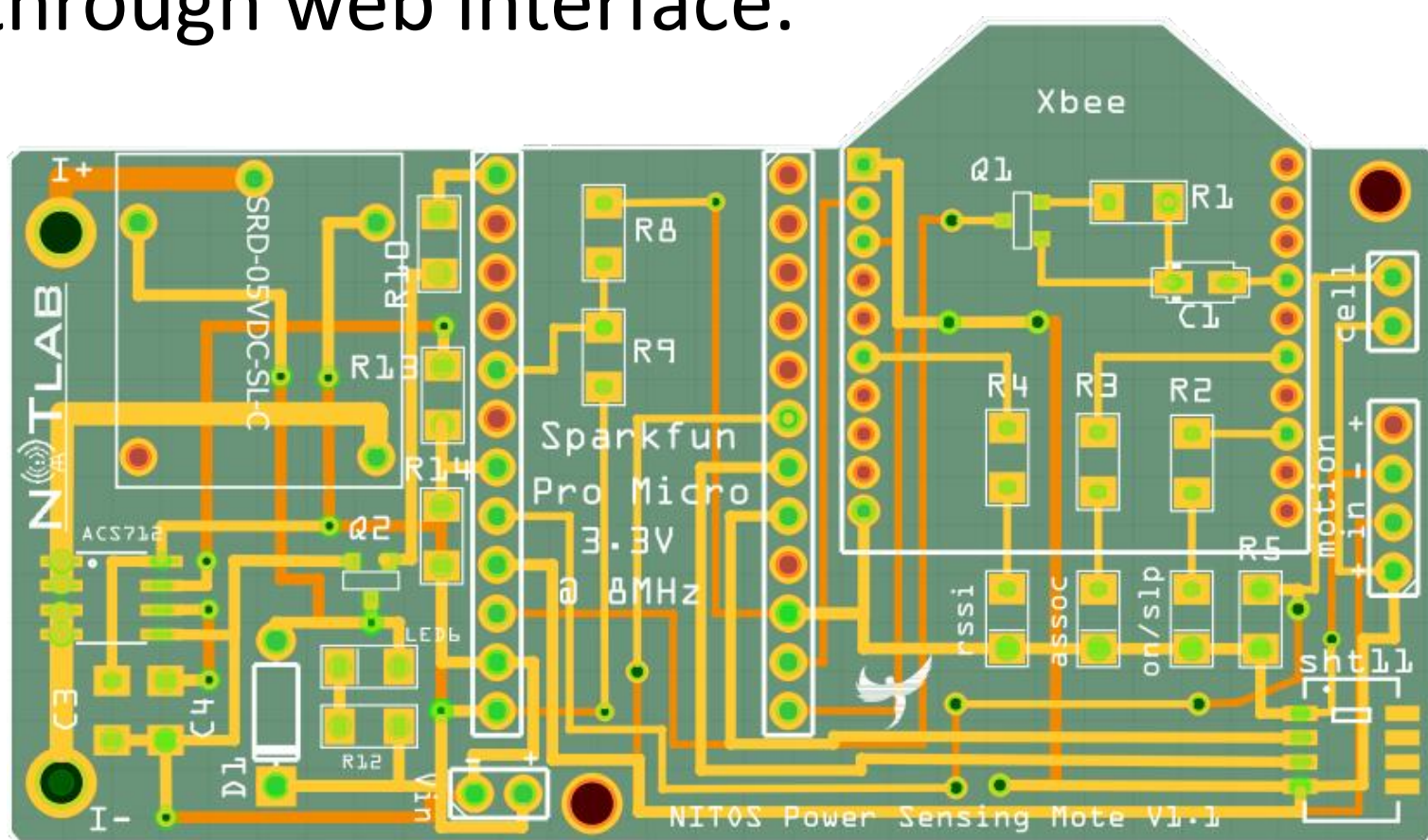# Control & Monitoring of Smart-Homes

NITlab developed a Power Meter framework consisted of Power Meter Devices and respective User Interface. The framework is capable of:
