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Exercises

Student Competitions: Mobile Robotics Training

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4. Obstacle Detection and Avoidance

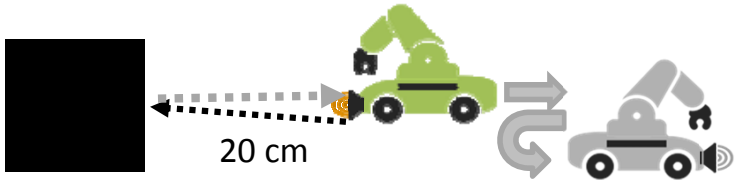
Reference: Video Part 4- Obstacle Detection using Ultrasonic Sensor

Task: Design an obstacle avoidance routine for the robot where it reverses by specified distance and makes a U-Turn when the Ultrasonic sensor senses an obstacle about 20 cm in front of it.

Steps:

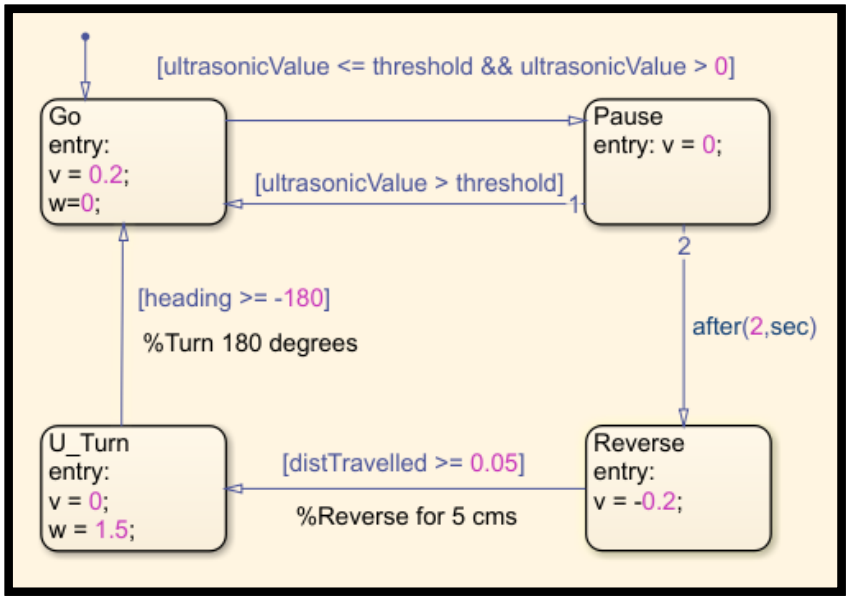
Open the model `obsAvoidance_uTurn_start.slx`. The model contains simulated ultrasonic sensor block, the robot simulator, and the required conversion and math blocks

1. Configure the robot simulator block parameters. Use `mapForSim` variable to use the default map. Optionally, follow **Exercise: Designing Robot Path Map** to create you a custom map for obstacle detection
2. Configure the Ultrasonic sensor block by defining the Sensor Characteristics parameters accordingly (Max range = 2, Min range = 0.02, Resolution = 0.01, Offset = [0 0])
3. Build a Stateflow diagram that detects an obstacle 20 cm in front of the robot and then reverses by 5 cms and makes a U-turn to head in the opposite direction
4. Simulate the model and observe its output.
5. Try changing the state logic to make a different maneuver upon detecting an obstacle (e.g. go around the object). Save the model as `obsAvoidance_uTurn.slx`



Solution

```
>> obsAvoidance_uTurn_solution.slx
```



Deploy to a VEX EDR Robot

```
>> obsAvoidance_uTurn_VEX.slx
```