Progress Review 4

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Team C / Column Robotics

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ILR # 5

November 25, 2015

Individual Progress

For this progress review, I did more research and ordered the parts for the PDB assignment.

Figure 1 shows the BOM with the updates on parts that have either arrived or have been ordered.

Part Type	Value	Part Designators	Quantity	Cost Per Part	Manufacturer	Manufacturer Part #	Supplier Name	Supplier Part #
Through-Hole LED	RED	LED1	3	$0.35	China Young Sun LED Technology Co., LTD.	YSL-R531R3D-D2	sparkfun	COM-09590
Through-Hole LED	GREEN	LED2	3	$0.50	China Young Sun LED Technology Co., LTD.	YSL-R531K3D-D2	sparkfun	COM-09592
Through-Hole Resistor	10k Ohms	R1, R2	6	$0.10	Stackpole Electronics Inc.	CF14JT10K0	Digi-Key	CF14JT10K0CT-N
Tantalum Capacitor	10uF	C1, C2, C3, C4	12	$0.99	Kemet	T356E106K016AT	Digi-Key	399-3638-ND
Diode	DO-214AC(SMA)	D1, D2, D3	9	$0.48	Diodes Incorporated	SBRT5A50SA-13	Digi-Key	SBRT5A50SA-13D
TVS Diode	16V	TVS1	3	$0.45	Littlefuse Inc	P4SMA16A	Digi-Key	P4SMA16ACT-ND
TVS Diode	7.5V	TVS2	3	$0.47	Littlefuse Inc	SMAJ7.5CA	Digi-Key	SMAJ7.5CALFCT-
Fuse	8A	F1	3	$0.89	Littlefuse Inc	37418000000	Digi-Key	F5490CT-ND
Fuse	5A	F2	3	$0.70	Littlefuse Inc	37215000001	Digi-Key	WK4263CT-ND
Connector	XT60	XT601, XT602	4	$1.50	sparkfun	PRT-10474	sparkfun	PRT-10474
Connector - Male	CGRID SL	CGRID	3	$0.26	Molex, LLC	50579402	Digi-Key	WM2900-ND
Connector - Female	CGRID SL	CGRID	3	$0.88	Molex, LLC	705430001	Digi-Key	WM4800-ND
Conn Terminal - Female	22-24 AWG	CGRID	3	$0.13	Molex, LLC	16020086	Digi-Key	WM2510CT-ND
Voltage Regulator	5V	MIC29300	3	$3.70	Microchip Technology	MIC29300-5.0WU	Digi-Key	576-1122-ND
Barrel Connector	5.5mmx2.1mm 5V DC	CGRID	3	$3.95	JacobsParts	B00QJ9VMI0	amazon	B00QJ9VMI0

Figure 1) Updated Power Distribution Board Bill of Materials

In the Bill of Materials, Green represents things that have already arrived or were found in the lab, and Yellow represents a part that has been ordered.

I found a few good things in the lab including LEDs, diodes, and resistors. Unfortunately there was only one Tantalum capacitor and it was 0.1uF instead of the 10uF that I need.

I also found that the lab was light on a few things. I feel like the lab could use a better variety of connectors. The XT-60 connector that we use is not there, but it is the connector that is very popular for LiPo batteries and thus I am sure would be pretty useful to have around.

Also, the voltage regulators recommended in the Power Protection assignment seem to not be there. Would be useful to have all the parts recommended in the lab, because I'm sure a lot of us used those when we could assuming they would be in the lab.

I feel that if I could go back, I would have checked the lab more thoroughly before i made the PDB. I could have then seen what parts were available and tried to use those parts in my design as much as possible.

I did some more work on the Systems Engineering side as well during the last two weeks, mainly in risk management.

I spent some time to ensure that we were tracking the risks that we had mitigated and the risks that we needed to add in for the Fall Validation Experiment.

