

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 9~10 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, we looked into designing the power cable for the PX2. Over this semester, our group has been extensively looking into the RIGrunner 4005i that will be used to power all of the sensor on the car. Our group has decided to dedicate one separate node for the PX2 since it will be the central processor for the majority of the sensors. Along with the powering cable of the PX2, we also decided to invest in an alternative model of the transceiver to further extend the connection range between the two devices when implementing the final models onto the car.

The PX2 Powering Cable



The PX2 will use a 10 pin PCI-E port which was mentioned in the previous log(Although the PX2. The wire connecting to the RIg Runner will be configured with a 12V output which is the power needed for the PX2. Since this is a VGA power supply cord, we will need a way to adapt it to a single wire that can be then converted to the RigRunner port. The prototype adapter involves the following parts:

- Breadboard
- 10pin to 6pin PCIE cable 6 breadboard wires

Although this conversion may be too messy for the final model, it will give us sufficient space to test the powering efficiency of the RIgRunner to the PX2. The 10 pin end of the PCIE will be connected to the powering port of the PX2. The other end of the wire will be connected to the 6 pin port which will be connected to the breadboard. The 6 wires will be first fitted into each of the pins of the PCIE. The bottom half will be the the common ground while a single node will be connected to a 12V power supply. Initially, we can use this way to see if the PX2 had sufficient power. We will add a switch to the cable system to allow for easier testing and another way to easily turn on and off the system.

The XBee Alternative

One of the things our hardware group also focused on was an XBee alternative model. In the final stage of the car, it is very important that we avoid packet losses when exchanging gps serial data. Since the XBee proved to have excellent adaptability to different programs and interface, we decided to keep the brand, but order a model that can have a further transceiving range. The new model that we chose is the XBee-PRO 900HP SB3 DigiMesh Module. We are changing to this model because the older model S1 that we were using even though it met the requirements for this project it felt like it barely did. We needed a device that could give us one hundred meters communication one hundred percent of the time. This meant doing well with buildings in between as well as other vehicles. The SB3 model has at least two things over the S1 that gave us the ability to better in these aspects. First the device allows for a detachable antenna which means that we can hook it up with the use of an antenna extension cable on top of the car for better transmission. The other thing is that it is built to work in the frequency range of 900 MHz instead of the 2.4GHz that the S1 was built for. This meant that this model is better suited to travel longer distances and go through objects better. The model that we looked into is shown below:



We will still be using the XBee brand, but purchasing a model that comes with detachable antenna. We looked into the model and realized that the antenna Eightwiid 900 MHz 3.5dBi Omni GMS is dedicated to the XBee. The extender wire can be ordered with different lengths. We have ordered a 6ft wire extender to be able to hook up the Antenna on top of the car. The length of the wire is important because when implementing the transmitter device on the two cars, we can have the wire long enough where the end of the antennae attached can be on the top of the car to ensure maximum efficiency but still not too long that the signal is not lost in the cable.

Individual Contributions (3/11~3/23)

Team Member	Contribution	Weekly Hours	Total Hours
Brad Stiff	Installed UbuntuMate and ROS kinetic on new pi. Studied Java GUIs online and posted created examples of various swing objects in personal GitHub.	24	95
Jose Candelario	Set up the testing method for the PX2 and overall planned how to test the XBee range with the cars for the new XBee models coming in.	9	89
Junho Chun	Search on power connection for PX2. Find the method that connect PX2 to power and each sensor to power.	9	64
Justin Wheeler	Started looking into GPS modules for the lead vehicle. Attempted to create the ROS node for the PX2 in C++ instead of Python.	5	64
Sang Uk Park	Looked into the alternative method for the transceiver models along with look into the powering methods of the PX2	7	72
Yifan Lu	Looked up potential cheaper model GPS/Orientation Sensors for the following car.	5	64
Zhize Ma	Search on power connection for PX2. Find the method that connect PX2 to power and each sensor to power. Also looked into possible GPS models to replace the XSENS GPS.	7	67

Plans for the Next Two Weeks

- Order the parts for the new XBee including antenna, wire extender, and newer model SB3
- Assemble a prototype for the PX2 powering chord

- Test both of these models on the cars