

# Introduction to Mobile Robotics with MATLAB and Simulink

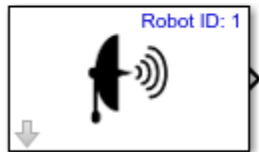
## Unit 5: Using a Distance Sensor

By MathWorks Student Competition team

# Distance Sensor

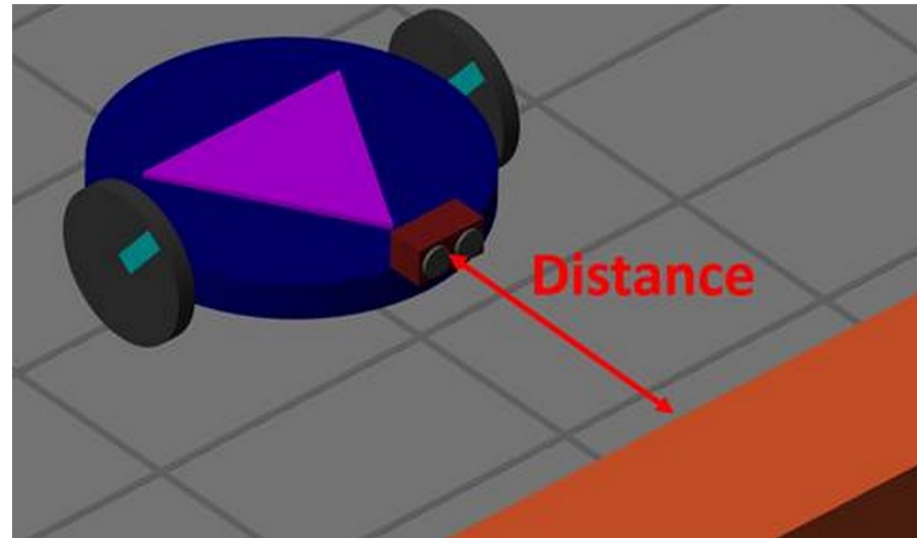
- Ultrasonic distance sensors are commonly used in robotics and can give you information regarding the proximity of a nearby object