So Figures 2 and 3 show risk mitigation strategies that we are either in the process of completing or have already completed.
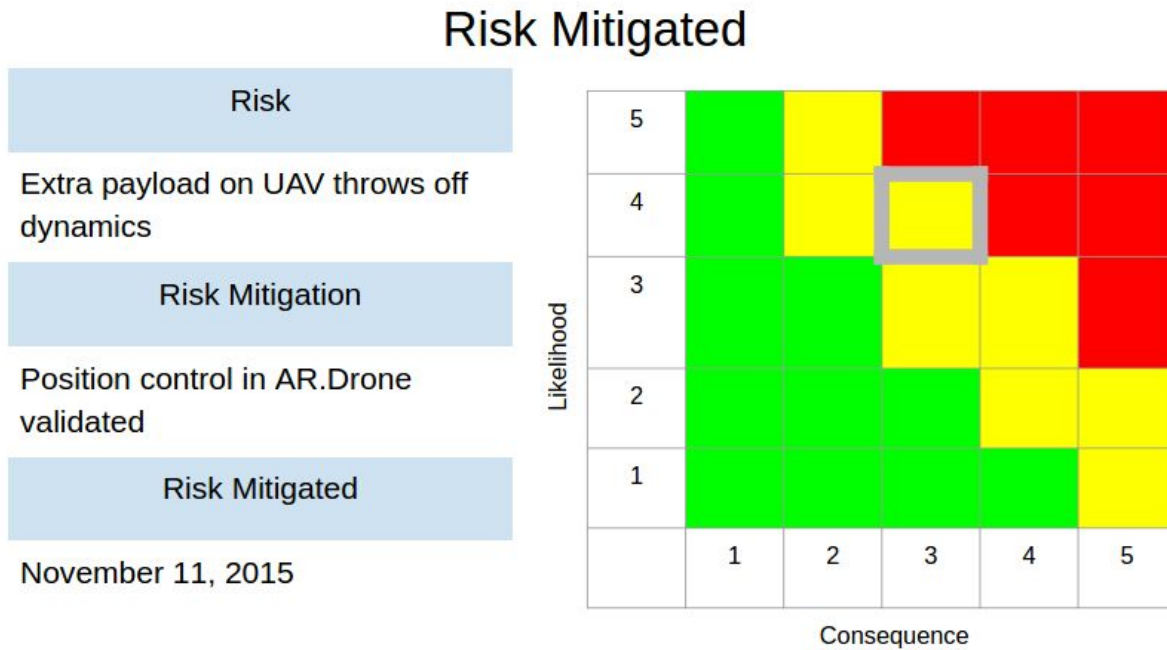

Figure 2) Extra Payload on UAV Throws Off Dynamics Risk Mitigation

Figure 2 shows the risk mitigation strategy and status for the risk: "Extra payload on UAV throws off dynamics". This risk is probably the most important for our entire project. The low level controls of the drone is going to be the most performance determining aspect of our project. We have decided that maintaining the AR.Drone2 platform alongside the Iris+ platform is the best risk mitigation strategy. If we find that we cannot get the Iris+ to fly effectively, we can still accomplish our SVE using the AR.Drone2. The mitigation of this risk was completed when we were able to effectively get good position controls with the AR.Drone2.

There is still work on this risk, however. We still need to maintain our system on the AR.Drone so that we do not run into a crunch time, but it is obvious that we would be able to complete our SVE now that we know we can get good control with the AR.Drone2.
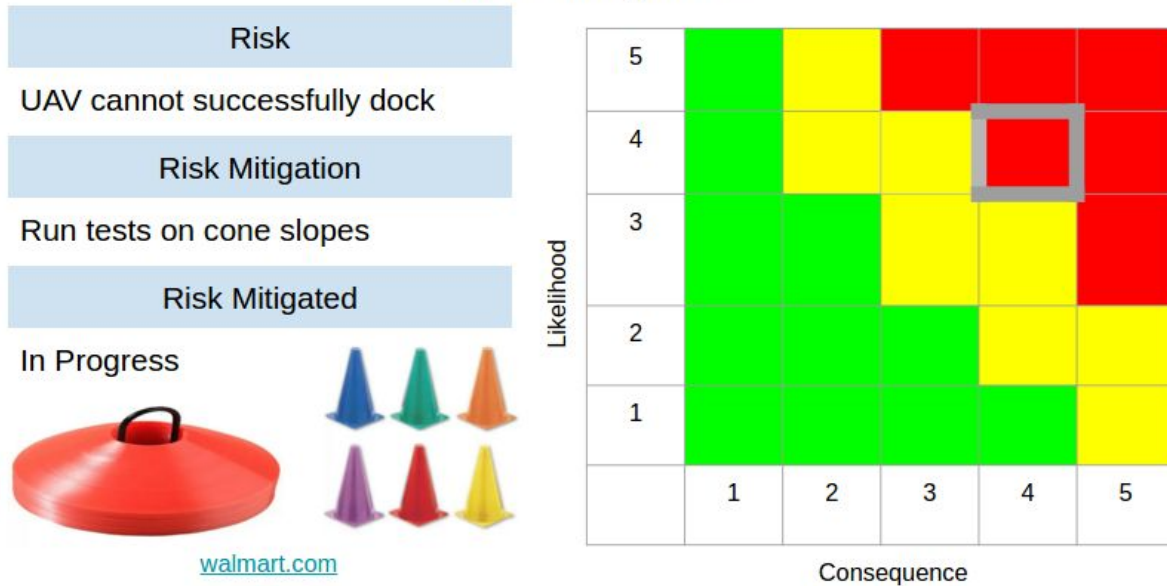
Figure 3) UAV Cannot Successfully Dock

Figure 3 shows the risk mitigation strategy and status for the risk: "UAV cannot successfully dock". This risk is another incredibly serious risk to our final goals. The docking aspect of our project is incredibly important to our overall success. We believe that this can be accomplished by using cones in order to guide the legs into the dock.

