

ELEC 499

Progress Report #2

Cloudpower

Feb 26th, 2013

Supervisor: Dr. Dong

Group Members:

Carl Stubens

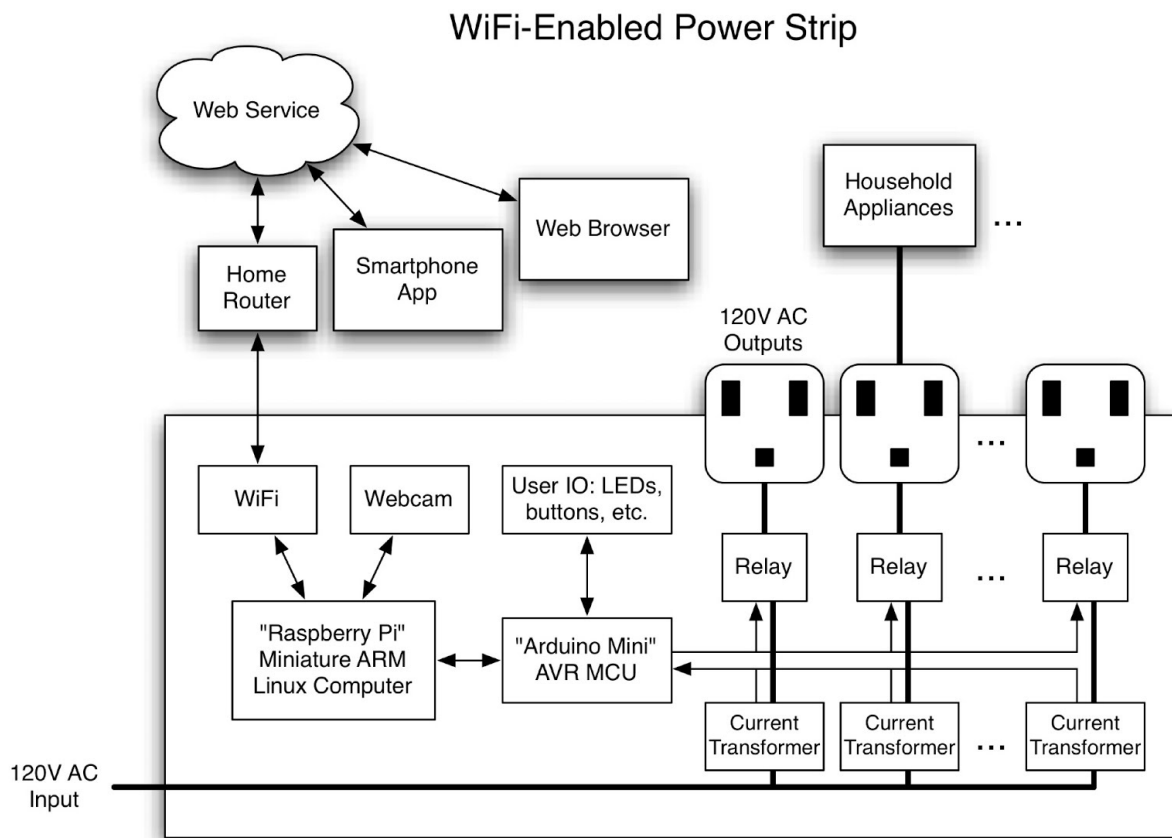
Drew Harris

Mike Anderson

Nathan Willson

Introduction

The project is to manage and monitor power wirelessly. For example turning on a light using an internet browser on a mobile device. The full device will include a power monitoring system, internet user interface, wifi authentication system, and various other features.



The project was split into two groups: **Hardware** and **Web/Software**. The two groups meet weekly and will eventually combine towards the end of the project.

Hardware

The hardware portion of the project includes building the relay circuit, developing a power monitoring system, interfacing with the arduino, etc. This portion of the project is being handled by Mike Anderson and Carl Stubens.