## Robotics Playground – Distance Sensor



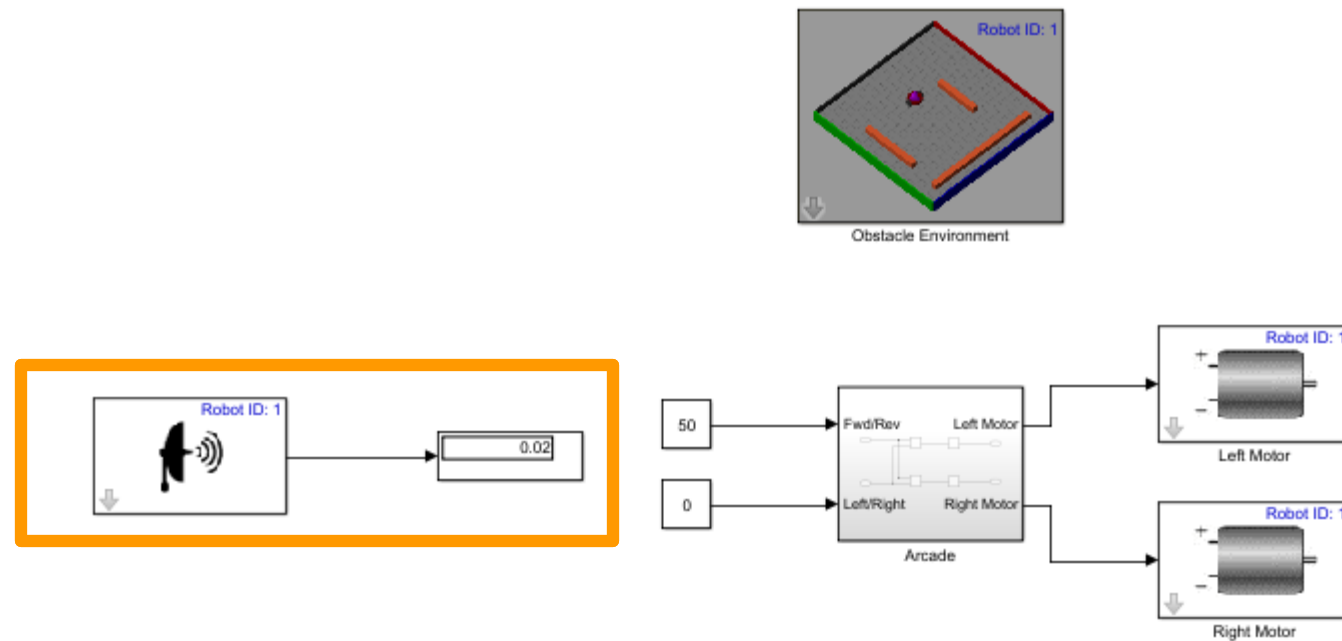
### Description

This block returns the distance in meters to a nearby object such as walls and obstacles. Several sensor properties can be adjusted from the block mask, but default values can also be used.

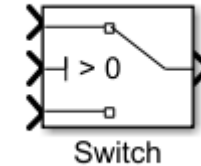


# Visualizing the Sensor Output

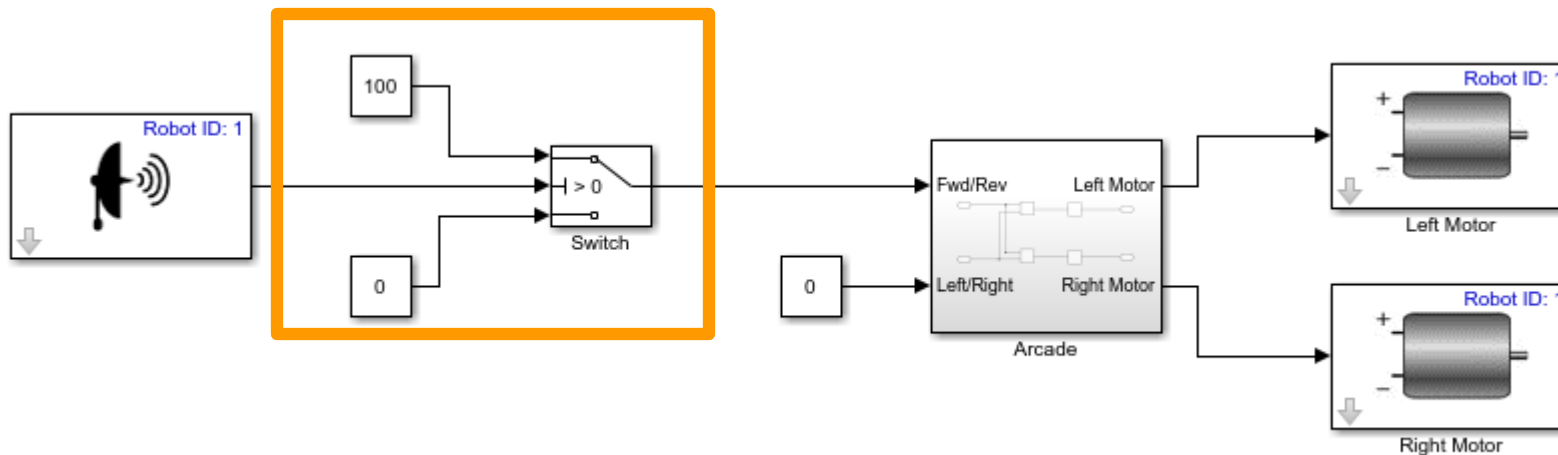
1. Open the “**AvoidWall\_start**”
2. Run the model
3. Observe the Simulink Display connected to the distance (The value in meters to the closest object in real-time)
4. Stop the model



