EE 491 Senior Design May 2018 Group Meeting

September 2017~May 2018
Client: Vishal Mahulkar
Advisor: Dr. Hegdey Chinmay

Safe Communication Between Lead and Following Vehicle

Week 3~4 Bi-Weekly Report

Team Members:

Bradley Stiff- Software Lead, Project Lead
Justin Wheeler- Software Lead
Sanguk Park- Scribe Lead, Communication Lead
Zhize Ma- Scribe Lead, Hardware Lead
Junho Chun- Hardware Lead
Yifan Lu- Hardware Lead
Jose Candelario- Project Lead, Communication Lead

Past Week Accomplishments:

This week, our group started making progress on building cables for the RigRunner 4005i. Over the past weeks, our hardware group focused on setting up the power distributor and getting use to the configurations. When it came to testing with the RigRunner, our group ran into the following problems:

- The wires that were used to measure the voltage and current output by the power distributor had difficulties as the RigRunner had a unique port.
- Most ports required full contact with the wires in order to have accurate data for the output.

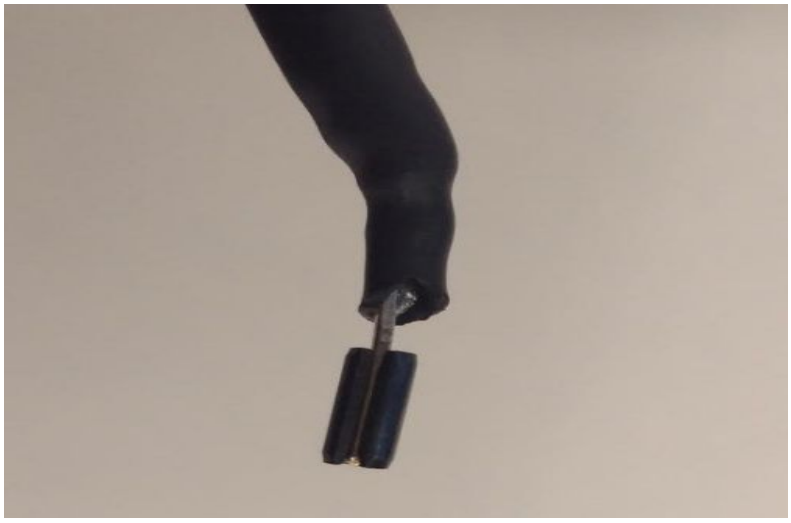
In order to address these problems, we planned on getting a hold of the correct connectors for the ports and soldering a wire to them for easier testing of case scenarios for the RigRunner. Our process is shown below:

As we can see from the image above, the power distributor has 5 pairs of nodes for distributing power. The pins that are used for the specific distributor is the 30 Amp Anderson Powerpole Connector.

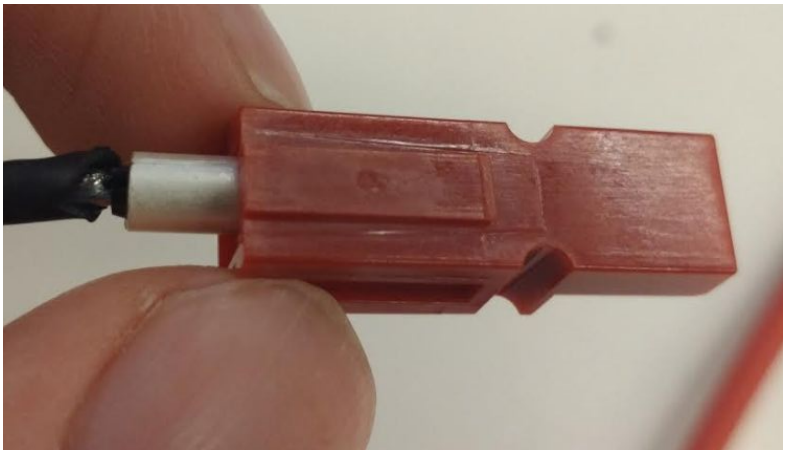
1)

The power pole connector comes with 3 pieces: a black rod clamp, the silver connector contact and the node connector itself. Before assembling the contact with the connector, we first needed to have the wire clamped to the black rod. The back rod slides into the rod shaped funnel of the silver contact so that the wire has a firm connection to the node connector.