Milestones:

1. Build the relay circuit. Interface it with the arduino.
2. Find a solution for power monitoring. Buy the parts.
3. Build the power monitoring system.

Software

The software portion includes the remote web server (running on an Amazon EC2 instance), the Raspberry Pi web server (part of the Cloudpower device), the data storage (for power consumption monitoring), networking & control, etc. This portion of the project is being handled by Drew Harris and Nathan Willson.

Milestones:

1. Implement communication between the Raspberry Pi and the Arduino
2. Start creating a local web interface to communicate with the Raspberry Pi while inside the same local network.
3. Create a remote web server to allow bi-directional communication between a client web browser and the Cloudpower device. This requires successful handshaking and communication from the Raspberry Pi web server to the remote web server, occurring via WebSocket.
4. Test with Hardware once step 1 (of Hardware) is completed.
5. Design and implement database for the power monitoring data.
6. Fully develop and polish the web interface and Raspberry Pi server.
7. Write scripts to decode QR codes via a webcam connected to the Raspberry Pi.
8. Write mobile-optimized web page to create QR code from wireless credentials and a unique identifier.

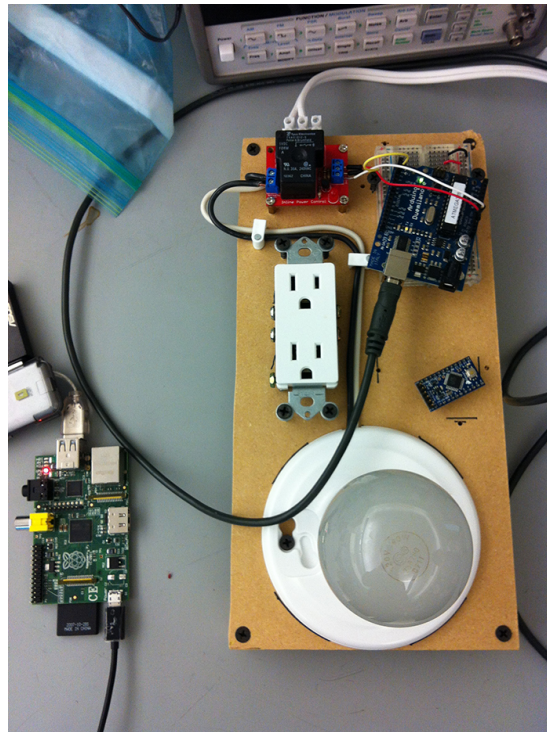
Extra: Wifi Authentication

The wifi authentication of the Raspberry Pi will be done using a camera as a QR code reader. The QR code will be generated from a mobile web page and will contain a unique identifier for the Cloudpower device and the user's wireless authentication credentials. This choice was made as an easy method for a consumer. This portion of the project includes coding, purchasing and interfacing a camera, and setting up a web interface.

Progress

Hardware

The relay circuit has been constructed. It is controlled via arduino and plugs into a wall plug in. The next step is to find a power monitoring solution. The group has been searching online and using school resources to find an economical and feasible solution. Once the plans are drafted the group will proceed with purchasing and building of the circuit. Afterwards the two groups will combine again.



Software

Meanwhile a small web server on the Raspberry Pi has been set up, and communication between the Raspberry Pi and the Arduino has been established. A remote web server is running on an Amazon EC2 instance, and an API exists to provide bi-directional communication from Raspberry Pi devices and client web browsers. The QR encoding and decoding scripts have been written and are mostly functional. A basic front-end web page has been written that provides switching of relays connected to the Arduino. Both groups met on Feb 26th to combine their progress. **We were able to successfully turn on a light bulb using both the local (Raspberry Pi-powered) and remote (Amazon EC2 -> Raspberry Pi) web interfaces from both inside and outside of the same local network as the device.**

The next development stage is to get the QR code reader working; further develop the web interface; and design the database to store consumer power consumption records.

Contact

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