Lecture 2-1: Representation and the Reactive Paradigm

Reading: Chapter 3

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Objectives:

- Describe representation and world model
- List the different types of world maps
- Describe an animal behavior
- Describe reflexive behaviors
- Define innate releasing mechanisms
- Describe the role of perception in behaviors
- Apply schema theory to implement robot behaviors

_____ is the form in which information is stored and encoded in the robot's brain.

Examples of representation data are:

- Maps
- Images
- History
- Prediction
- Self
- Tasks

_____ is a representation of the robot's environment

There are several types of world models including:

- Landmark based path
- Landmark based map
- topological
- Odometric
- Full metric

The key differences between these world models is the way that the information is represented, accuracy requirements, and object permanence.

Representation timeline

- An _____has a short time line and may change as the robot moves
- A _____ has a long time line and stay's around for the lifetime of the robot's tasks

Representation and Control Architectures?

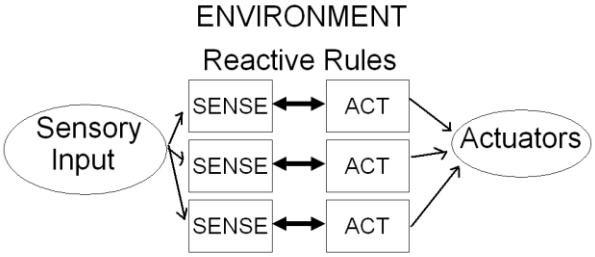
What type of control architecture requires a highly accurate detailed world?

What type of control architecture does not afford the use of a world model?

What type of control has distributed world models?

_____ is one of the most common modes of robot control and has a tight coupling between robot sensors and actuators. There is no internal representation or prediction of the outcome of actions.

The ***reactive paradigm*** is based upon the stimulus and response behavior of biological systems. Two examples of reactive rules are obstacle avoidance and random wander. Obstacle avoidance is based upon sensory inputs and random wander is based upon on internal state.



Unlike the hybrid control system which uses ***horizontal decomposition***, biological systems use a ***vertical decomposition*** where several actions may occur in parallel.

Typically reactive rules are ***mutually exclusive*** and only the important events get a distinct rule and all other events get a default response. For example, the robot should wander randomly unless an obstacle, wall, or target object is identified.

A reactive controller can encounter a stuck situation when there is a conflict in the rules so there are several solutions to resolve this situation:

- _____
- _____
- _____

Action Selection

Reactive systems must be able to support parallelism and be able to multitask so at times when the rules conflict it may be necessary to use action selection. There are two common ways to select the appropriate action:

- _____
- _____