# Using a Switch block

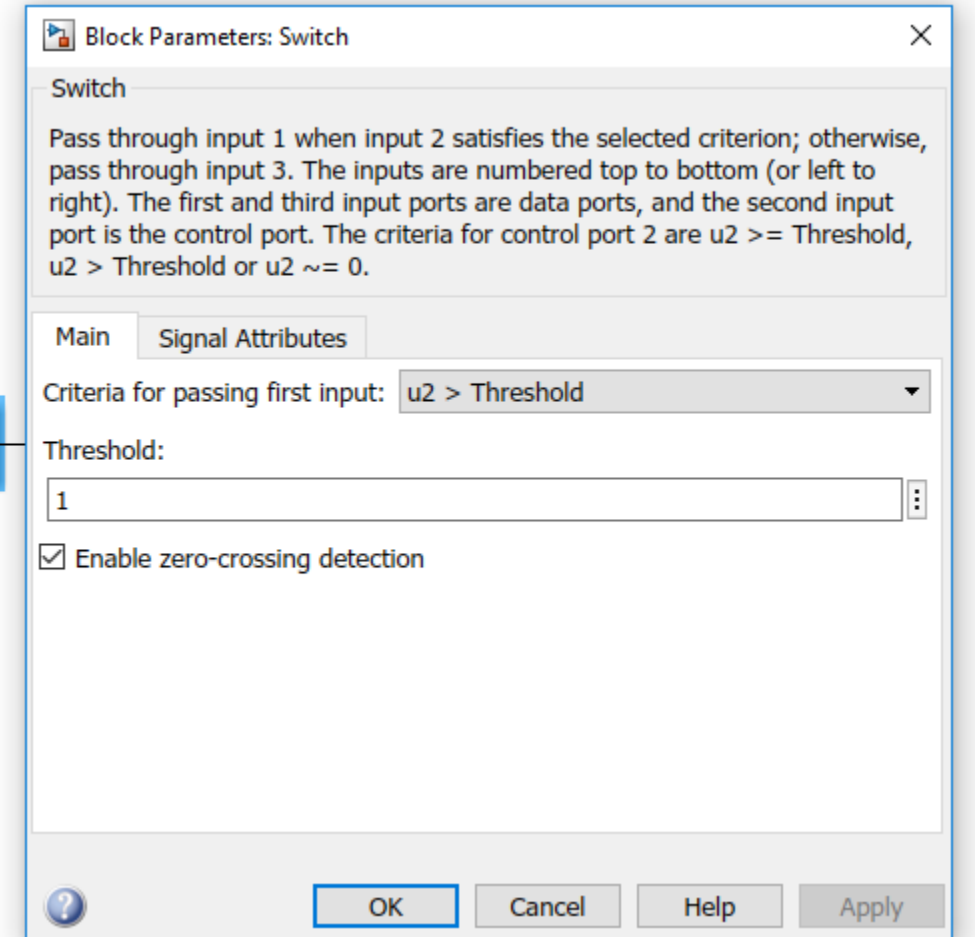
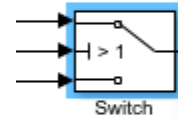


- Modify the model to prevent the robot from colliding into the wall.
  - The switch block is the equivalent to an IF statement for different signals in Simulink
1. Place a switch block in the model.
  2. Connect the sensor distance to the switch block
  3. Connect two constants to the switch block