Part of this risk mitigation was discussed above. By getting the AR.Drone system up and running with good position control, we have gone a long way to mitigating this risk. Another aspect of this risk mitigation strategy is in having a good design for the dock cones that will be guiding the legs. In order to mitigate this risk, we will be running experiments with many different cone slopes in order to understand whether our conceptual design holds up to experiment.

Figure 4 and 5 show the new risk that I was tracking these last two weeks.

Added Risk Mitigation Strategies

Risk ID:	Risk Title:		Risk Owner:	Date Submitted:	Date Updated:
16	AR.Drone breaks during testing		Cole	11/15/2015	11/25/2015
Description:					
AR.Drone breaks or is damaged during a test run before the FVE					
Consequences:			**Risk Type:**		**Risk Level:**
Team will not be able to complete the FVE challenge			- Schedule - Programmatic		YELLOW 9 / 25
Risk Reduction Plan			**Expected Outcome:**		**Comments**
1. Take out a second AR.Drone from inventory			AR.Drone is available in inventory, so this will be no problem		MITIGATED

Figure 4) Risk: AR.Drone Breaks During Testing

This risk is specific to our Fall Validation Experiment. Of course at any moment the AR.Drone we have taken out of stock could break, but that risk is easily mended at another time during the year. It is especially important so close to the FVE, because if it gets damaged, we may not have time to get one from inventory and thus we would be in danger for the FVE.

I have mitigated this risk by taking out a second AR.Drone from inventory right before Thanksgiving. This will ensure that technical problems with the AR.Drone will not derail the FVE.

Added Risk Mitigation Strategies

Risk ID:	Risk Title:		Risk Owner:	Date Submitted:	Date Updated:
17	Dock parts do not come in on time or are ineffective		Job	11/15/2015	11/15/2015
Description:					
During the manufacturing process, the designed or manufactured parts are not effective and need to be replaced, but there is not time.					
Consequences:			**Risk Type:**		**Risk Level:**
The team will not be able to complete the FVE effectively			- Technical - Programmatic - Schedule		YELLOW 9 / 25
Risk Reduction Plan			**Expected Outcome:**		**Comments**
1. Order multiple dock prototype parts of different properties 2. Order parts ASAP			Dock Design will be able to be completed before the FVE		

Figure 5) Risk: Dock Parts Do Not Come in on Time or are Ineffective

This is another risk that could derail our Fall Validation Experiment. It is our most worrisome risk. We believe that we will be able to have a design done by the FVE without fail, but if there is some flaw in our design thinking or the parts we manufacture/order are not functioning properly, we may not have enough time to manufacture/order new parts.

We are trying to mitigate this risk by designing/building/manufacturing multiple different parts in order to ensure that we have some flexibility when testing our dock. I think that this will ensure that we can meet our FVE goals.

This week I also did some more research on the navigation stack [1].

Challenges

The challenges this week mainly revolved around miscommunication within the team. We were all very consumed with work in other classes, and we did not accomplish as much as we wanted to. There was also some miscommunication about what we needed to start working on that was not for the Fall Validation Experiment, but necessary to start on for the Spring.

There was also some challenges revolving around the Electrical Hardware system on the Iris+. It is not as straightforward as we originally thought. The system will require quite a few modifications in order to get everything set up electrically.

The first thing is that one of the power circuits that we bought for the Iris+ requires some significant modification in order to get it into the housing of the drone. This is not damning, but it is extra work that needs to be carefully planned. Another problem arrised from the UART communication. The ODROID and the Pixhawk use two different high voltages for their level, and so we need a level shifter in order to get the voltages to match up. This is another situation we need to tackle that is complicating the design.

Teamwork

The team got together on the 24th in order to analyze the last two weeks. During this time we were able to resolve all of the miscommunication that was plaguing us during the last two weeks. This was one of our more productive meetings where we were able to lock down our expectations and plans for the Spring Semester. This was very helpful in getting us on the same page.

The team also got together in order to have an in-house CoDR for the dock design. Job led the meeting and presented his dock designs for the team. We came up with requirements, revised the design, and set up the testing criteria for the design.

The team also worked together on some class assignments: Systems Engineering Presentation 3 and Website Check 2.

Future Plans

This week before the FVE I will be working from home during Thanksgiving. I will be working to get ahead for the Spring. I will be working on a ROS node to recognize April Tags and get the position information from the feed. I will also be doing research on some other tags that we could use in order to get a higher frequency of information than April tags provide.

Erik and Rohan will be working on getting the AR.Drone hardware and software completed and ready for the Fall Validation Experiment.

Job will be working on the next iteration of the dock design in order to have it completed for the FVE.

Resources

[1] navigation stack