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Team F  
Individual Lab Report 9

## Individual Progress

- For CMUcam4 progress this week, I made the system track dynamic targets. I essentially waited for the target to reach one edge and then let another state get ready to shoot. We know that it'll take the same amount of time for the target to go to the center from either edge, so this seems to be a valid tactic. The pseudo code is shown in Figure 1.
- An issue that has been plaguing us is the camera not being able to track in different lighting conditions. Due to this, I've taken several images in different lighting conditions to mitigate this issue. I then tweak the color boundaries as necessary.
- I worked with SooHyun and David to calibrate the shooter and make the system closed loop. This took some work since we had to go over 40 pixels per target. This will need to be repeated when the tilt system is done.
- For the ball hopper, we wanted a sensor to detect when the feeder was in the correct position to dispense the ball. I acquired an infrared reflective sensor to detect the panel. The one I had acquired was already wired up, but incorrectly for an Arduino. It was created for a different controller. I replaced resistors to the system to make it operational for the Arduino. Wiring is shown in Figure 2.

## Challenges

- Not having tilt has been a bit of an issue. It was frustrating that we ordered it on Tuesday with three day shipping. The company shipped Friday and we received it the following Wednesday, right before Carnival.
- Inconsistent shooting has been a challenge. We've mitigated as we've tested. We have made steady improvement to the shooter to help keep the ball from jittering while in transportation to the flywheels.

## 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 the dynamic target such that we can shoot at it. We did not demonstrate this capability in this

week's system demo since it wasn't fully integrated into the state machine. I also worked on a new sensor for the ball hopper.

Richard worked on the feeder mechanism and the ball hopper. The feeder mechanism was important to be able to consistently shoot the balls. The ball hopper is also necessary, but not as important.

SooHyun and David worked on programming the system. The code now has a more accurate look up table. Their work is based upon new parts being added to the system.

### **Future Work**

We still need integrate in the new tilt system. This will take some work, but once it is in, we should be able to make significant progress on the look up table. After that, we can just test the system for the final system.

CMUcam4 work may be close to done. Basically testing functionality in different lighting conditions is the main thing that needs to be done.

As mentioned in today's system demonstration, we should integrate a couple of throw switches into the system to be able to tell it to shoot at dynamic or static targets. This will be implemented as soon as possible.

## Figures

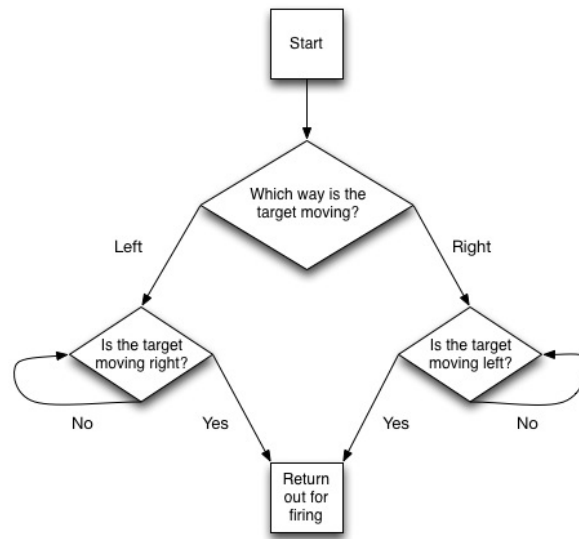


Figure 1. Pseudo-Code for Dynamic Target Tracking

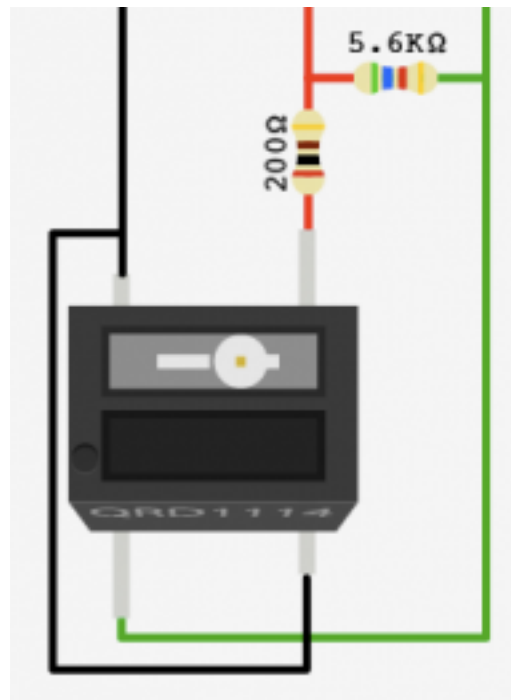


Figure 2. QRD1114 Reflective Sensor