Over the past week, Jonathan has been working on detecting hand gestures using OpenCV. The hand is detected using a convex hull, and different finger gestures are represented to digits. The main problem that we had was on how the hand color is similar to the background wall. As a result, we are wearing contrasting colored gloves (blue) to have a better hand-detection performance. The hand gesture and ball detection program have been integrated to work together as a single program. So, we are ready to combine it with the robot movement algorithm. Jiaxuan has been working on the integration of the control program and the detection program. The ball detection function was integrated into the control program and was tested under different lightings. The robot was able to perform ball tracking in some tests but still needed some tuning. One of the main problems was that the tracking function was affected by the lighting conditions quite a lot. It is hard to provide a constant and uniform lighting for the robot to move around. The robot was also easy to be distracted by some ambient noise. Another problem was the inconsistency of the performance of the motors. One motor always tended to run slower and was easier to be affected by the drop of battery voltage.

In the previous week, we had a problem in detecting both the ball and hand in a single frame. However, we now have a solution for it by processing them separately on the same image frame.

In the upcoming week, Jonathan will be working on how to apply multiprocessing and use multiple cores of the RPi. Jiaxuan will continue to work on tuning the robot and the integration of the hand detection function. Since we will be integrating the computer vision program to the robot, we will mostly be performing debugging to make sure everything goes smoothly. One of our main concerns is on how well the camera will be able to detect the ball or hand when the robot is moving (and close to the ground). We will try to create better lighting for the testing and tuning of the robot.

In terms of tracking the initial plan, we are currently on track.