Exercises

Student Competitions: Mobile Robotics Training

MathWorks | *Training Services*

1. Dead Reckoning using Wheel Encoders

Reference: Video Part 1- Dead Reckoning

Task: Design robot behavior to turn in spot by a specified angle using the Heading estimation

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

1. Build a controller using Stateflow chart to take the heading as input and compute the desired angular (w) velocity output values to achieve a 90 degree turn in the clockwise direction.
2. 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
3. Use the heading value from Step 2 as the input to your state diagram and build the logic inside for an On-Off controller.
4. Simulate the model and observe its output
5. Save the model as `deadReckoning_heading.slx`

You can design the same model with a PID controller instead, and then compare the simulation results from both these controllers to analyze the difference in performance. We will perform this exercise when we look at PID controllers in the next video.

Solution

>> deadReckoning_heading_solution.slx
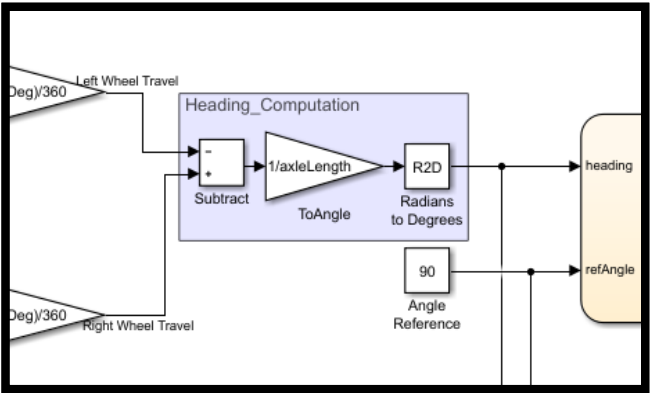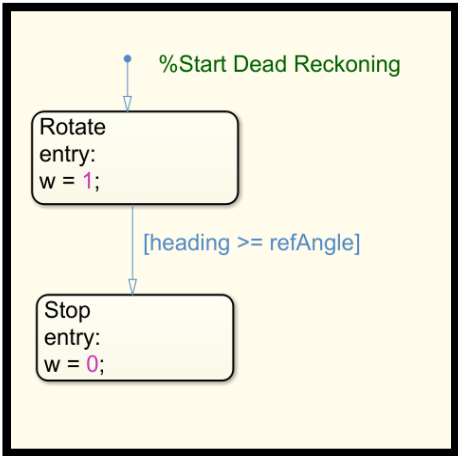
Deploy to a VEX EDR Robot

>> deadReckoning_heading_VEX.slx