

Lab3

Ryan Jannak-Huang
Vinny Damiano

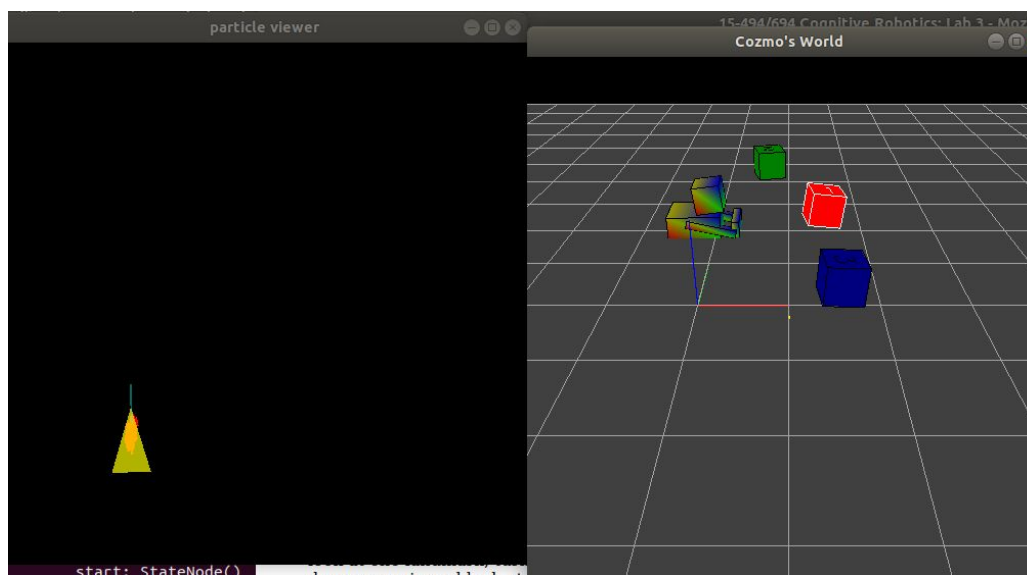
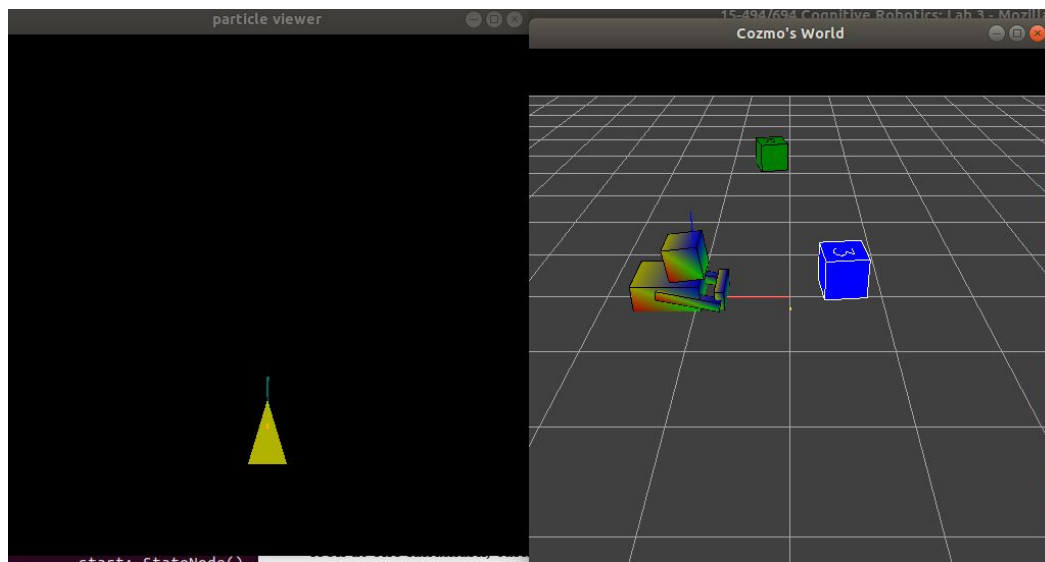
Measuring R:

The value we measured was about 20mm.