2)



After soldering the metal rod clamp onto the tip of the wire, we assembled the contact to the connector. The connector would then have a firm contact with the wire which now enables us to gather more accurate output data rather than simply struggling to get the node connections in our previous experiments.



With the wires made, we can look forward to running more tests and getting use to the configurations. We made a total of eight testing wires for the 4 pair of nodes that are available on the RigRunner.

One thing that we were worried about was how the current would react when several different loads were placed on all the ports. We tested this by connecting loads on port two and port three. Then we tested the the current and the voltage for different values of resistance. The table below shows the results:

Node 2 Load(Ohms)	Node 3 Load(Ohms)	Current load 2 Amps	Current load 3 Amps	Voltage load 2	Voltage load 3
120	120	0.095	0.098	12.05	11.54
120	100	0.094	0.117	11.85	11.9
120	80	0.097	0.143	11.84	11.79
120	60	0.096	0.192	11.6	11.9
120	40	0.096	0.279	11.8	11.8
120	20	0.096	Too High	11.78	11.7

From our experiment we noticed that within the ranges of the values that our components will have we will have the appropriate currents applied. We also noticed that the load in one port does not affect the value of either the current or the voltage in another port. This means we will not have to worry one component failure affecting another component failing.

The Software Team Accomplishment

This week, the software part of the group also started to work on the programming portion of the transmission of data. In the previous semester, our software team focused on programming to receive and transmit GPS serial data between the XBees. This past week, the software group went to go test the transmission once more before they started working on implementing the code onto the Robot Operating System (ROS). This semester, our software group will be working towards moving the transmission codes onto the ROS so that it is in conjunction with all of the other sensors of the car.

Some of the code being written includes communication in python with the raspberry pi and the XSENS GPS that we are using. It also includes formatting to have ready to transmit over to the ROS node. We also started creating some MATLAB code to send and receive information through the XBees.

Currently, our group is in the stage of preparing for the final testing stage of the project. Before we start putting together the final parts, it is important to make sure that all of our contributions have accurate and efficient results which is why we take it of great importance.

Individual Contributions (1/27~2/10)

Team Member	**Contribution**	**Weekly Hours**	**Total Hours**
Brad Stiff	Set up the testing of the transmission of the GPS between the end and coordinator Xbees as well as worked on some programming issues with the python.	6	50
Jose Candelario	Gave the overall plan and goals for the two weeks and set up milestones for what we need accomplished for the testing phase of the project. Also tested the Rigrunner for parallel inputs.	6	64
Junho Chun	Researched better idea how to connect clamps with RIGRunner without soldering.	4	43
Justin Wheeler	Went to Vermeer and tested the transmission of GPS data between the lead and following vehicles.	7	48
Sang Uk Park	Helped move car in the GPS testing setup with Justin and Brad and helped Zhize with assembling and testing the wires.	6	53

Yifan Lu	Set up Matlab scripts & XCTU to run communication tests between Xbees. Getting ready for real world performance tests under various conditions	6	46
Zhize Ma	Helped assemble the testing wires and test whether or not they worked efficiently.	6	47

Plans for the Next Two Weeks

Our group plan on accomplishing the following by the upcoming two weeks:

- Start to slowly implement the transmission code into the Robot Operating system and if everything is converted successfully, try to test out the efficiency through the ROS
- Regather all of the output data using the modified wires and start to create a way to efficiently distribute all the power needed in powering the sensors.
- Test the XBee in real life moving vehicles and test under different environmental factors such as speed and distance.