

Weekly Report for 2020-02-24

Student Name: Daylen Mackey (1444775)

Group Name: Milky Way Solutions

Group Members: Leo Marroquin, Jia Xiang (Tony) Yang, Ian Then

Progress this week:

Goals From Last Week (including goals carrying over from weeks prior)		
Goal #	Goal	Status
6	Test the Electrometer Code with Octave (Get the electrometer running through Octave)	In Progress/On Hold
8	Install MATLAB on the R-Pi 4B (and test code if possible)	In Progress
11	Integrate the Temperature/Pressure sensor with the GUI	In Progress
12	Use Dr. Barlage's current source and new adapters to test the electrometer.	Completed
13	Test Sensor results against pressure and barometer	In Progress
14*	Compile Task Data for the Midterm Progress Report	Completed
15*	Run simulations to test GUI abnormalities and edge cases	Completed

* These tasks were not included in the last report's "New Goals For Next Week" because of the two week gap

Goal 6,8,11,13:

These tasks have been halted as we are booting and reformatting the R-Pi 4B. We've encountered several setbacks including needing to find new a new power supply, and a new Display Cable. We didn't realize the R-Pi 4B would be so different from the R-Pi 3, so we are re-gathering components. This could have been prevented with better preparation.

Goal 12: Use Dr. Barlage's current source and new adapters to test the electrometer

Leo met with Dr. Barlage to test his picoAmp current source. The current source could only be used on passive devices, so we measured our TerraOhm resistance setup. The current source values were quite different from the electrometer (Leo has the exact values, and we plan to include them in the upcoming midterm report). The current source is likely more accurate, but we will need to run more tests to confirm.

Goal 14: Compile Task Data for the Midterm Progress Report

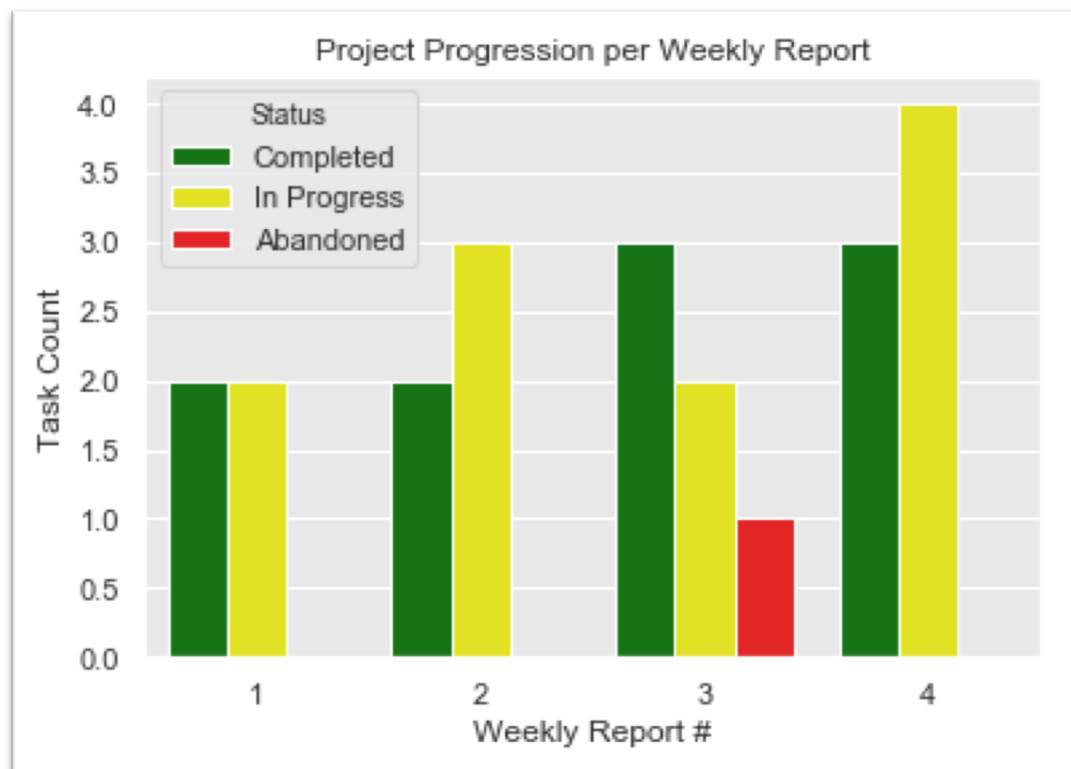
This was a simple task. All I needed to do was grab the charts from previous reports and move them into a spreadsheet. I'd like to visualize the data for the upcoming Midterm Progress Report, but I'm not sure what the most effective way is. I've included a bar plot below, but it is not an elegant or interesting way of presenting the data. Maybe using area plots?