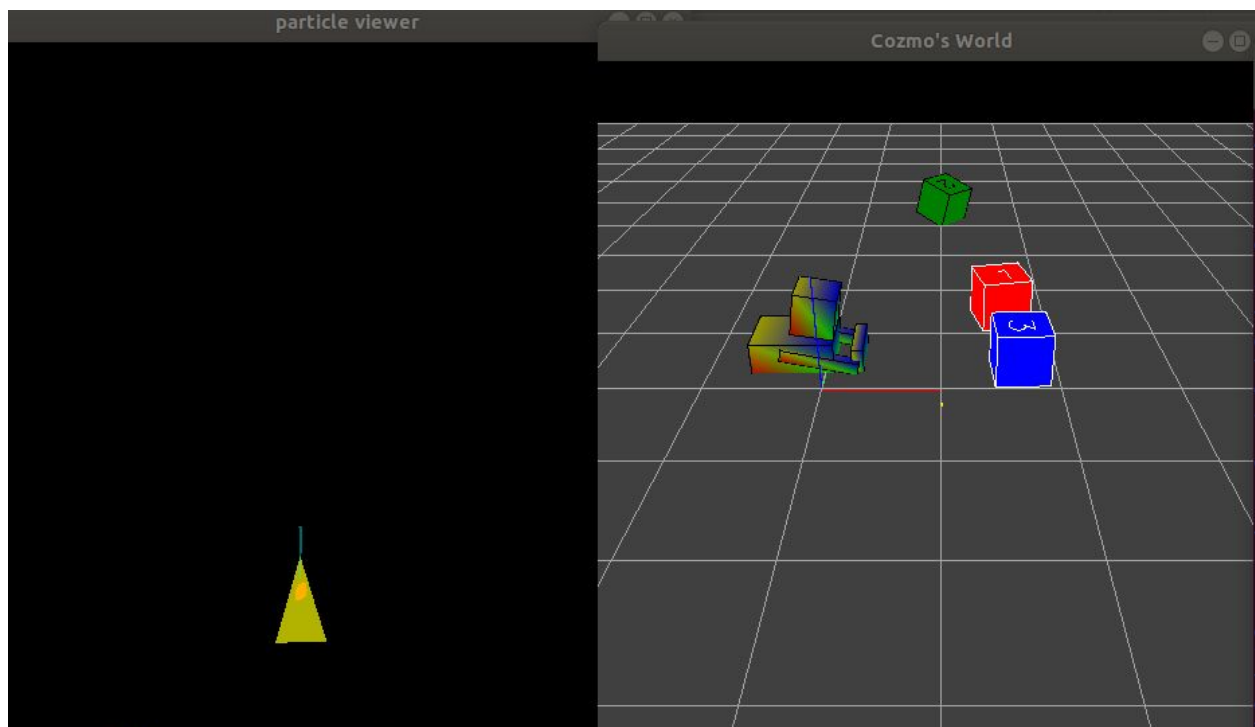
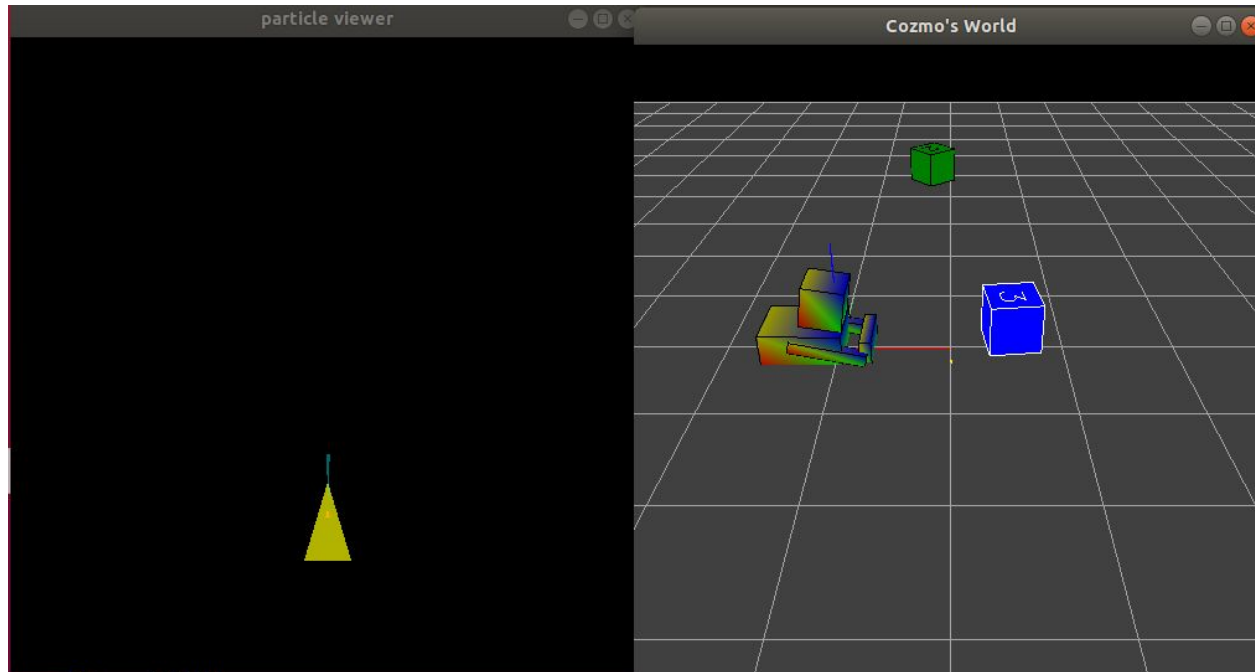
Problem 2:

To test localization using landmarks, we used multiple different configurations. In one configuration, we used cubes, spaced far enough apart that Cozmo would only see one cube at a time. In the second configuration, we spaced the cubes close together so that Cozmo would turn and see both cubes. In our third and final configuration, we used the Aruco landmarks, set up 160mm from Cozmo, with Cozmo using the combination distance and bearing sensor model.

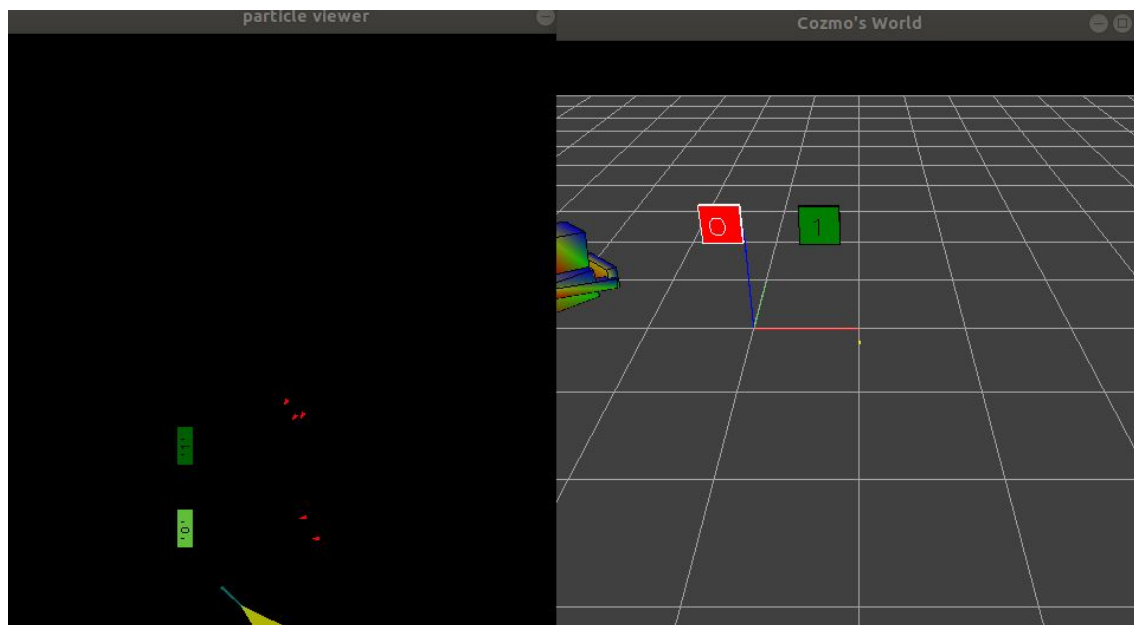
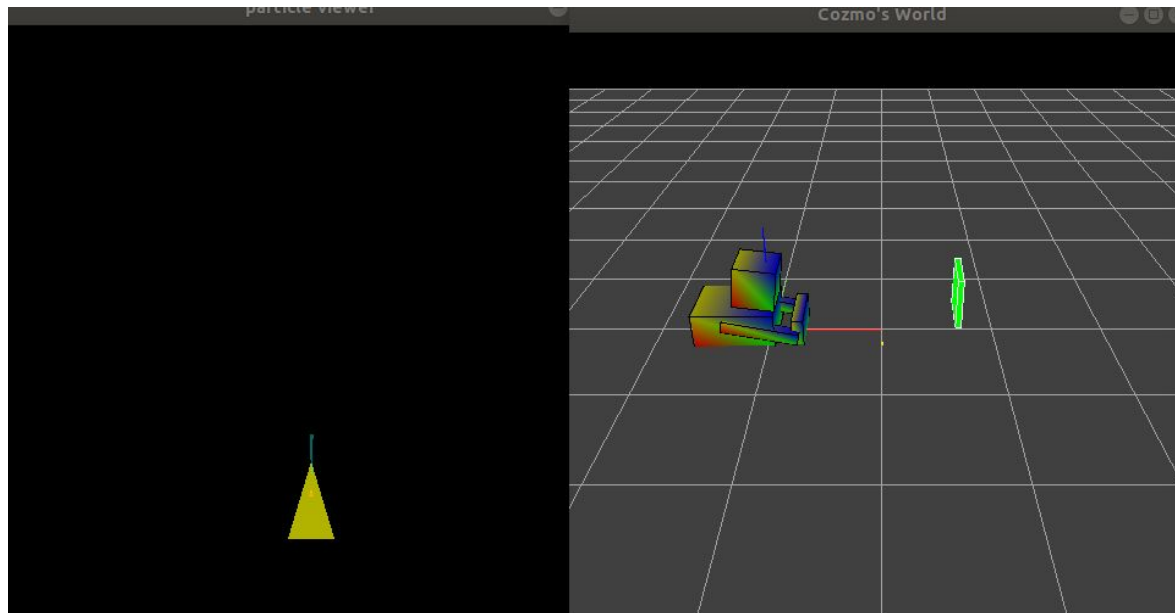
In our first configuration, we noticed that the particles did not collapse into a small area as much as we were expecting. The long pattern the particles form show that there was little noise measured in how far Cozmo traveled, but a lot of noise in its distance from the second cube. Of course, the ability to see the second cube means Cozmo can calculate its distance from the cube, and if we resampled particles here we would see the particles collapse into a small area.



In our second configuration, we wanted to test if the existence of two landmarks (in the form of cubes) would result in a smaller particle spread. Interestingly, the particles still spread across a large area, though not as large as the first configuration. Again, if we resampled the particles, we would expect them to collapse into a small area with accurate bearings, especially when using two landmarks.



