Individual Lab Report 4

Name: Zhihao Zhu

Team: PhoeniX (H)

Date: 03/027/2019

Team Member: Akshit Gandhi

Shubham Garg

Parv Parkhiya

I. Individual Progress:

My work for the last two weeks are mainly focused on designing the micro-controller. Its role is to receive command from Jetson (UAV platform) or from Zotac (UGV platform), and to control the opening/closing of water tank. Considering the performance and physical size, we use Teensy 3.6 as our micro-controller (see below):
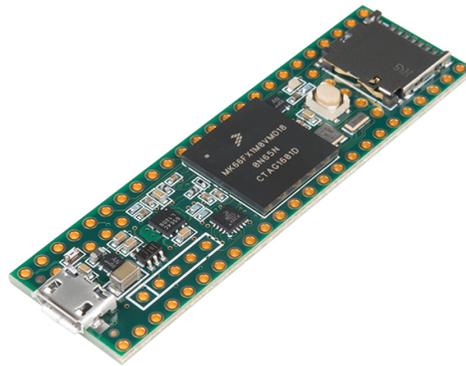

Figure 1. Teensy 3.6 board

Our target is to enable Teensy to communicate with Jetson (Zotac) on the ROS platform through serial communication.

The first step is to install the ROSSerial Package on Jetson (Zotac) which provides serial communication between two devices by using USB port. Then, we installed Arduino IDE on Jetson (Zotac), as well as ROS add-on for the IDE, which allows to burn ROS code into the Arduino. The challenge then comes as we are using Teensy instead of commonly-used Arduino serials like Uno, so we have to deal with the software compatibility (among ROS version, Arduino IDE version, Teensy Version). It took us quite a lot of time to figure it out as we are using all the newest version, and the Teensy 3.6 add-on for Arduino IDE is not available on Teensy's website. So we followed some online tutorials to make some modifications on an older version of Teensy 3.6 add-on to make it compatible with our IDE.

After all the software environment is set, we move forward to implement code to enable the serial communication between Jetson(Zotac) and Teensy. The basic idea for the code is as follows: write a ROS publisher on the Jetson(Zotac) side to

publish control message (here we just use one boolean value), and write a ROS subscriber on the Teensy side to subscribe to that message, and determine the output port's value (High or Low) depending on the received message. We have also successfully tested another function: once the Teensy receive the message from Jetson, we make the onboard LED blink at the rate of 1 hz.

II. Teamwork

Shubham has helped me a lot configure the software environment to make the Arduino IDE compatible with Teensy add-on. Shubham and Akshit also helped explained about the differences and benefits between USB and serial communication.

III. Challenges

The major challenge is the software compatibility problem. Another challenge is the potential synchronization rate between Jetson(Zotac) and Teensy, as well as between Teesy and water tank controller.

IV. Future Plan

The future work for our team will be divided into as follows: I and Akshit are going to implement the function— mount the laser on the robot arm and enable it to point at the massage bag containing hot water (the heat source in our project), based on the visual servoing and heat object segmentation algorithm which were developed previously. We are going to establish the simulation environment for the robot arm, and run some tests. In addition, I'm going to implement the water tank control via serial communication. The future task for Shubham and Parv is to continue improve the performance of SLAM.