Week 4: Odroid SBC, Dock Prototype,

Individual Lab Report #4

Job Bedford

Team C: Column Robotics
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ILR4
11/13/15

Individual Progress:

My main responsibility for this past two weeks was Setup of the Odroid XU4 single board computer. Setup composed of booting Linux Ubuntu, installing ROS along with necessary packages for the FVE, established wifi and ssh capabilities, and sending data stream from a sensor on the SBC to a host computer. Last week, I also complete the CAD for the first Dock prototype.

Odroid XU4:

THE odroid XU4 is a single board computer used on some of the droid products. It is frequently used in custom drone projects. Odroid is seen in Figure 1. Our team purchased an Odroid XU4 and a Minnowboard max, to be used as Iris+'s processor. For the Fall Validation Experiment, we will be showcasing the full hardware functionality on the Iris+.

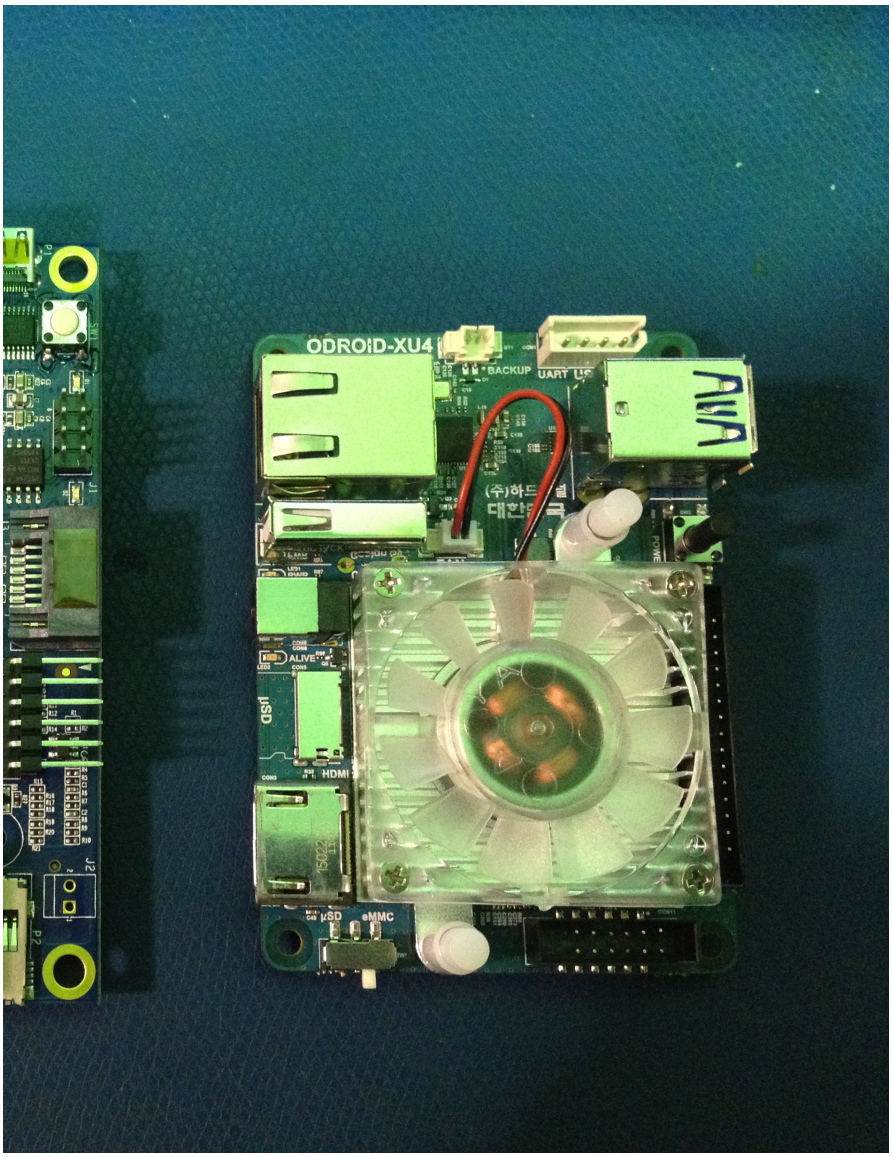

Figure 1: Odroid XU4

Utilizing tutorials online, Ubuntu 14.04 was booted on the Odroid. After appeasing to the demands of the CMU-Secure Wifi, Odroid was soon able to connect to the internet. With internet, the wonderful world of ROS was available to be download. ROS Indigo as well as some basic packages like image_view were installed. With all the basic setup complete, I embark on interfacing with the Axus kinect RGBD camera, which was one of our possible sensors to be used on the Iris+. I followed some tutorials, downloaded openNi2 package for RGBD camera, and was soon able to achieve a camera feed over a rostopic, as seen in Figure 2. Moving forward, I implemented a portion of the Task 7 ROS familiarization assignment. On my own computer, i establish a link to the Odroid, started up the RGBD camera package, subscribed to the camera feed topic. The RGB camera also had a depth image topic which will possibly prove useful in the spring semester. Depth profile seen in figure 3.