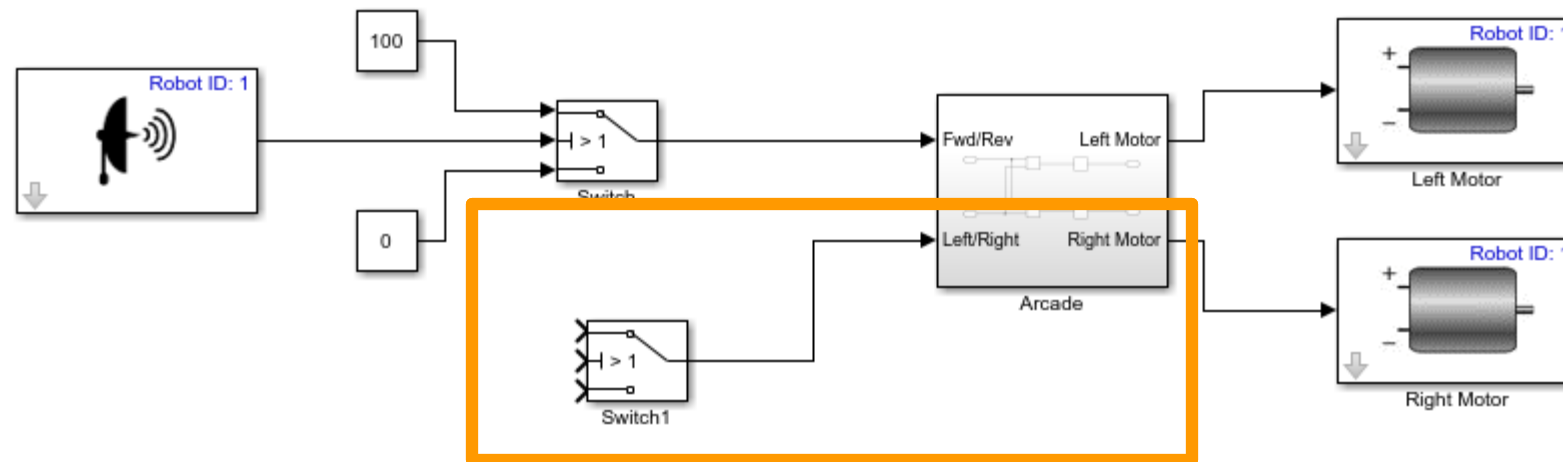
# Picking a Distance Threshold

1. Open the switch block settings and change the switching threshold to 1 meter
2. Run the model
3. Adjust parameters if necessary to avoid colliding with the wall



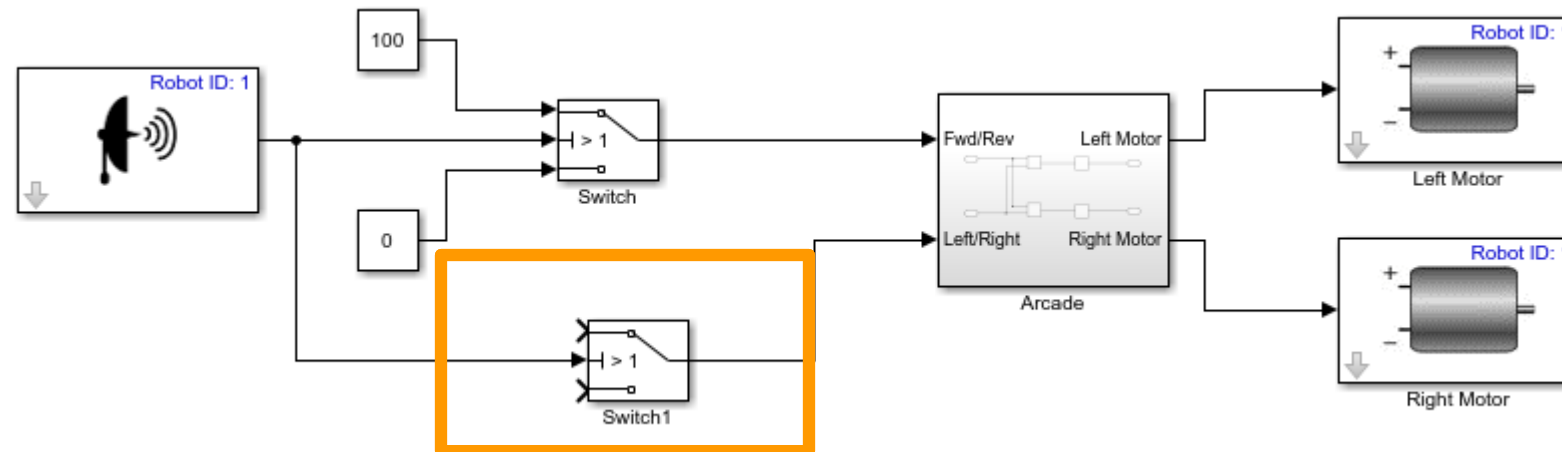
# Tracking the Wall

- Use the information from one distance sensor to track the walls within the field
1. Open the **“TrackWall\_start”** model
  2. Add a second switch that makes the robot turn when it is too close to a wall



# Using Another Switch Block

- Connect the signal from the distance sensor to the second switch input
- Connect appropriate constants to the remaining switch block inputs
- Run the model
- Adjust constants and thresholds to have the robot track the walls



## End of Unit 5: Using a Distance Sensor

- Congrats !
- Here are some learning outcomes from this unit
  - How to use a distance sensor
  - How to implement switching logic
  - How to track a wall with one sensor