In the third configuration, we used the Aruco landmarks to see if the combination distance and bearing sensor model would reduce the amount of noise in the resulting particle spread. Interestingly, the result was a looser spread of particles. This might be due to the Aruco landmarks being set slightly at an angle, instead of perpendicular to Cozmo and the table.



In summary, movement always results in noise in the set of particles, as expected. The accuracy of resampling these particles after the introduction of a new landmark is dependent upon the measurements it can make with the landmarks it currently sees. Thus, the ability of Cozmo to find out where it is in the world is entirely dependent on the quality of its sensors and the amount of information it can learn through its sensors with the aid of known landmarks.

Problem 3:

Cozmo can do many things well, but tossing a ball is not one of them. After creating the technologically advanced basket which you see below, we had cozmo toss a paper ball several times, and realized they were approximately the same every time. We set his lift speed to the max, and unfortunately due to the nature at which he swings his lift, he was on average able to toss the ball about 9 inches backwards everytime. He was very consistent in the direction of his tosses, which varied in the y-direction at most 3mm. This makes sense as his lift moved at the same speed and angle every single time. We would say that what really comes into play here is the ball we use and how we build the basket. Had we structured this differently, he would have likely been able to toss it differently, yet consistent in his tosses. Below is Cozmo after one of his tosses.

