

Progress Review 2

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Team C / Column Robotics

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ILR # 3

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Individual Progress

For this progress review, I took the lead on the power distribution board and began research into the lower level controls of the Iris+ drone.

Having the most experience with electrical systems, I took the lead on the power distribution board. Our power distribution needs are fairly simple. We have decided to run our vision and high level algorithms on a single board computer attached to the Iris+ drone. Thus, we need to get power to the single board computer from the battery pack on the Iris+. The power to the motors and the flight controller are already handled by the hardware of the Iris+. Any other sensors that we need will be run from USB off of the single board computer.

I assimilated all of the electrical specs for the electrical components and determined the specifications necessary for the power distribution board. I also decided that we needed overvoltage/reverse voltage, overcurrent, and other protection to protect from fluctuations coming from the voltage regulator.

In order to prepare for doing lower level controls, I have had to get a better understanding of the way that controls of quadcopters work. I do not have much experience in this area, so I used this week to do some basic research on techniques.

Teamwork

I, along with Rohan, spoke to a PhD student this week about techniques he used for his quadcopter controls. He told us that he used Optical Flow technique with the Lucas-Kanade Algorithm. He also recommended using visual servoing once we were able to visually locate the dock.

Rohan was able to find the pixhawk documentation [1]. In the documentation, we were able to find information about a simulation specifically designed for the Iris+ platform [2]. Together me and Rohan attempted to download the simulation and the pixhawk source code. Rohan was able to get it downloaded with Docker, but I was not. I will discuss more about this in the Challenges section.

Rohan and I also spoke to the PhD student about cameras. He recommended using the playstation eye due to its high frame rate (120fps). We decided to order this camera due to its low price tag at only \$8 on amazon [3].

For the power distribution board, the team worked together in order to specify all of our needs. Rohan, Job, and Erik worked with me to lay out all of our needs and answer my questions about the systems that we were planning on using.

Challenges

This week was full of many challenges. The first major challenge that we faced was the Iris+. Due to an error with the system, our Iris+ was sent back to the manufacturer once it had reached Pittsburgh. Due to this, we had to re-order the Iris+. We spoke with Kayla about this, and she has ensured us that the Iris+ will be shipped immediately.

The next major challenge that we faced was in getting the simulation running for the Iris+. We had to learn about the Docker system in order to download it. The source code was giving us a lot of trouble. Personally, I was having a good amount of trouble with my system in general. My computer has not been working effectively with Linux. I have been having enormous difficulties getting Linux to run properly on my system. This has caused numerous issues and has set me back and wasted my time. I have remedied this by buying a laptop designed to work with Linux. This should come soon, and I will hopefully have no more issues with Linux.

Future Work

The next two weeks will be a very busy one. We will of course be working heavily on our PDR presentation.

I will also be continuing to work on the low level controls of the Iris+. This will be mainly focused on continuing to do research on the Pixhawk source code. This means that I will need to get a linux system to work on the code until my new computer comes in. Once I get the simulation of the Iris+ up and running, I will be working on understanding the simulation.

Rohan will also be working on low level controls of the Iris+. We will both be working on the simulation and the Pixhawk source code.

Once we have a better understanding of what needs to be done with the source code and get the Iris+ in, we will be able to split the work into tasks that will be done individually.

Job will be working on the dock prototype for the PDR. Based upon guidance from our sponsor Hagen Schempf, Job will be designing a “30%” prototype to show. He will also be working on controls of the ARDrone2.0 to build on the work he has done on the MOVER node.

Erik will be working on testing existing visual odometry algorithms to see how well they can meet our needs.

Resources

- [1] [Pixhawk Documentation](#)
- [2] [Simulation in the Loop](#)
- [3] [Amazon: Playstation Eye](#)