Goal 15: Run simulations to test GUI abnormalities and edge cases

Dr. Barlage suggested we run a test to validate GUI functionality, so I wrote a Python script to randomly test all the user inputs. The script would generate a number between -10,000 and +10,000, fill the user field, then submit the values to be processed in MATLAB. I ran 500 trials with 11 user fields (totalling 5,500 tests). All 500 trials came back successful: There were zero cases of data corruption and zero crashes

I plan to expand on this simulation once we have a better idea of what values should be used in the electrometer. I would like to include larger values but run fewer trials as my computer took approximately 90 mins to run this simulation.

Progress Bar Plot:



Completed: Represents Tasks completed in the span of the weekly report

In Progress: Represents the number of ongoing tasks (ongoing tasks can carry over to the following week)

Abandoned: Represents Tasks abandoned in the span of the weekly report

Evaluation from last week:

This last week was not as productive, and we encountered some setbacks. The biggest being trying to transition over to the R-Pi 4B without realizing we'd need new components. We had

some small successes like the Electrometer, and the simulation tests, but we're still behind on key tests where we'd use MATLAB to run the Electrometer.

For Next Week:

New Goals For NEXT Week	
Goal #	Goal
16	Boot the R-Pi 4 with the new components
17	Expand the simulation to include values up to $\pm 10,000,000$ (fewer trials however)
18	Write a script to recognize when a new USB is inserted into the Pi

Concerns: I have 4 midterms next week, so some of the in progress tasks may take 2 weeks

Weekly Report for 2020-02-10

Student Name: Daylen Mackey (1444775)

Group Name: Milky Way Solutions

Group Members: Leo Marroquin, Jia Xiang (Tony) Yang, Ian Then

Progress this week:

Goals From Last Week (including goals carrying over from weeks prior)		
Goal #	Goal	Status
4	Test BME sensors on the Raspberry Pi	Completed
6	Test the Electrometer Code with Octave (Get the electrometer running through Octave)	In Progress/On Hold
7	Begin GUI backend construction (passing input data to raspberry pi)	Completed
8	Install MATLAB on the R-Pi 4B (and test code if possible)	In Progress
9	Debug the Electrometer via Oscilloscope	Abandoned
10	Log input data to csv or txt file	Completed

Goal 4: Test BME sensors on the Raspberry Pi

Tony and I managed to get the sensor working this week (and it matched room temperature and pressure estimates). We needed to install additional libraries (updated CircuitPython and adafruit bme280) and enable SPI communication on the R-Pi. The detailed steps were documented in case we need to reformat the memory card when moving operations from the R-Pi 3b+ to the R-Pi 4+.

Goal 6: Test the Electrometer Code with Octave (Get the electrometer running through Octave)

This task is on hold as we are trying to use MATLAB to replace Octave.

Goal 7 & 10: Begin GUI backend construction & Log input data to csv or txt file

We completed both tasks and progressed beyond the listed goals. Backend construction began with registering input events (users using the popup numpad to enter values), and "grabbing" those field values once the user clicked the "Start Measurement" Button. From there, I was able

to pass these labelled values to a csv file. Some extra code was also added to ensure all input fields were filled out, and inside a given range – if the user tried to submit missing values, their input was rejected.

