

EE/CprE/SE 492 BIWEEKLY REPORT 2

1/22/18 – 2/9/18

SDMay18-41

Free Market P2P Energy Trading and Analytics

Client: Sodima Solutions

Adviser: Goce Trajcevski

Team Members/Role:

Arun Sondhi: Embedded Engineer/Hardware-Software Interface Lead

Alec Dorenkamp: Software Engineer (back end)

Noah Eigenfeld: Software Engineer (front end)

Brendon Geils: Software Engineer/Technical Lead

Jack Myers: Hardware Engineer/Project Manager

Joe Staudacher: Hardware/Power Engineer

Weekly Summary

These past two weeks were partially focused on addressing the hardware issues that we discovered at the beginning of the semester and towards the end of the last semester. On the software side, we continued to address security issues that were raised at our panel review and worked to create user and admin portal access. We continued to divvy out and assign tasks amongst ourselves to coordinate the work that needs to get done for the rest of the semester. We finalized our Gantt chart and are looking at using it to help us move forward in a more focused and specific manner.

Accomplishments in past two weeks:

Arun:

- Embedded platform research
 - Weighed benefits of switching to a different platform from existing prototype (Raspberry Pi)
- Worked on code sharing between React-Web and React-Native apps

Alec:

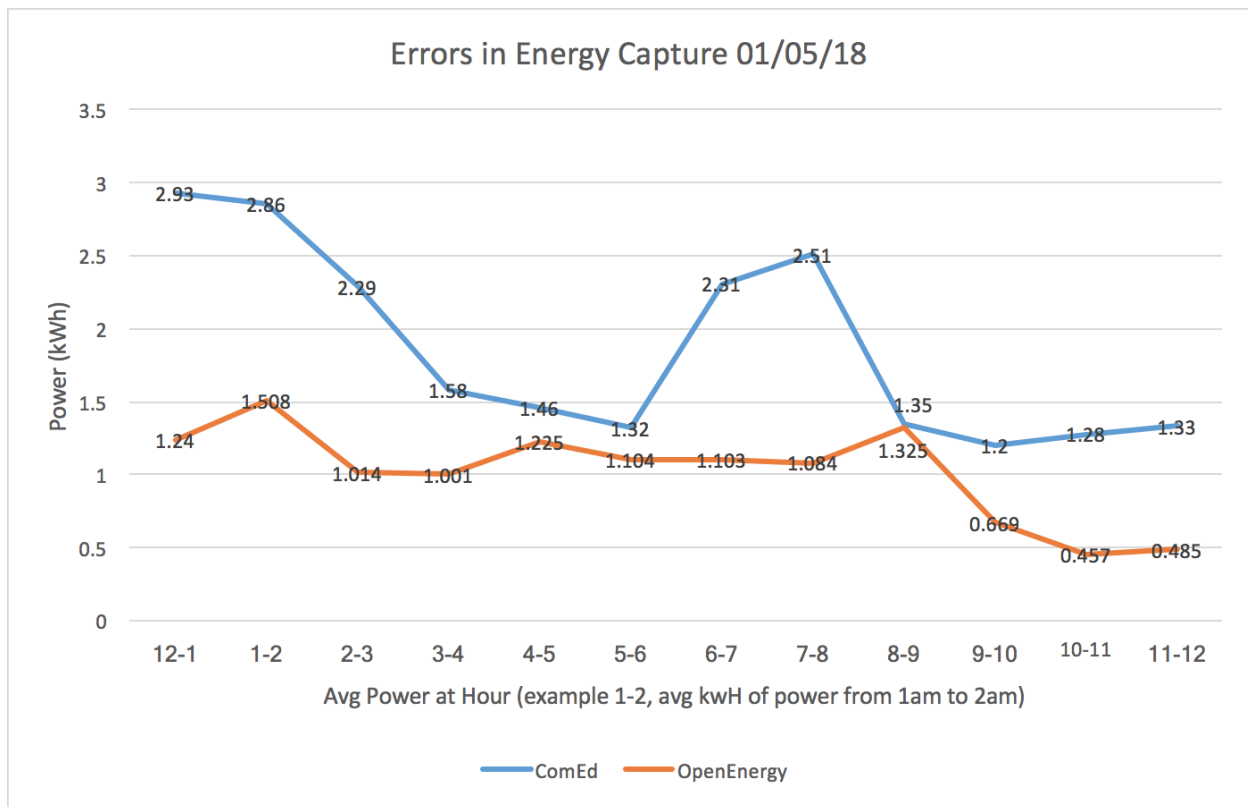
- Implemented a python API authentication solution to ensure that only authorized smart meters (the ones that we would sell) can post energy usage information to our Mongo Database. Also implementing this solution on a test database, after which can be converted to work on our production database and server

