Lecture 4: Educational robotics. Infrared sensor

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Lesson Objectives

1. Learn how to use an Infrared Sensor
2. Learn to make a remote control system and a program that follows the beacon.
3. Learn to use the Infrared Sensor in all three major modes
4. Learn the limitations of the Infrared Sensor

What does the Infrared Sensor do?

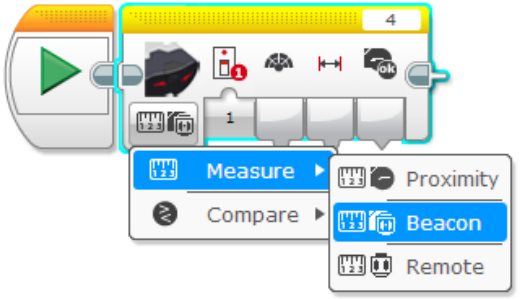
- Measures proximity to beacon or object
- Measures the angle of the beacon relative to the sensor
- Measures which button is pressed on remote.
- Beacon/remote can be set to 1 of 4 channels. Infrared sensor code must specify which channel to use. This allows you to use multiple remotes in the same room

Infrared Sensor

Beacon/Remote

Three Modes

- Works up to about 70cm away (or 100 proximity units)
- Proximity Mode
  - Returns undefined unit type called proximity (not inches or centimeters)
- Beacon Mode
  - Returns heading (angle) and distance to beacon. Heading measurement is not in degrees.
- Remote Mode
  - Returns which button is pressed on the remote
- We will use all three in this lesson
- The Infrared Sensor block can be found in the yellow sensor tab



Challenges

- To learn how to use the Infrared Sensor you will complete three challenges:
  - Challenge 1: Create a remote control for your robot that does a different action based on which button you press on the Remote
  - Challenge 2: Proportional Dog Follower: The robot should move to wherever the Beacon is using proximity and heading
  - Challenge 3: Test how accurate the Infrared Sensor is for measuring distances

Pseudocode/Hints

Challenge	Hint/Pseudocode
Remote Control	Run different actions based on which button(s) are pressed on channel 1
Proportional Dog Follower	If the robot is <15 proximity from the beacon move backward If the robot is >15 proximity from the beacon move forward Use proportional control to adjust the steering base on the “heading” of the beacon *Note: Proportional Control is covered in an Advanced Lesson on EV3Lessons.com. Please refer to this lesson.*
Accuracy of Proximity	Measure distance using ultrasonic and measure proximity using infrared (use Port View on brick). Compare measurements for different distances to different surfaces.

Challenge: Compare Sensors

Surface	Actual Distance to Surface	Ultrasonic Measurement	Infrared Measurement
Aluminum Foil	10CM		
Wooden Table	10CM		
Black Paper	10 CM		
Glass	10 CM		
White Paper	10 CM		

Instructions:

1) Hold the each sensor 10CM away from the material and check the sensor readings on Port View
2) Pick reflective and non-reflective surfaces to try

Lesson:

The Infrared Sensor's reading are based on the intensity of the reflective light. It will not be as accurate as an ultrasonic sensor in measuring how far away an object is. Try different distances next.

References

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