**Weekly Progress Report**

**Project Name**: Energy Management System (EMS)

**Date**: October 04, 2015

**Collaborators:**

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**Project URL:** TBD

**Updated Milestone Chart:**

Updates from previous revisions are italicized for clarity.

| **Task Description** | **Original Scheduled Completion Date** | **Responsible Team Member** | **Modified Completion Date** | **Comments** |
| --- | --- | --- | --- | --- |
| Critical Component Breakout Boards | 8/24/2015 | RM, DM | 9/28/2015 | Critical component breakout boards have been completed for all functions. Messages have successfully been sent through the power line using the provided evaluation boards. |
| User Interface Implementation | 8/24/2015 | JL, AC | 10/12/2015 | Rest of system does not heavily depend on webapp so completion delay is not a large factor. This milestone has slipped again from its previous date of 9/28. |
| Web App Database Communication | 8/24/2015 | AC, JL | 9/13/2015 | The web application is able to communicate with the database using Hibernate (An Object-Relational Mapping library for Java) |
| Order Parts | 8/24/2015 | All | 9/20/2015 | Cypress has provided a new PLC evaluation kit which functions correctly. |
| Initial PCB Design | 8/31/2015 | DM | 9/6/2015 | Focusing efforts on vero-boarding initial hardware design instead of PCB design. Breadboard has been constructed. PCB may still be constructed if time permits, but based on summer slippage time for spinning PCB my not be available. Completion of breadboard has met the intent of this task. |
| Obtain and Verify Parts | 9/7/2015 | All | 9/20/2015 | All parts except PLC have been received and verified. Completion date has been pushed back as received evaluation PLC boards are not functioning properly. |
| Verification of Power Supply Circuitry | 9/14/2015 | DM | 9/14/2015 | Power Supply circuitry has been verified. |
| Verification of Breadboard Load Switch | 9/14/2015 | DM | 9/14/2015 | Load Switch is operational, and a load is able to be switched ON and OFF via an external voltage (provided from FPGA or other embedded system). |
| Verification of Breadboard Current Sense | 9/21/2015 | DM | 9/21/2015 | Current sense circuitry is operational. |
| Verification of Breadboard Voltage Sense | 9/21/2015 | DM | 9/21/2015 | Voltage sense circuitry is operational |
| Outlet Communication with PLC | 9/28/2015 | RM | 9/25/2015 | Messages have been successfully sent via the power line. |
| Interface PLC with Pi | 9/28/2015 | RM, JL | 10/7/2015 | Team has decided to acquire PLC evaluation boards. *PLC communication is occurring with the PI but communications does not work consistently. Team is working on debugging issues.* |
| Verification of Breadboard Processor | 10/5/2015 | All |  | On schedule |
| Final PCB Design | 10/19/2015 | All |  |  |
| Finalized Database Structure | 10/19/2015 | AC, JL | 9/28/2015 | This will be a result of the webapp completion. |
| PI PLC API | 10/26/2015 | RM, AC, JL |  |  |
| System recognizes new outlets automatically | 11/2/2015 | All |  |  |
| Send Hardware Measurement over PLC | 11/9/2015 | RM, JL, DM |  |  |
| Receive and store measured data | 11/9/2015 | AC, JL, RM |  |  |
| View measured data | 11/9/2015 | JL, AC |  |  |
| Toggle state of single outlet from web interface | 11/16/2015 | All |  |  |
| Toggle state of a group of outlets | 11/16/2015 | All |  |  |
| Outlets and groups follow schedule | 11/16/2015 | All |  |  |
| Data Compression Verification | 11/16/2015 | AC |  |  |
| Full system test passed | 11/25/2015 | All |  |  |

**Current Milestones:**

| **Task Description** | **Original Scheduled Completion Date** | **Responsible Team Member** | **Modified Completion Date** | **Comments** |
| --- | --- | --- | --- | --- |
| User Interface Implementation | 8/24/2015 | JL, AC | 10/12/2015 | Rest of system does not heavily depend on webapp so completion delay is not a large factor. This milestone has slipped again from its previous date of 9/28. |
| Interface PLC with Pi | 9/28/2015 | RM, JL | 10/7/2015 | Team has decided to acquire PLC evaluation boards. *PLC communication is occurring with the PI but communications does not work consistently. Team is working on debugging issues.* |
| Verification of Breadboard Processor | 10/5/2015 | All |  | On schedule |
| PI PLC API | 10/26/2015 | RM, AC, JL |  |  |

**Next Milestones:**

| **Task Description** | **Original Scheduled Completion Date** | **Responsible Team Member** | **Modified Completion Date** | **Comments** |
| --- | --- | --- | --- | --- |
| Final PCB Design | 10/19/2015 | All |  |  |
| Finalized Database Structure | 10/19/2015 | AC, JL | 9/28/2015 | This will be a result of the webapp completion. |
| PI PLC API | 10/26/2015 | RM, AC, JL |  |  |
| System recognizes new outlets automatically | 11/2/2015 | All |  |  |
| Send Hardware Measurement over PLC | 11/9/2015 | RM, JL, DM |  |  |
| Receive and store measured data | 11/9/2015 | AC, JL, RM |  |  |

**Status**

**Difficulties:**

Evaluating and selecting a new microcontroller based on PLC PSoC difficulties.

Currently experiencing intermittent PLC to Raspberry Pi communication. Communication is occurring successfully about 50% of the time. Team is currently working on debugging possible issues.

**Surprises**

PLC PSoC can only perform PLC functions and cannot perform any calculations on voltage current data. Therefore an additional embedded platform will be needed to perform controller functionality.

**Successes:**

Started to utilize Freescale KL25Z Freedom Board, and verified that is was able to construct a digital version of the input signal using an ADC, sampling every 200 µs. We then measured a second signal from a second ADC, but found there was only a single analog output. To get around this, we used a multiplexer, and found that we WERE able to utilize both ADCs. We are now working on averaging the values using Simulink, in order to eventually compute power. Basic RMS calculations were implemented for the two inputs into the Freedom board.

The database has been created in MySQL and Hibernate objects have been created in the Java application.

I2C level shifting circuitry has been constructed and is working properly to translate 3.3V logic levels of Raspberry Pi to 5V logic levels of PLC evaluation board.

**Questions/problems for consideration:**

We have decided not to make an overall PCB but to develop a working hardware prototype on vero-board which can be used to demonstrate the functionality of the system, and if time/budget permits then complete a PCB design.

Determine if the Raspberry Pi (main module), will be able to process I2C messages via interrupts or if polling will have to be used.

Team is considering moving proposal document from a word document to a LaTeX document to avoid Figure number issues etc.

We are making a design change within the web application. We are switching from using the Python based Django framework to the Java based Vaadin framework. This is being done because the team is more familiar with Java and the Vaadin framework and also because Java is a more powerful platform for development. This means we will need a way for the Java app to talk to native Python scripts running on the Raspberry Pi (possibly Jython) and that the web application will use significantly more system memory. Some additional tests will be run in the near future to ensure the memory usage is not too high.

**Gantt Chart:**