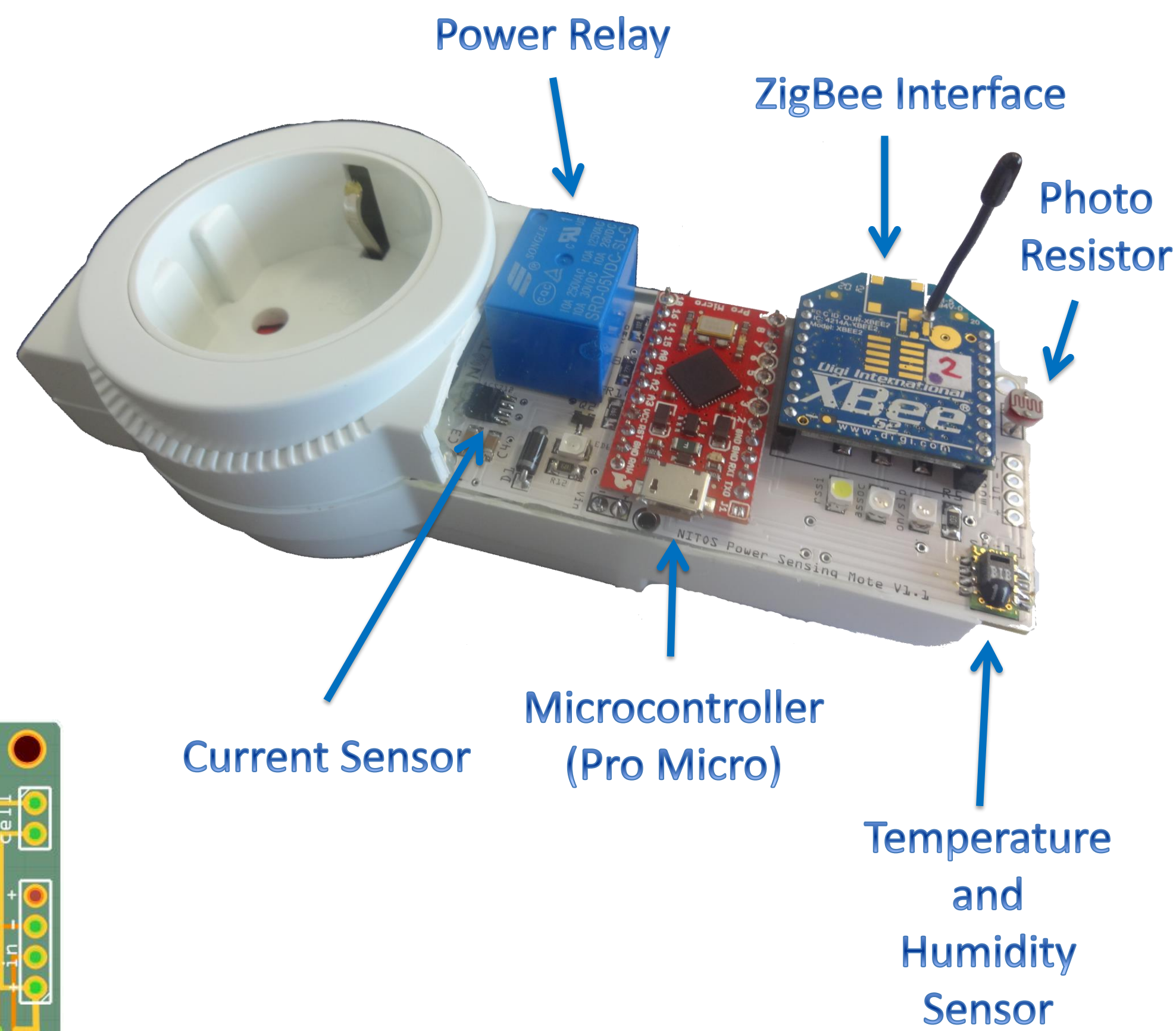- ✓ Sampling the Power Consumption of a connected electric device.
- ✓ Sensing environmental conditions.
- ✓ Transmitting the logged data to NITOS server through a Gateway node for further processing.