Beyond the goal:

I learned MATLAB has a Python Application Programming Interface (API) that allows execution of MATLAB scripts from a Python file. Using this API, I called a simple MATLAB script that pulled the user's values from the csv file, modified them, and rewrote them to a different csv file. This acts as a proof of concept because this technique can be easily altered to include the MATLAB script to run the electrometer.

Goal 8: Install MATLAB on the R-Pi 4B

We did not make progress on Goal 8 this week. We are waiting for the power cable we ordered, then we can begin.

Goal 9: Debug the Electrometer via Oscilloscope

In our most recent client meeting, Leo found the source of the bug, and corrected the issue. Debugging via Oscilloscope is no longer necessary.

Evaluation from last week:

This last week was highly productive! We got the sensor working (within room temperature and pressure estimates) and implemented a GUI backend that sends legal values to a MATLAB script for processing while rejecting illegal/missing inputs. Leo solved the Electrometer bug with the help of our client, and Ian is making progress with the 3D case. With the progress made this week, I am far more confident that we will see this project to competition.

For Next Week:

New Goals For NEXT Week	
Goal #	Goal
11	Integrate the Temperature/Pressure sensor with the GUI
12	Use Dr. Barlage's current source and new adapters to test the electrometer.
13	Test Sensor results against pressure and barometer

Concerns: None

Weekly Report for 2020-02-03

Student Name: Daylen Mackey (1444775)

Group Name: Milky Way Solutions

Group Members: Leo Marroquin, Jia Xiang (Tony) Yang, Ian Then

Progress this week:

Goals From Last Week (including goals carrying over from weeks prior)		
Goal #	Goal	Status
2	Build simple TkInter GUI for testing Purposes	Completed
4	Test BME sensors on the Raspberry Pi	In Progress
5	Establish UWS Wi-Fi connection with the raspberry pi	Completed

6	Test the Electrometer Code with Octave (Get the electrometer running through Octave)	In Progress
7	Begin GUI backend construction (passing input data to raspberry pi)	In Progress

Goal 2: Build simple TkInter GUI for testing Purposes

We completed the TkInter GUI this week just in time to meet the deadline from our proposal. It was built with Object Oriented Principles so it would be scalable and easy to modify. A number-pad pops up whenever the user clicks within a textbox so no keyboard will be necessary for data entry. We might make changes to the appearance if time permits it.

Goal 4: Test BME sensors on the Raspberry Pi

This has been a surprisingly challenging task. Existing libraries are not working as expected. It seems that these old libraries haven't been updated to Python 2.7 standards, and probably never will (Python 2 support was discontinued as of January 2020). We likely need to reconfigure some code to meet Python 3 standards to solve the problem.

This is a minor setback, but this task be completed by next week.

Goal 5: Establish UWS Wi-Fi connection with the Raspberry Pi

This goal was completed by Ian and Tony. The task was far more challenging than expected (required many linux commands from terminal), but the two of them did a great job!

Goal 6: Test the Electrometer Code with Octave (Get the electrometer running through Octave)

We tested the electrometer code with Octave, but we did not run it with the electrometer. Most of the time spent this week was restructuring the current code base and running it with MATLAB. We've found a version of MATLAB that can be run on the Raspberry Pi 4B, and we're hoping it will be compatible with our project. This was a recent discovery, but we are planning on testing this next week.

Goal 7: Begin GUI backend construction (passing input data to raspberry pi)

We did not begin this goal this week. Now that the frontend is complete, we can start this task. This task should be completed in 1.5 weeks.

Evaluation from last week:

While this last week was productive, I believe progress has stalled. The sensor libraries did not work as planned, and we still do not have a very strong grasp on the communication protocol for the electrometer. Leo is working very hard on the communication protocol, but it's a challenging task. We only have 2 months left, and there is still a lot to do. I think these next three weeks (including reading week) are pivotal. We need to start progressing if we're to complete this project on time.

