To: Dr. Satici, Nardos Ashenafi, Brian Higgins

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

Subject: Biweekly Update 2/26/2023 – 3/12/2023

Date: March 12, 2023

Hello again professors. I hope you have all had a great March. The following is a short update on progress our group has made since our last update.

# Work Completed

Daniel Pullicar:

* Fixed Undistort (was actually an error with calibration resolution)
* Tested point-conversion accuracy (ongoing)
* Assisted with new chessboard.

Mason Cannon:

* Looked into how the findChessboardCornersSB() function worked to be able to detect how to orientate the checkerboard to find the (0,0) position. The SB stands for sector based. Found out the function without the SB on the end worked great with the new checkerboard.

Roscoe Ambrose:

* Downloaded Ubuntu 20.04 on home PC to be able to test program functionality on the operating system in which the robot in the lab will be using.
  + ROS runs on this version of Ubuntu.

Haston LaGrone:

* Consolidated test program and standard detection program into one class.
* Launching multiple copies of the same program to run separate cameras is possible in numerous ways, finding which is most efficient/user friendly will need further investigation.
* Further tested OpenCV parameters to improve camera picture quality with manual settings. The way in which the camera interprets the numerical values passed to it varies by model, so using the GUI with a fixed exposure for the desired fps and eyeballing the values of the other params is likely the easiest solution.

# Work Pending

The goals of the team in the coming weeks remain similar. With much of the foundation of the program complete, most of the emphasis is being placed on debugging, cleaning up code, and testing. The biggest priority task before moving on to multiple cameras is the image-coordinate to world-coordinate point conversion. Once cameras are all working with the same coordinate system, the rest of the project can progress. The team is also putting together a concept for presenting the detection system away from the air hockey table.

Daniel Pullicar:

* Fix point-conversion.

Mason Cannon:

* Find any errors that can occur when using the checkerboard to make sure it is robust.
* Assist Daniel with more calibration functions.

Roscoe Ambrose:

* Implement Daniel’s calibration functions into the main program.
* Research ROS nodes and learn how to output our real-world coordinates into ROS for robot to use.
* Update four.cc code for backend API on Linux to V4LS instead of MJPG.

Haston LaGrone:

* Tandem capture test. Initialize two instances of detection program and observe behavior.
* Further refine initialization of camera parameters. Test with GUI.
* Investigate ROS node implementation. (Ongoing)

# Conclusion:

Continued progress is being made on the detection program. With the GUI, calibration, and detection program being combined into one. Issues we run into have been found primarily through testing, so this will continue to be the teams focus for the coming weeks. As we approach the prototype demonstration, we are looking forward to having a cohesive and user-friendly program to showcase.