Weekly Status Report 7

Dates: 3/29/2018 - 4/4/2018
Group Number: sddec18-02
Project Title: Steam Heat Controller Retrofit
Client/Advisor: Lee Harker

Team Members - Role
Sarah Coffey - Reporting Lead
Ken Wendt - Webmaster
Liz Wickham-Kolstad - Design Lead
Jevay Aggarwal - Technical Lead
Joe Filbert - Client Lead
Thomas Devens - Planning Lead

Summary

Each subteam continued to make progress on their goals. The hardware group connected the H-Bridge to the motor and were able to send PWM waves through a power generator. They were able to determine what kind of wave/timing is needed to drive the motor, and discovered that the second input on the H-Bridge needed to be grounded for the motor to work correctly. The software group created code for the different scenarios of use (sleep mode, display on, and communicating) and did initial benchmarking of the energy consumption with these use-cases (see tables 1 and 2). This also involved programming the Alphanumeric display, which ran through an I2C bus to the chip. After collecting these numbers and doing some calculations, we came to the conclusion that the BLE board with systemOff mode and the Alphanumeric display at ~3.5 V would be the optimal set-up, and would require ~21,000 mAh for an entire semester.

Table 1. Feather board power consumption comparison (WiFi - Adafruit Feather HUZZAH ESP8266 board, BLE - Adafruit Bluefruit nRF52 board)

Protocol	Mode	Current (mA)
WiFi	UART communication	78
WiFi	Deep Sleep	300
BLE	UART communication	15
BLE	Deep Sleep	13
BLE	systemOff	7

Table 2. Power consumption of the Alphanumeric display with varying input and display types.

Voltage (V)	Display	Current (mA)
5	"8888"	56

5	" "	.63
4	"8888"	30
3	"8888"	6
3.5	"8888"	17.5

Pending Issues
- The battery life on the board is still no ideal, so we are investigating alternative programming methods to support this lifespan.
- We have not been able to successfully transmit/ recieve data with the BLE board with the Raspberry Pi.
- Motor mount is still in the process of being remanufactured.

Going Forward
Hardware team: Write code to drive the motor/H-Bridge with the Raspberry Pi. If the motor mount is done with reman soon, then verify the fit on a valve with the motor.

Software team: Figure out how to communicate between the Raspberry Pi and the Feather BLE board. Continue working on the thermostat circuitry and investigate alternative programming techniques to cut the energy consumption further.

Individual Contributions

Name	Contribution	Hours Worked	Total Hours
Sarah	Created comparable codes for the WiFi and BLE Feather boards and completed initial power consumption tests.	6	49.5
Ken	Started to test the H-Bridge to control the motor. Figured out how to drive the motor through this H-Bridge using a signal generator.	4	50.5
Liz	Checked bluetooth and Wifi running at the same time on Pi. Helped work on bluetooth feather pairing to Pi	4	54
Jevay	Worked on Bluetooth Feather pairing to Pi. Coded the Feather advertising itself. Worked on buttons to change the temperature on display.	5	48

| Joe | Tested motor and H-Bridge circuit using AWG and did trouble-shooting for the encoder response. | 4 | 51 |
| Thomas | Helped with WiFi communication setup between Feather and Pi / additional planning for web interface | 5 | 37.5 |

Meeting with Client/Advisor

Not applicable.