For Next Week:

New Goals For NEXT Week	
Goal #	Goal
8	Install MATLAB on the R-Pi 4B (and test code if possible)
9	Debug the Electrometer via Oscilloscope
10	Log input data to csv or txt file

Concerns: None

Weekly Report for 2020-01-27

Student Name: Daylen Mackey (1444775)

Group Name: Milky Way Solutions

Group Members: Leo Marroquin, Jia Xiang (Tony) Yang, Ian Then

Progress this week:

Goals From Last Week (including goals carrying over from weeks prior)		
Goal #	Goal	Status
1	Format the new Raspberry Pi and install necessary frameworks	Completed
2	Build simple TkInter GUI for testing Purposes	In Progress
3	Integrate GUI with Raspberry Pi and touchscreen	Completed
4	Test BME sensors on the Raspberry Pi	In Progress

Goal 1

This goal is marked as completed, but it is one that will likely linger throughout the semester. We installed all the frameworks necessary for early operations, but I'm certain we will need to install more as the semester goes on.

Goal 2

Tony and I made significant progress on this goal last week. We familiarized ourselves with the TkInter framework and split the GUI construction into left (my job) and right (Tony's job) sides. I managed to also construct a popup number pad so that users will be able to enter all values without attaching an external keyboard. The GUI should be completed by the end of the week.

Goal 3

This goal ended up being more challenging than expected, but we still made it work. The touchscreen was very finicky and requires an additional power supply. We figured out we could directly connect power pins from the pi to the screen (which makes our lives a bit easier), but that also makes the project more susceptible to fail if a wire falls out of place. This is something we need to be cautious of moving forward. The ribbon cables, and cords currently being used for the touchscreen are not very secure – we will need to fix this.

Goal 4

We didn't complete this task, but we did make progress. We've setup the sensor and written the test code. The only issue was we weren't able to install a necessary code library. This led to us trying to establish a wi-fi connection through UWS, but we encountered some difficulties. We've received an email with instructions from IT support, and intend to solve this problem by the end of next week.

Evaluation from last week:

Progress this week was substantial, and our client was very pleased with our progress. Leo finalized PCB designs, Ian made significant progress with the outer casing, and Tony and I completed the majority of the TkInter GUI.

The team did a great job joining forces this week. As a team, we made progress cleaning our client's codebase, and setting up the Raspberry Pi's touchscreen and sensors. We did however

struggle to set up the Wi-Fi connection with UWS. This is something we plan to continue tackling next week.

We are planning to do a test run of the electrometer code through Octave tomorrow (Monday, January 26). This will be a pivotal test. Even though the code we are running will be simple, if the Octave code does not work, we may need to restructure our design.

For Next Week:

New Goals For NEXT Week	
Goal #	Goal
5	Establish UWS Wi-Fi connection with the raspberry pi
6	Test the Electrometer Code with Octave (Get the electrometer running through Octave)
7	Begin GUI backend construction (passing input data to raspberry pi)

Concerns: None

Weekly Report for 2020-01-14

Student Name: Daylen Mackey (1444775)

Group Name: Milky Way Solutions

Group Members: Leo Marroquin, Jia Xiang (Tony) Yang, Ian Then

Progress this week:

Progress was very limited this week as I was sick with Laryngitis, and another group member had Pneumonia. This puts us slightly behind schedule, but we will work hard to make it up.

We did find the time to meet and delegate some weekly tasks.

- We plan to keep meeting as a group every Tuesday
- Tony and I will be responsible for building the Python GUI backend and testing it on the touchscreen this week.
- Ian has taken size measurements of the instruments, and is working on designing the board layout
- Leo is finalizing the PCB design and plans to get it reviewed this week.

Our parts arrived and we have already begun working with them. We spoke to Alan about implementing switches and fuses for our power source as well.

Evaluation from last week:

This last week was not incredibly productive, but two team members were very sick. However, I am pleased with the progress our team made during our short meeting.

With a client meeting next week, and everyone understanding their role, I believe we are on the right track.

For Next Week:

New Goals For NEXT Week	
Goal #	Goal
1	Format the new Raspberry Pi and install necessary frameworks
2	Build simple TkInter GUI for testing Purposes

3	Integrate GUI with Raspberry Pi and touchscreen
4	Test BME sensors on the Raspberry Pi

Concerns: None