Noah:

- Began setting up user account creation through Okta
- Updated development environment to sync with software members
- Collaborated with Brendon and Alec to define and assign tasks for semester

Brendon:

- Presenting as one of eight finalists for the 2018 Cleantech University Prize, a \$50,000 grant awarded to the most innovative and promising clean energy projects at Midwest universities
- Tested hardware and software integration
 - Found and gained access to the lab that would be used for hardware accuracy testing
- Developed the high-level model for the trading marketplace
- Coded programs for user interface inputs



- The source of the large discrepancies between the data from our meter and the data from ComEd was discovered this past week. Through experimentation and analysis, we discovered the problem was that our sampling from the ADC was not in sync with the signal output by the transducer and this was resulting in bad data. We also found out that our transducer is less accurate at lower currents and, to a much lesser extent, was contributing to our inaccuracy problems.

Jack:

- Tested current clamps with Joe and determined that we were getting a sinusoidal signal on the analog output of the transducer. This affects how we are reading the samples in software as the amplitude is changing with time so we can't expect to read a constant value
- Researched and discussed with ETG potential solutions to powering our module from the line
 - One potential solution that was discussed is having a professionally installed 120 or 240 V plug on the outside of the panel. This would allow us to plug in our module outside of the panel safely, while still being able to measure voltage and power our module
 - Another potential solution would be to take a preexisting wall charger with a switching power supply and use its circuitry to power the device. We would have

to come up with a more robust way to connect so we aren't just tying loose wires to the prongs

- Also started initial design for hardware filtering for data that we are reading from the current clamps
 - One basic solution would be that we could filter out all components of the signal that is not at 60 Hz

Joe:

- Hardware modifications research
 - Explored comparable solutions on the market for hardware/software, such as how other device were powered from the main breaker
- Tested the current transducer with Jack and found the issue with the DC vs. AC sampling
- Worked on initial PCB design
- Worked on accuracy testing and evaluation of the tolerance for our devices

Pending Issues

- Current data acquisition is still not as accurate as we need it to be but we believe we have found the source of the issue. We will be looking to address the way our ADC samples the data and possibly look into getting a more accurate transducer.
- Continue to work on the simulation and high-level design of the trading platform
- Continue to research PCB options and familiarize ourselves with the design process

Individual Contributions

Team Member	Contribution summary	Biweekly Hours	Total Hours (Semester)
Arun Sondhi	Investigated advantages/disadvantages of various hardware platforms, worked on sharing code between React-Web and React Native apps	12	22
Alec Dorenkamp	Implemented a python API authentication solution precursor	12	22
Noah Eigenfeld	Collaborated with Brendon and Alec to define software tasks, updated development environment, began setting up user account creation through Okta	12	22

Brendon Geils	Explored the feasibility of our project and met with individuals with industry knowledge, tested current hardware prototype on home	25	40
Jack Myers	Tested current transducer, researched hardware power options, started on design for the hardware filter	30	42
Joe Staudacher	Tested current transducer, started practicing PCB design, researched options and spoke to faculty about filter design	20	30

Plan for coming weeks

Hardware team

- Continue to update Gantt chart and address the issue with transducer accuracy
- Begin the PCB design
- Start building a prototype of the hardware filter

Software team

- Continue to develop marketplace
- Develop Admin portal and Native app
- Work on aggregation of data and general database management

Arun:

- Continue to investigate security concerns related to various hardware modules and communications methods
- Complete training for data sharing between Web and Native
- Assist in speccing and evaluating LCD screen components and options

Brendon:

- Work on the developing the next phase of the trading app development
- Continue development on the admin portal

Alec:

- Continue to work on API security
- Work on database management and look into data aggregation

Noah:

- Develop more detailed and complete front-end software
 - Continue to work on development for new user signup
 - Start working on development for new user configuration

Jack:

- Finalize the fixes necessary for addressing the accuracy concerns of the transducer
- Continue research for hardware filtering development

Joe:

- Continue to research power supply implementation from the main home voltage source
- Continue working on PCB design
- Begin work on the display screen design and order necessary parts