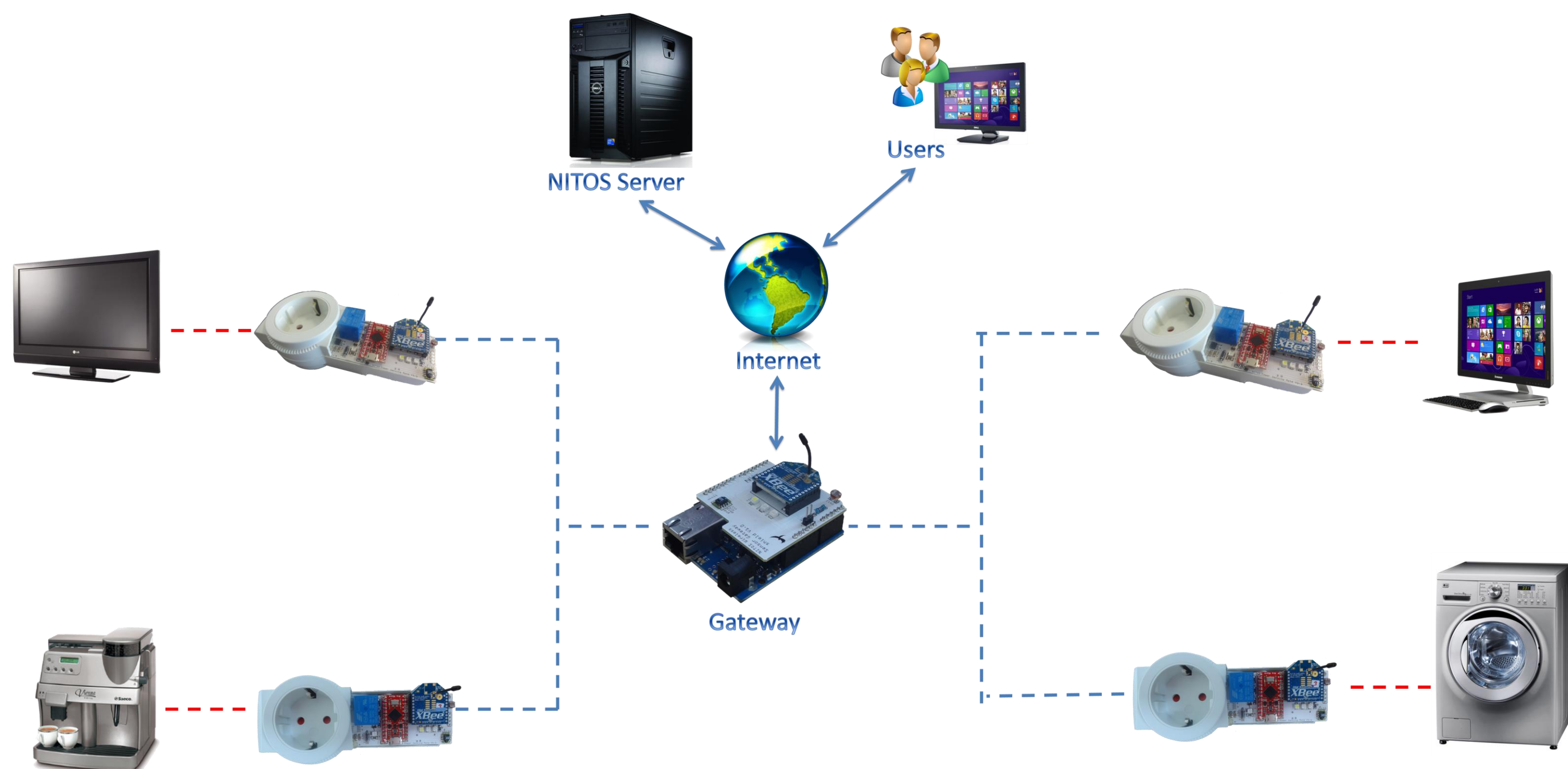Offers remote control of each mote through web interface.

