



WIRELESS MODULAR TESTBED Capstone

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Client: Dr. Morgan Vigil-Hayes

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Mentor: Arnau Rovira

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Section I. Introduction

In this memo, we will at what our every member's job for the continuation of capstone will be.

We will be looking at everyone's jobs that they will be performing over the next couple of months. Due to the nature of our capstone, we have been researching any programs that might help us complete the tasks. After which we will be further examining how each member will be contributing to the subsystems of the project.

Section II. Research

Throughout the past couple of weeks we have been focused on finally finding the technologies to use for the network between the different antennas. We have found ways to run the wifi and bluetooth technologies within Linux but the more specific technologies such as LoRa and Zigbee we've been forced to do more research. Right now although we have these antennas we are still looking into what languages would be best to transmit data between them and then how to use the network to communicate in between them.

Section III. Work Breakdown Structure

We have broken the Work Breakdown Structures into five different categories, Software Configuration, Network Communication, Hardware, GUI, and Documentation. Duties in these categories have been split between all four members of our team with each of team member taking a lead on each section.

Jack will be leading Network communication and software configuration, this involves getting data from the antennas and relaying it between the Raspberry Pi's to create a modular network. The Hardware side is led by Cody Roberts and involved the research into the different types of antennas needed based on client requirements and ordering them, as Treasurer, Cody was able to effectively research and order all of the parts we needed. Ryan will be working on the website including the documentation of meeting minutes, software, hardware, and all the network configuration used to make the project work. Hannah is leading the effort to develop a Graphic



User Interface for the data. This will make output the data and make it easier to read by students, high configurability was necessary as part of this project and will be accomplished here.

Section IV. Subsystems

The following are the subsystems as explained in Section III.

- **Hardware (Complete)**
 - All required parts have been ordered.
- **Install Power Supplies (Cody)**
 - Ensure all Raspberry Pi modules receive power through portable power supplies.
 - Test power supplies in use to ensure they remain powered throughout the 6 hour duration desired by the client.
- **Network Development (Team)**
 - Core (**Jack**)
 - Handles packet exchange
 - WiFi Mesh (**Jack**)
 - Source Code
 - Integration
 - WiFi AP (**Jack**)
 - Source Code
 - Integration
 - FM (**Cody**)
 - Assemble hardware
 - Source Code
 - Integration
 - LoRa (**Cody**)
 - Assemble hardware
 - Source Code
 - Integration
 - Zigbee Attempt (**Team**)
 - Assemble hardware
 - Source Code
 - Integration
- **Network Integration (Team)**
 - Ensure proper operation with configuration software
 - Test all channels with multiple Pis
 - Test multiple channels with a single Pi
- **Configuration Software (Jack)**
 - Ensure use with all antennas
- **GUI (Hannah)**
 - Similar to mini-net
 - Lightweight linux

- Customization options
- Mobile option
- **Website (Ryan)**
 - Upload source codes
 - Update project status
 - Documentation of project
 - Presentable for client and employers
 - Easily displays information and necessary requirements

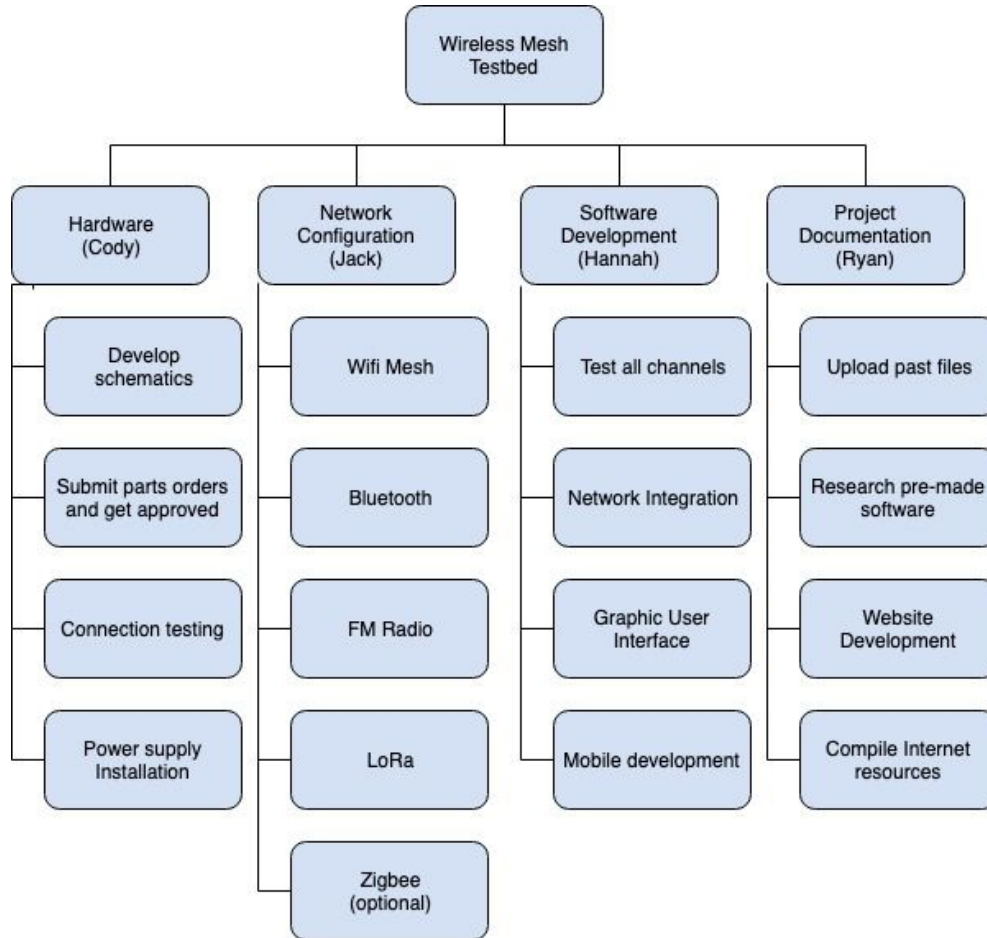


Figure 1: WBS Chart

Section V. Conclusion

In conclusion, we have been looking to taking the final steps in developing our technology, the last semester and couple months has led to us getting ready to process the data between the Pi's. This technology has been done before and we are working towards implementing many different types of data and code together.

With the multiple antenna systems we are incorporating into our system, the challenge comes with the configuration to allow the Raspberry Pis to utilize multiple channels for data transfer. As we near the end of network development, we will be focusing our efforts on testing, configuration software, and the GUI to ensure the project requirements are met. We will, however, also be keeping an internal side project running through to the end of the project which will be developing the network software, which will work with the developing configuration software, for the LoRa antenna to exceed our client's requirements. Throughout all of this work, we will also be producing appropriate documentation and website updates.

As we finish our research we will implement the codes we found and develop a network along with a Graphic User Interface so the project meets Dr. Vigil-Hayes standards for what we were set out to do. It has been a surprise how much research this project has been instead of focusing on hardware but in the end hopefully we will have a good final product that can be used for education on network technologies.