The goal of this activity is to program the robot to perform a desired path. Correct calibration plays an important role in this activity. Your robot should be able to perform a predetermined path. While wheel encoders are not necessary for this activity, you are encouraged to use them.

Part 1: A basic path planning problem

Your robot navigates from an initial position to reach a final destination. With reference to figure 1-(a), the robot travels between its initial location $P_0$ and a final destination $P_F$, and passes through waypoints $P_1, P_2, P_3$. The goal is to reach $P_F$ with minimum error. When traveling through the waypoints, the path error should not exceed a specific value characterized by the circle shown in the figure. In other words, the robot needs to be inside these circles for the attempt to be accepted. The robot should stop when it reaches the final destination.

- Number of attempts: As many as you want (or need).
- The activity completion date and time, the number of attempts and the final destination error will be used to determine the performance and the grade.

Part 2: Crossing the bridge

The robot needs to cross the straight bridge shown in figure 1-(b). Clearly, smaller robots have an advantage; to minimize this advantage, the width of the bridge will be adjusted for robots with larger size. The length of the bridge will be between 1.5 to 3 m. The instructor reserves the right to change the bridge specifications.

- Number of attempts: As many as you want (or need).

Report

Each team should submit a report detailing activities 1 and 2. Examples of topics to be included: building the robot, calibration, PWM, H-bridge, parts used, etc. Don’t forget to include references and some pictures of your robot. The report should follow the double column IEEE style, its length should be about three pages including references. Code can be attached in appendix. The report will be graded based on the following criteria: abstract, formatting, organization, content, mechanics (grammar, spelling, punctuation), language, illustrations, references, conclusions.

The report is due two weeks after the completion of activity 2.