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Team F
Individual Lab Report #8

Individual Progress

This week, my main focus has been on CMUcam4 progress.

Before the weekend, I was able to get the code to track all three targets in sequence and record ten frames of data. This was to prove that we can do this. For reference, we weren't able to get this to work two weeks ago due to an unknown issue.

After I determined I could track multiple targets, I attempted to see if I could track moving targets. I remembered that Curtis Layton had said that you had to use a laptop to command the positions of the targets. I felt that this was not usable since I was in the lab and couldn't use the targets. So I emailed him and suggested that we make a switch box to select which targets are moving that way a laptop isn't needed anymore. Simple hand reset can be used to make the system simpler. Lo and behold, he thought it was a good idea and immediately implemented it. Figure 1 shows what Curtis made.

After the weekend, I worked on doing data analysis of target tracking. With the new switch box, I was able to test multiple target tracking. I collected some sample data shown in figure 3. This is collecting at 5 frames per target. Figure 4 shows a plot of 25 frames of red target tracking. Figure 2 illustrates the view of the targets from the CMUcam4 perspective. I thought I'd include it because I've never included one before in any ILR.

Challenges

The main challenge we faced was during the programming the look up table. It was relatively difficult to program the system. The challenge here was reducing the jittering of the ball as it is getting fed into the shooting wheels. SooHyun and David took the lead on the weekend with initial Look Up Table calibration. Tuesday night, we all sat down to work on the system. With more eyes on the system, we were able to better debug the system.

While observing it, I noticed that the ball jittered around quite a bit. David and SooHyun came up with using sand paper to help grip the ball over the weekend, which helped considerably. I thought the solution would be to use a cradle to help keep the ball stationary. I talked with another team, and they said a good method was using three screws to cradle the ball. This was a much better solution than trying to CNC aluminum to cradle the ball. After the three pronged idea, I still saw that the ball was jittering, partially due to the friction of the ball on the acrylic. I

suggested we make a tray to carry the ball forward, that way it doesn't have to rub against everything.

So in general, our challenge was to reduce ball movement when pushing into the shooter.

Teamwork

This week we split up the work as usual. I took the role of working on the CMUcam4, Richard worked on the mechanical part of the system, and David and SooHyun worked on programming the system.

I made significant progress with the CMUcam4. It can now track multiple targets in under 2 seconds.

Richard worked on the release angle adjustment, the hopper, the feeder mechanisms, and the servo for panning the system. These were critical in order to work on the look up table.

SooHyun and David worked on programming the system. The code is much more like what we want it to be for the final product. The code is very clean and works well.

Future Work

For next week, we are working on integrating the CMUcam4 into the system and making the system closed loop. I will be working on it with SooHyun and David. We will also finish the ball hopper and integrate a new tilting system. Richard is primarily responsible for that. The next big CMUcam4 system is shooting the moving target. I hope to accomplish this.

Figures



Figure 1. Switch Box

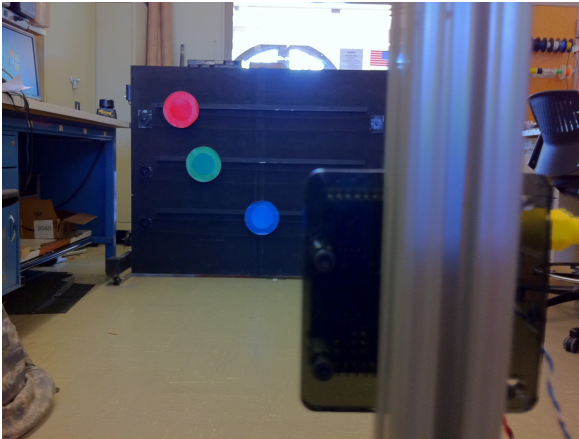


Figure 2. Tracking from CMUcam4
Perspective

RUN 1 (red)

X: 77 Y: 43
X: 74 Y: 42
X: 72 Y: 43
X: 70 Y: 42
X: 75 Y: 58
X: 75 Y: 57
X: 75 Y: 57
X: 75 Y: 57
X: 75 Y: 57
X: 62 Y: 75
X: 61 Y: 74
X: 61 Y: 74
X: 62 Y: 74
X: 61 Y: 74
Red Moving
Green Not Moving
Final X Position: 75
Blue Not Moving
Final X Position: 61

Figure 3. Sample Data at 5 Frames Per
Target

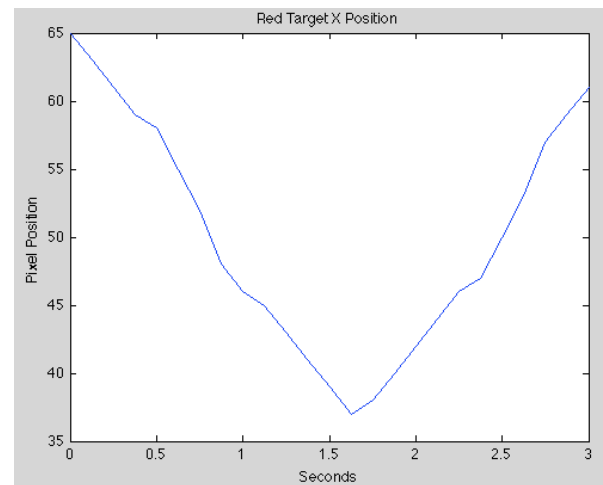


Figure 4. Data from Red Target
Tracking

Code

This is the pseudo code for the CMUcam4. This is heavily simplified. It basically just tracks the three targets and analyzes the information to determine which targets are static and which ones are dynamic. Figure 3 shows actual data generated by this program.

