Lab 2 Report

[Task 1 – Rectangle] Task one is to design a controller that will drive our e-puck robot in a rectangle at user given distances and a constant speed. Being able to use the IMU helped a lot in stopping my robot during a spin or turn. The rectangle simply takes four 90 degree turns and drives a specific length between them.

[Task 2 – Circles] Task two is to design a controller that will drive our e-puck robot in two clockwise circles without stopping using two user given radiuses and a constant speed. The infinity shape with two clockwise circles seemed to be done easiest by having the first circle move my bot in reverse with a faster right motor and after stopping, driving the second circle forward with a faster left motor. I'm glad I decided to do it this was because it went much faster.

[Task 3 – Waypoints] Task three is to design a controller that will drive our e-puck robot in an oval "running track" shape using a user specified radius for the curves on either side and a distance for the drive between, as well as a constant speed. With this task I finally learned how to read the IMU in a 0-360 range and was forced to backtrack to the other labs and make everything a bit more accurate and much less clunky.

I cleared up my confusion with unit conversions with a TA. In lab one the reason my circles weren't completing fully was because I wasn't considering the wheel's radius. Dividing by a factor of .8 completes my circles correctly. Working with the IMU was a great chance to try a different method of completing circles. It was tricky going from radians to degrees because the IMU reads from a scale of $[-\frac{\pi}{2}, \frac{\pi}{2}]$ and the requested range for degrees is [0,360]; this problem was solved using the modulo operator % 360. I'm comfortable with Python but I was not able to spend sufficient time on this lab due to having other projects in different classes that require learning languages ive never used before (JavaScript, Node.js, VHDL). I will try to dedicate more time to the next lab.

Calculations