Robot Software Architectures
Robot software architectures

- Most robot systems are ad hoc combinations of components
- Supported by software architectures (e.g. ROS)
- No principled way of combining components
- No principled way of extending system or components through learning
Cognitive Architectures for Robots

- How to integrate these specialised components?
- What is an appropriate architecture?

Icarus – Langley
Agent Architecture

Monitor / Goal Selection

Perception → World Model → Action

Perception → World Model → Action

Perception → World Model → Action

Sensors

Albus - RCS

Nilsson - Triple Tower

Actuators
Scales in the Hierarchy

- General, deterministic, persistent, slow, human readable

- Specialised, stochastic, transient, fast, unreadable
RCS (Albus)
Robot Operating System (ROS)
Blackboards

- Agents communicate by posting objects to blackboard
- Objects are timestamped and logged to a database
  - enables introspection and learning
- An agent subscribes to objects of specified types
- Agent is activated when object of the right type is posted
speech recognition

natural language processing

<postal-address> ::= <name-part> <street-address>
<name-part> ::= <personal-part> <last-name> <opt-jr>
<personal-part> ::= <first-name> | <initial> "."
<street-address> ::= <opt-apt-num> <house-num> <street>
<zip-part> ::= <town-name> "," <state-code> <ZIP-code>
<opt-jr-part> ::= "Sr." | "Jr." | <roman-numeral> | ""

audio input

colour recognition

depth analysis

motor actions

tactile sensors

planner

pickup(B)

move(.)

"pick up the green ball"