EE/CprE/SE 491 WEEKLY REPORT

Start Date – End Date: 9/20/2024 - 9/26/2024

Group number: sdmay25-18

Project title: Weather Triggered Wireless Telemetry System

Client &/Advisor: Daji Qiao and Sarath Babu

Team Members/Role:

1. **Alex Chambers:** Individual Component Designer
2. **Alexander Christie:** Client Interaction
3. **Adam Fields:** Data Formatting
4. **Nisha Raj:** Team Lead
5. **Aidan Gull:** Component Integration
6. **Colin Kempf:** Documentation

Weekly Summary

       The goal for this week was to put together a powerpoint for our client and advisor that outlined the individual component flowcharts for our project. We worked on splitting up our project into three parts that would each flow information into the next part in order to complete its functions. We worked through the first component that we decided would predict weather events. We created a flowchart that described how after the program was started it would query weather data API or the weather collectors on the ARA stations which would then schedule when to record data based on predicted weather which will send a command to start and end data collection. The next module we looked at was to gather data. We were working through with our advisor and client if we just output a stream of data or collect it and then send it as an output. The next module we designed was to process data in terms of putting it in a zip format following the hierarchy given from our client. We also once again kept investigating the different ARA experiments and API in order to gain more familiarity with the system. This will help us in the future as we start to work on collecting weather data directly from the ARA framework.

Past week accomplishments

- **Individual Component Diagrams - Alex Chambers:**
  - Created additional diagrams to break down the three different major components of our Conceptual Flow Diagram.
  - Everyone in the group had previously come to a general understanding of how we viewed these components to work. Once they had been drawn up, we reviewed them as a group, and revised certain aspects or found ways to better convey our design to clients.
  - Specific member tasks:
    - <u>Alex Chambers:</u> Created the designs and oversaw a lot of the final creation for how the individual components would work. He also created the overview design and glossary to go along with the drawings. He also took point on

presenting these drawings.
- **Additional Experiments with ARA Framework - Group:**
  - As instructed by the client, we continued to learn how the ARA framework works and understand their system through the experiments in the ARA User Manual.
  - The group all participated in this and it was the majority of what we spent our time on. We did these experiments individually and in pairs, learning how to collect data and how we might go about using it.

Pending issues

- **Python API**
  - A work in progress more than an issue. We need to get all group members set up with the local python API so that they can use ARA without going through the portal.
  - This requires both the API and the CISCO Iowa State VPN

Individual contributions

NAME	Individual Contributions	Hours this week	HOURS cumulative
Nisha Raj	-Continued experiments with ARA framework -Worked on debugging local environment to run ARA code locally -Started brainstorming finite state machine layout based on flowcharts from last week	4	12
Alexander Christie	-Experimented further with ARA framework -Compiled evolving flowcharts into Visio based on Individual component design.	4	12

Aidan Gull	-Worked on more experiments with ARA framework
	    - Monitoring AraMIMO Wireless Link Behavior
	    - Capturing CSI Data using the AraMIMO Deployment
	-Worked with ARA weather API
	- Helped Work on presentation with individual component drawings
		6	14

Colin Kempf	- Conducted experiments with ARA framework
	    - Understanding ARA Portal (licenses, containers, etc.)
	    - Monitoring AraMIMO Wireless Link Behavior
	    - Capturing CSI Data using the AraMIMO Deployment
		6	14

	- Worked with Alex Chambers to create a presentation to share the individual component drawings to the clients		
Alex Chambers	- Updated Conceptual Design to include feedback provided by client in previous meeting - Presented updated design to receive client during weekly meeting to receive more feedback	6	14
Adam Fields	- Continued doing more experiments with data formatting - Read the ARA data formatting standards document	4	12

Plans for the upcoming week

- **Research**
  - **APIs**
    - Research possible weather APIs that could be used to predict weather events.
    - Specific member tasks:
      - Nisha Raj & Alex Chambers: Investigating possible APIs.
  - **Receiving Data**
    - Research into pull vs. push for receiving data
    - Make a pros and cons list for these, and come to a group consensus on which we should use for the project and report back to the client with our findings
  - **Dynamic Feedback**
    - Research into dynamically updating (feedback) the weather prediction algorithm
- **Improve Individual Component Designs**
  - Based on feedback from the client meeting, update the individual component designs to better meet their expectations.
  - The Gathering Data and Predicting Weather Events components need to be more closely integrated.
    - Much of their programming may overlap, such as both needing to access the ARA API.
    - Rather than make them as separate components which are developed independently, they should be developed together, or possibly be all one component, and the designs should reflect this.
  - Specific member tasks:
    - Alex Chambers & Colin Kempf: Brainstorming and redesigning
- **State Diagram**
  - Create a state diagram of the different weather events
    - Define what different events there are (states) and the conditions required to switch from event to event
    - Break down the different states into types of that weather event. For example

when it's cloudy, is it overcast or only partly cloudy?
- ■ Use this to help us updated the overall conceptual sketch and individual component design
- ● **Continuing Experiments**
  - ○ Continue to test and learn the ARA framework from the given experiments
  - ○ Get the Python API and CISCO VPN set up on all group members computers
- ● **Website Design**
  - ○ Personal information
  - ○ Summary of project

Summary of weekly advisor meeting

This week we had our meeting with our advisor and client on 9/20. Our meeting consisted primarily of us sharing our presentation of the individual component designs we had created. We explained how we envisioned these components working and how they would then fit together. The client and advisor gave feedback on these designs, highlighting features they would like added or changed. Additionally they asked clarifying questions about our designs, pointing out some things we could further specify.

The client and advisor also gave us more things we should be researching to help with the project based on what we had come up with for our individual component design. These included pulling vs pushing for retrieving data from a Weather API, and dynamic feedback for our prediction algorithm. They also instructed us to create a state diagram to help visualize how the different weather events will change from one to another. This will help us when we try to figure out our weather prediction algorithm for the program.