Software vs Cognitive Architectures
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

“pick up the green ball”

natural language processing

audio input

motor actions

tactile sensors

planner

colour recognition

depth analysis

stereo camera

stop
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
The purely reactive scheme is not capable of performing complex tasks. Software behaviour based systems performed very well, also in changing environments. However, uncertainties in sensor measurements and the errors robots that were running reactive paradigm.

Consequence of perception is perhaps the reason why it is also called the sense-plan-act. Sensors and real world models are usually inadequate. That the actions are not a direct sensors to update this model, and to draw conclusions based on the updated model.

Robots. This resulted in a hierarchical system having an elaborate model of the world, using this feedback model. A sensor generates feedback, which is compared to the expected feedback. Early robotic systems for single functions were designed as control systems with a clear derived from a model of the system. Any deviation is used to update the control signal so as feedback model.

We present a Novel Decentralised Architecture for Navigation and Control of Service Robots. It is our firm contention that a well designed software architectural framework is necessary to effectively leverage microcontrollers (Read Service Robots), wireless networks (read process orchestration) to address problems of complexity, scale and reliability of networked Service Robots. Hence, it has become increasingly important to develop Service Robots on ready µ products. Hence, it has become increasingly important to leverage upon Hybrid Approaches to robotic developments across projects and platforms. ('Ragavan and Ganapathy 2).

In spite of an explosion of technology and methods, the Service Robots are still not complex. It is not just because three is an aesthetically pleasing number. It has to do with the role of knowledge needed to deal with the uncertainties and surprises of the real world, became enormous big and the planning too expensive in time and computer resources. Hence, it has become increasingly important to test the competence on a real robot, a complete system is needed involving a process based architecture based on purely reactive approach is usually monolithic and requires rewriting certain optimization criteria. The classical deliberative approach to navigation is based entirely on planning and on explicit symbolic models of the world exhausts the computation.
Scales in the Hierarchy

- General, deterministic, persistent, slow, human readable
- Specialised, stochastic, transient, fast, unreadable
Nilsson’s Triple Tower

Perception

World Model

Planning & Action Library

Sensors

Actuators

Environment
Nilsson’s Triple Tower

- Perception
- World Model
- Planning & Action Library

Sensors

Environment

Actuators
Cognitive Architectures for Robots

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

Icarus – Langley
RCS (Albus)