

WEEK 9:

Hours: 8

This week the team ordered PCBs and made significant progress on the software components of the project. My contribution this week was to the visual tracking of a table tennis ball, specifically by filtering out the orange color of our team's balls.



In the above figure, one can see the testing environment for the color filter code. I tried to choose objects that were similar in color to the orange balls we plan to use in the final project demo. Picking objects that are intentionally difficult to distinguish from our balls should help with finding optimal parameters for the final product. I also added some lighting close to the table, because the uneven lighting in the lab was leading to only half of each ball being detected at a time. These LEDs were found in the cabinet and may find their way into the final project. If we decide to make them a permanent component, they would be cut along the lines marked on their flex PCBs, and mounted vertically on the posts which hold up the net.

The color filter operates by taking in two colors in HSV format, one upper bound and one lower bound. The filter also takes in an image from our camera, and outputs a binary image of the same size. For each pixel in the input image, if the color is between the lower bound and the upper bound, the corresponding pixel in the output image will be white. If the color of the original pixel falls outside the provided range, the corresponding pixel in the output image will be black.

To test the filter and find the optimal parameters, I positioned the aforementioned testing setup under our ceiling-mounted camera, and ran the program shown in the figure on the next page. This program allowed me to modify the filter parameters in real time to get feedback about the accuracy and sensitivity of the filter.



The results shown in the figure above are very promising. Each ball is clearly visible as a white circle in the image at the bottom right. More importantly, nothing else on the table seems to be showing up in the filtered image.

Next week I plan on making some simple demos of ball tracking, like a projected trail that follows the ball around the table. To be able to do that, I will also need to work on some software that maps the pixels that the camera can see to the pixels to which the projector can display.