To: Dr. Satici, Nardos Ashenafi, Brian Higgins

From: Robotic Vision Team: Daniel Pullicar, Mason Cannon, Roscoe Ambrose, Haston LaGrone

Subject: Biweekly Update, 1/1/23 – 1/15/23

Date: January 15, 2023

Welcome to the new year professors. We are looking forward to continuing our progress this semester and excited to be continuing working with you all.

# Work Completed

Our schedule over the break did not allocate any required tasks to members of the team. Coming into this first week of classes, many of the members focused on organizing meeting times and reconnecting with group members. The group has lined up meeting times with Professor Higgins and have narrowed down a few potential time slots to meet with Nardos. There have been a few independent tasks completed, however.

Mason Cannon:

* I haven’t completed anything significant just continued to work on my pending work.

Roscoe Ambrose:

* Begun implementing timing functionality into script to see whether our program will be able to keep up with a faster camera (60-fps for now).

Haston LaGrone:

* Implemented a very simple canny edge detection algorithm. Will be the base for attempting edge detection.

Daniel Pullicar:

* Continued to read and learn about Point-n-Perspective

# Work Pending

The team’s main goals are to begin implementing calibration into our program, explore solutions to our fast-moving-object issue, as well as fix the lighting setup on the air hockey table. Both intrinsic and extrinsic camera calibration must be coded and then implemented into the full program. To deal with the fast-moving-object issue, Haston and Roscoe are looking into whether a faster camera with a high enough fps will fix the issue, or if we need to explore canny edge detection. For the lighting issues over the air hockey table, we are looking at some large sheets of light diffusers to cover the entire table. This will ensure even lighting across the playing field and would eliminate the issue of glares reflecting off the table.

Daniel Pullicar:

* Complete intrinsic calibration programming
* Complete extrinsic calibration programming

Mason Cannon:

* There are different filters that can help find the puck. This is including the dilation, erosion, opening, and closing filters to be applied after the gaussian blur filter is applied to the frame.
* Looking into the canny edge detection function to understand how it works.

Roscoe Ambrose:

* Finish implementing timing functionality with faster camera
* Explore CNN (Convolution-Neural-Network) with example from Nardos

Haston LaGrone:

* (priority) Find the missing 60-fps camera and test HoughCircles
* (If unsuccessful) Investigate methods of extracting specific edges from the canny edge detection program.
* Investigate program efficiency with new detection method.
* Investigate program accuracy with new detection method.
* Finish GitHub branch setup.

# Conclusion:

At the moment, the group has two critical paths ahead of us. The one in which we take will be dependent on the results of some experimentation in the coming weeks. If the HoughCircles program used for puck detection can execute at high frame rates (60+ fps), then the fast-moving object problem we have been facing should be eliminated. This would allow the team to proceed implementing a more dynamic version of the detection algorithm as well as begin testing new camera positions. On the other hand, if the program cannot run at a rate in which it utilizes the higher frame rate, then a new detection solution will be explored via canny edge detection. However, the lack of familiarity with this new detection algorithm will require a time investment for both research and testing.