Lecture 4-1: Common Sensing Techniques for Reactive Robots

Reading: *Introduction to AI Robotics* (Sec. 6.1 – 6.5)

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Objectives:

- Define the difference between active and *passive sensors*
- Define the following terms in one or two sentences: *proprioception, extereoception, exproprioception, proximity sensor, logical sensor, false positive, false negative*
- List the metrics for rating sensors
- Describe the problems of *specular reflection, cross talk,* and *foreshortening* with an ultrasonic transducers
- Describe the types of behavioral sensor fusion and be able to apply to a real world problem
- Write perceptual schemas from any logical equivalent range sensor to produce a polar plot for obstacle avoidance behavior

Perception is one of the most important tasks of an autonomous robot. It takes sensor feedback to acquire knowledge about the robot's environment.

In a reactive system, perception

- Releases a behavior
- Guides the actions of the behavior

_____ sensors provide some form of energy and then measure the return to understand the environment such as sonar or laser.

_____ sensors receive energy already in the environment such as a bumper or camera.

_____ sensors do not require a great deal of processing or computation but the information they provide is simple or limited such as distance or light levels.

_____ sensor require more processing and computation but may provide more information such as a camera

The _____ to extract data determines whether a sensor is ***active*** or ***passive***.

The _____ of the data determines whether a sensor is ***simple*** or ***complex***.

Some sensors detect elements in the robots internal state such as battery power or distance and these are _____ sensors.

Sensor which perceive information about the robot's environment such as temperature or light intensity these are _____ sensors.

What is an example of sensor redundancy on the Traxster II?

What is an example of complementary sensors on the Traxster II?

What are the 3 types of behavioral sensor fusion?

1. _____

2. _____

3. _____

Active ranging systems are used for

- Obstacle detection
- Obstacle avoidance
- Localization
- Environment modeling

Name 3 objects that are difficult for an infrared range sensor to detect.

1. _____

2. _____

3. _____

What is your definition of specular reflection in one or two sentences?

Give one example of a cause for error for ultrasonic sensors and explain how you would correct it.

Name one advantage for using infrared and ultrasonic range sensors.