Figure 2: Camera Feed

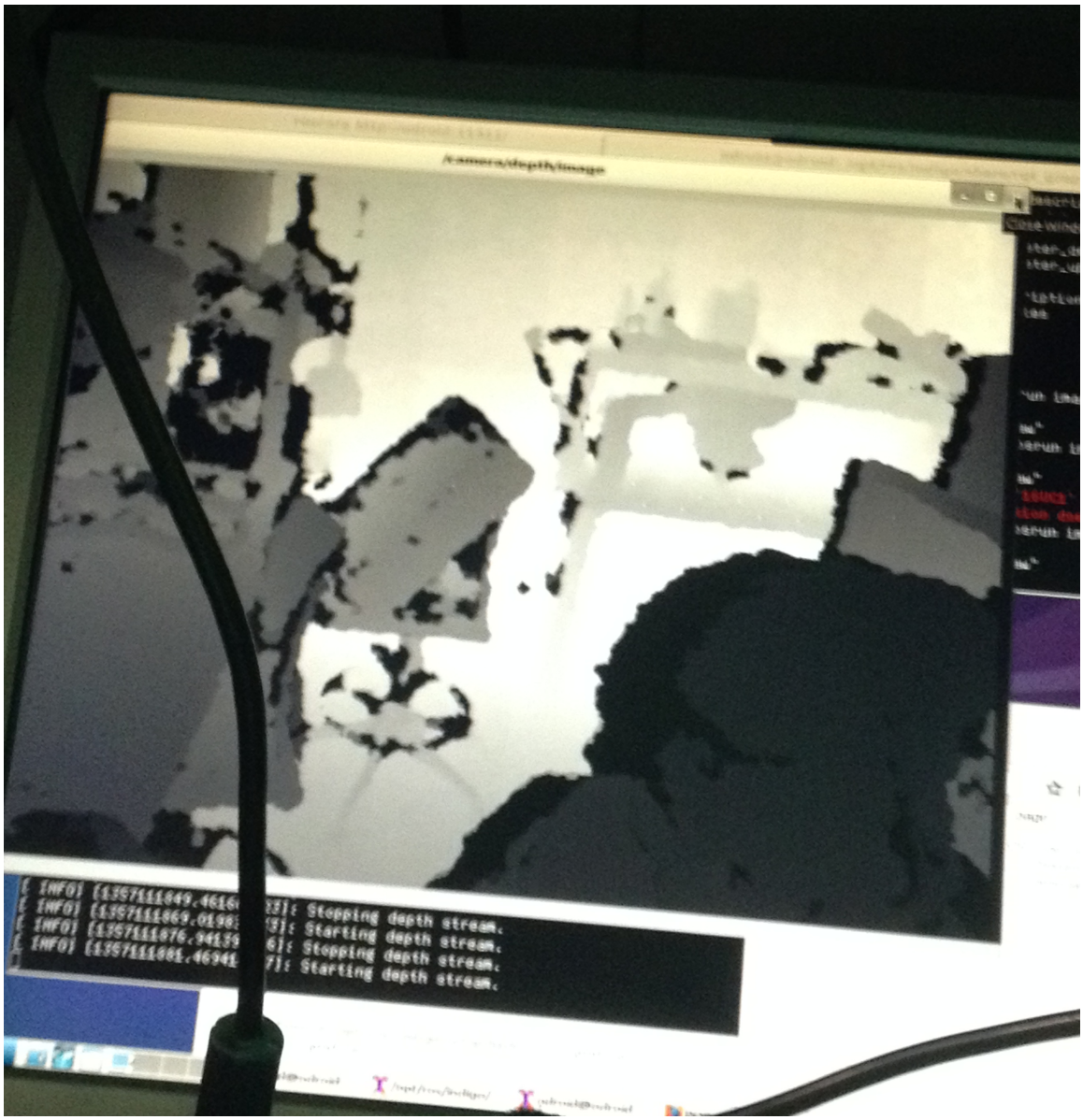

Figure 3: Depth Famera Feed

Challenges:

I personally took upon the setup of the single board computer, because I had little experience in setting one up from scratch. In the past I struggled with and still haven't successfully established a Beagle Bone Black for a project. I see great potential in processors, but am a partially intimidated by the learning curve. This week was a learning experience in single board computers.

This week was riddled with unnecessary and avoidable holdups. When our team ordered the Odroid XU4, we didn't realize we also needed a micro SD card or eMMC storage device imaged with an OS. Due to time constraint and the leadtime of ordering, I scrounged around campus until finding a micro SD, (a harder task than it seems), after finding one I proceed to image it. This task took two to three days amongst 3 different computers. The rest of the setup process was pretty straight

forward and any snags could be conquered by successfully following an online tutorial or two.

Teamwork

This week Erik worked on the position tracking for the AR.Drone2. The system need to be able to know it relative location in space and go to a given destination. Eric utilized the Tum AR.Drone Package in ROS to accomplish this. Working through the package and dissecting it, he soon understood it well enough to perform a solid lab demo. His major discovery was understanding the packages internal Kalman filter that drastically improved estimate of the drone odometry.

This week Rohan worked on obtaining odometry data from the Iris+ via pixhawk. Rohan also commited time to researching the best visual odometry methods for the project. Amongst this research he unstood the advantageous and limitations of Parallel track and mapping (PTAM), Semi-direct monocular (SVO) vision, and LSD SLAM. He actually implemented SVO with the PSeye camera after playing around with the parameters.

This week Cole primarily committed himself to the Power Distribution Board circuit design and fabrication and also the PCB Project assignment. As our team's main electrical engineer and given the time canstraints of this sprint, we agreed that Cole would be the point person for these tasks.

The whole past two weeks the team has been mostly divided preforming each of our own delegated assignments. There was very little team work outside of working on the PDR and weekly management meeting. Rohan and I did spent the first two day of this sprint test flying the quad and playing around with its RC controls

Upcoming Week

With Arguably two weeks left before the Fall Validation Experiment. The remainder of this semester will be devoted to finalizing our demo in preparation for the December 3rd hard deadline.

My responsibilities will mainly concern the leading the development and fabrication of the fall dock prototype. I will also continue work on establishing RC communication to Iris+ via Odroid. This process will echo the mover node I wrote for the AR.Drone2, as described in my previous ILR.