MathWorks | Training Services

# Exercises

Student Competitions: Mobile Robotics Training

MathWorks | Training Services

# 2. Using PID for Heading Control

**Reference:** Video Part 2- Using PID Control

**Task:** Design heading control using PID for a robot rotating by a specified angle

**Steps:**
Open the model `deadReckoning_headingPI_start.slx`. The model is already configured to read simulated encoders data and send the appropriate input values to the robot simulator.

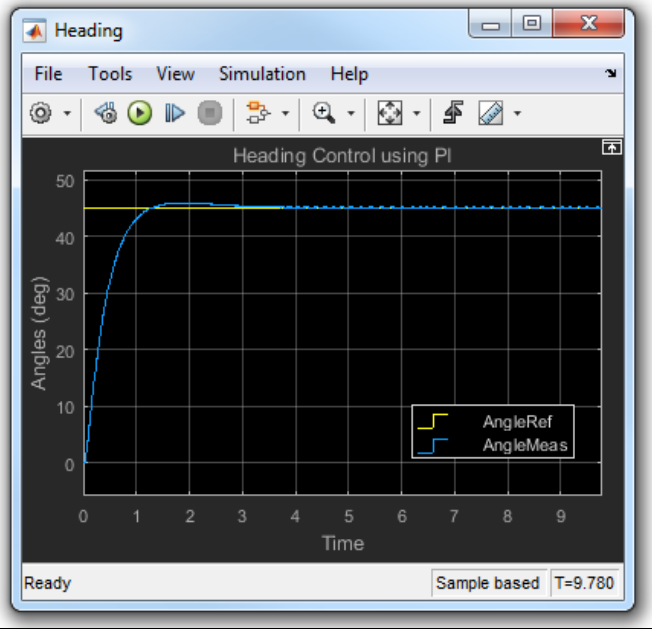
1. Build the heading computation system using the following equation:

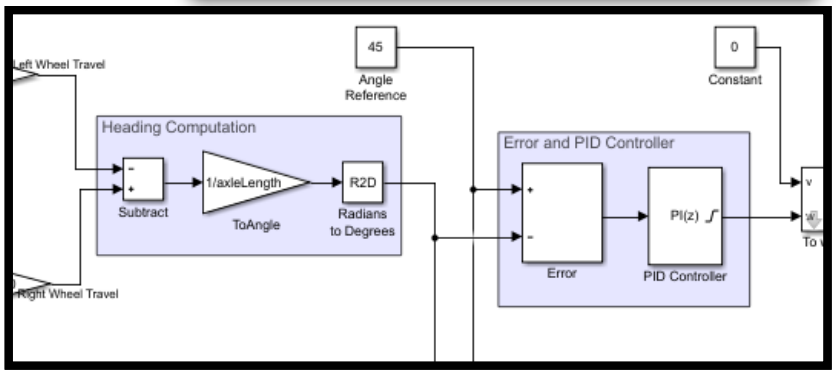
```
heading = R2D((rightWheelTravel-leftWheelTravel)*(1/axleLength))
```

   **R2D** is Radian to Degrees conversion and there is a Simulink block for this is in the Simulink Extras library
2. Compute the error between the actual heading angle and reference angle. Then, add a PID block and update the model appropriately to compute the desired angular (w) velocity output values to achieve a 45 degree turn (Angle Reference) in the counterclockwise direction
   Note: You can start with a P controller and test its behavior in simulation before proceeding to add an I and/or D. Also, remember to configure the Saturation Limits and Anti-windup method parameters in the PID block as explained in the video
3. Simulate the model and observe its output in the simulator window
4. Save the model as `deadReckoning_headingPI.slx`

**Solution**

**`>> deadReckoning_headingPI_solution.slx`**




**Deploy to a VEX EDR Robot**

**`>> deadReckoning_headingPI_VEX.slx`**