Power Meter Device
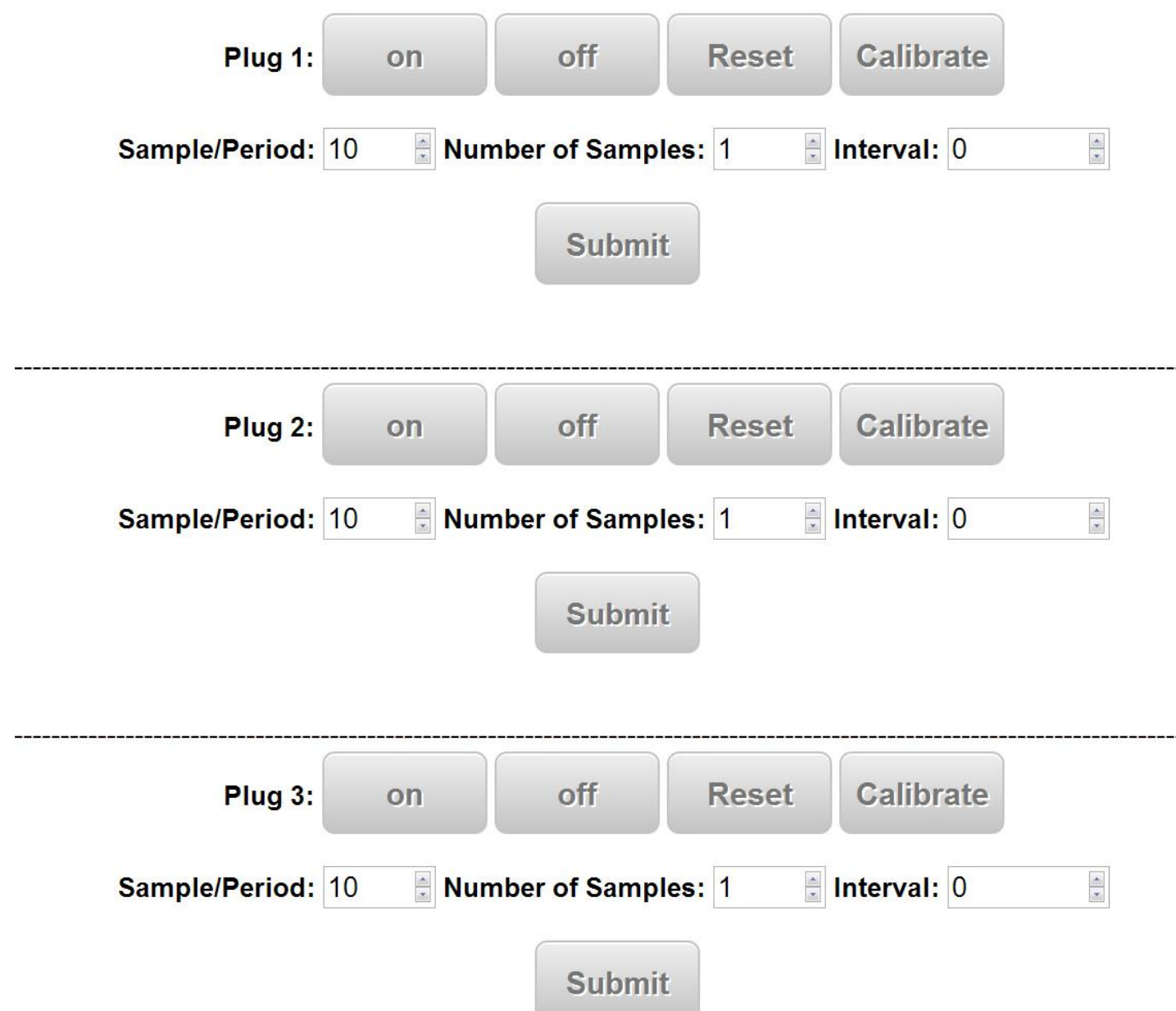

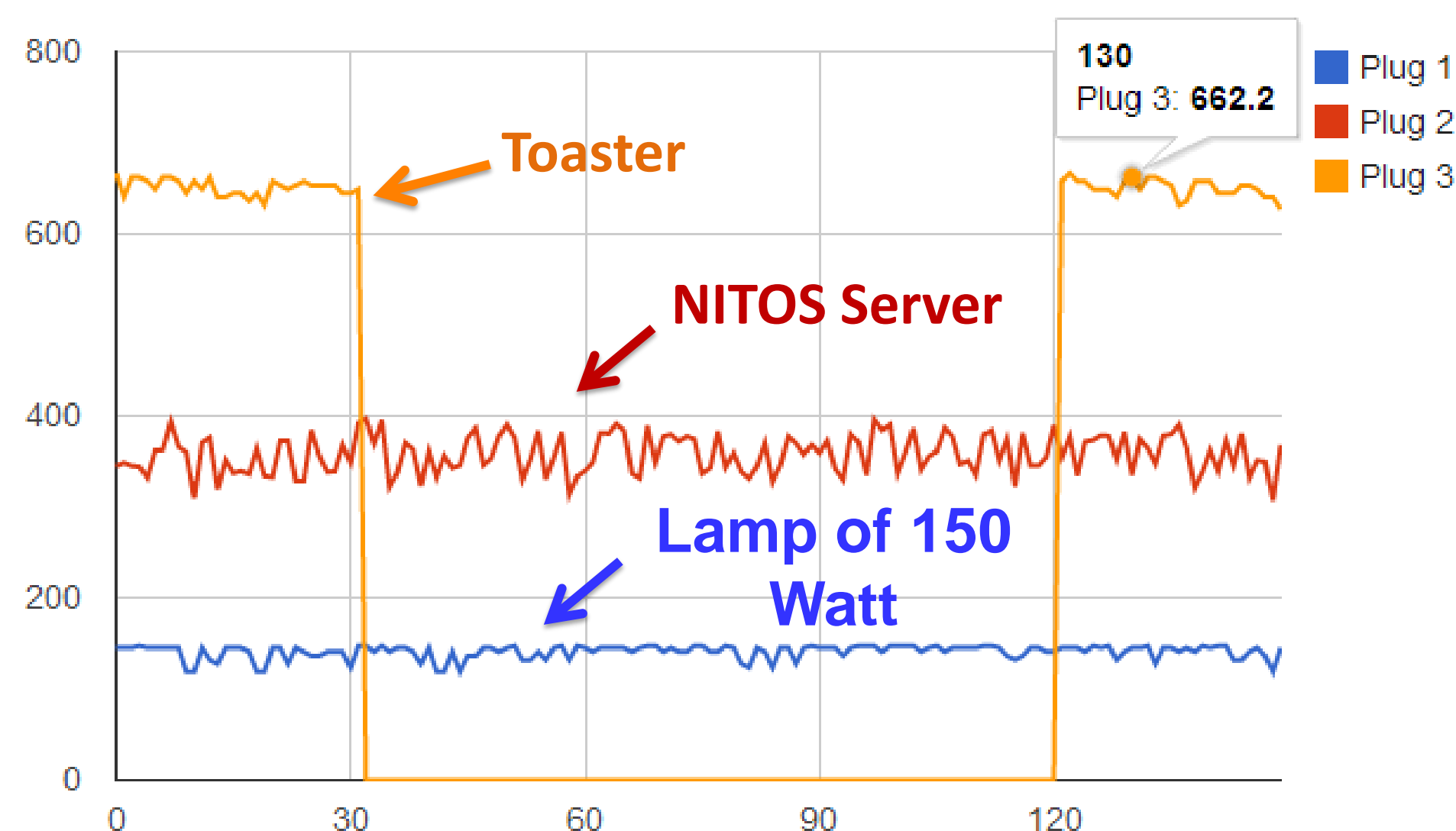Power Relay · ZigBee Interface · Photo Resistor · Current Sensor · Microcontroller (Pro Micro) · Temperature and Humidity Sensor

Designed PCB

Features

- ✓ Features **Pro Micro** microcontroller board.
- ✓ **ATMega 32U4** running at 3.3V/8MHz.
- ✓ Programmable through **Arduino** IDE.
- ✓ **ACS712** current sensor that providing precise current measurements.
- ✓ Featuring **Electrical Power Relay.**
- ✓ **Xbee S2** module for wireless communication.
- ✓ **Sht11** temperature & humidity sensor.
- ✓ Light intensity **photo-resistor** sensor.

- ✓ Output voltage proportional to AC or DC input current.
- ✓ Hall-Effect based sensor.

ACS712 Current Sensor

Network Architecture

NITOS Server · Users · Internet · Gateway

- ✓ Each Power Meter mote is connected with an electric device.
- ✓ The microcontroller samples the power consumption of the device using the current sensor, while also it collects environmental measurements (temperature, humidity, light).
- ✓ The measurements are sent to the Gateway node using the ZigBee interface.
- ✓ The Gateway collects the measurements from all the available motes and transmits them to the NITOS Server.
- ✓ Users can control the motes remotely (turn on/off, change sampling parameters, reset, calibrate) through a web-based framework.
- ✓ They can also visualize the measurements through web-based tools.

User Friendly Web-based Interface

| Plug 1: | on | off | Reset | Calibrate |

Sample/Period: 10   Number of Samples: 1   Interval: 0

Submit

| Plug 2: | on | off | Reset | Calibrate |

Sample/Period: 10   Number of Samples: 1   Interval: 0

Submit

| Plug 3: | on | off | Reset | Calibrate |

Sample/Period: 10   Number of Samples: 1   Interval: 0

Submit

Remote Control Tool

Current Power Consumption Values (Watts):

130
Plug 3: 662.2

Plug 1 · Plug 2 · Plug 3

Toaster

NITOS Server

Lamp of 150 Watt

Visualization Tool

Android Application

Giannis Kazdaridis, Vasilis Maglogiannis, Stavros Ioannidis, Thanasis Korakis and Leandros Tassiulas

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