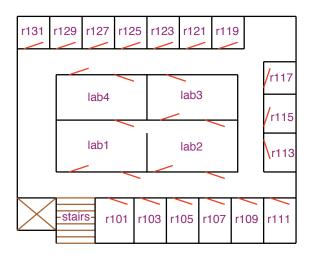
Four Example Application Domains

- Autonomous delivery robot roams around an office environment and delivers coffee, parcels,...
- Diagnostic assistant helps a human troubleshoot problems and suggests repairs or treatments. E.g., electrical problems, medical diagnosis.
- Intelligent tutoring system teaches students in some subject area.
- Trading agent buys goods and services on your behalf.

Domain for Delivery Robot



Autonomous Delivery Robot

Example inputs:

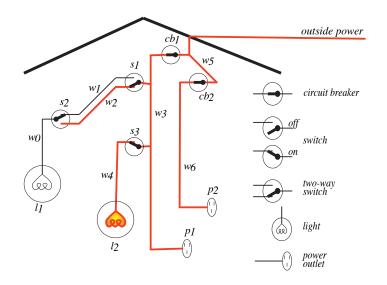
- Abilities: movement, speech, pickup and place objects.
- Prior knowledge:its capabilities, objects it may encounter, maps.
- Past experience: which actions are useful and when, what objects are there, how its actions affect its position.
- Goals: what it needs to deliver and when, tradeoffs between acting quickly and acting safely.
- Stimuli: about its environment from cameras, sonar, sound, laser range finders, or keyboards.



What does the Delivery Robot need to do?

- Determine where Craig's office is. Where coffee is. . .
- Find a path between locations.
- Plan how to carry out multiple tasks.
- Make default assumptions about where Craig is.
- Make tradeoffs under uncertainty: should it go near the stairs?
- Learn from experience.
- Sense the world, avoid obstacles, pickup and put down coffee.

Domain for Diagnostic Assistant in a Smart Home





Diagnostic Assistant

Example inputs:

- Abilities: recommends fixes, ask questions.
- Prior knowledge:how switches and lights work, how malfunctions manifest themselves, what information tests provide, the side effects of repairs.
- Past experience: the effects of repairs or treatments, the prevalence of faults or diseases.
- Goals: fixing the device and tradeoffs between fixing or replacing different components.
- Stimuli: symptoms of a device or patient.

Subtasks for the diagnostic assistant

- Derive the effects of faults and interventions.
- Search through the space of possible fault complexes.
- Explain its reasoning to the human who is using it.
- Derive possible causes for symptoms; rule out other causes.
- Plan courses of tests and treatments to address the problems.
- Reason about the uncertainties/ambiguities given symptoms.
- Trade off alternate courses of action.
- Learn what symptoms are associated with faults, the effects of treatments, and the accuracy of tests.

Trading Agent

Trading agent interacts with an information environment to purchase goods and services.

- It acquires a users needs, desires and preferences.
- It finds what goods and services are available.
- It purchases goods and services that fit together to fulfill a user's preferences.
- It is difficult because users preferences and what is available can change dynamically, and some items may be useless without other items.

Trading Agent Inputs

- Abilities: acquire information, make recommendations, purchase items.
- Prior knowledge: the ontology of what things are available, where to purchase items, how to decompose a complex item.
- Past experience: how long special last, how long items take to sell out, who has good deals, what your competitors do.
- Goals: what the person wants, their tradeoff.
- Stimuli: what items are available, prices, number in stock,

Intelligent Tutoring System

- Abilities: Present information, give tests
- Prior knowledge: subject material, primitive strategies
- Past experience: common errors, effects of teaching strategies
- Goals: the students should master subject material, gain social skills, study skills, inquisitiveness, interest
- Stimuli: test results, facial expressions, questions, what the student is concentrating on



Common Tasks of the Domains

- Modeling the environment Build models of the physical environment, patient, or information environment.
- Evidential reasoning or perception Given observations, determine what the world is like.
- Action Given a model of the world and a goal, determine what should be done.
- Learning from past experiences Learn about the specific case and the population of cases.