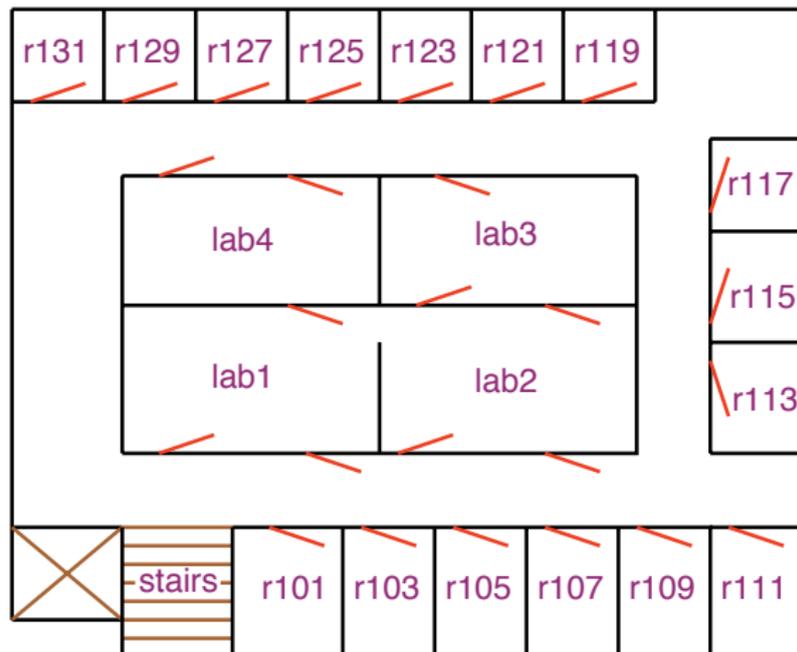


Our Two Examples Application Domains

- **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.

Domain for Delivery Robot



Autonomous Delivery Robot

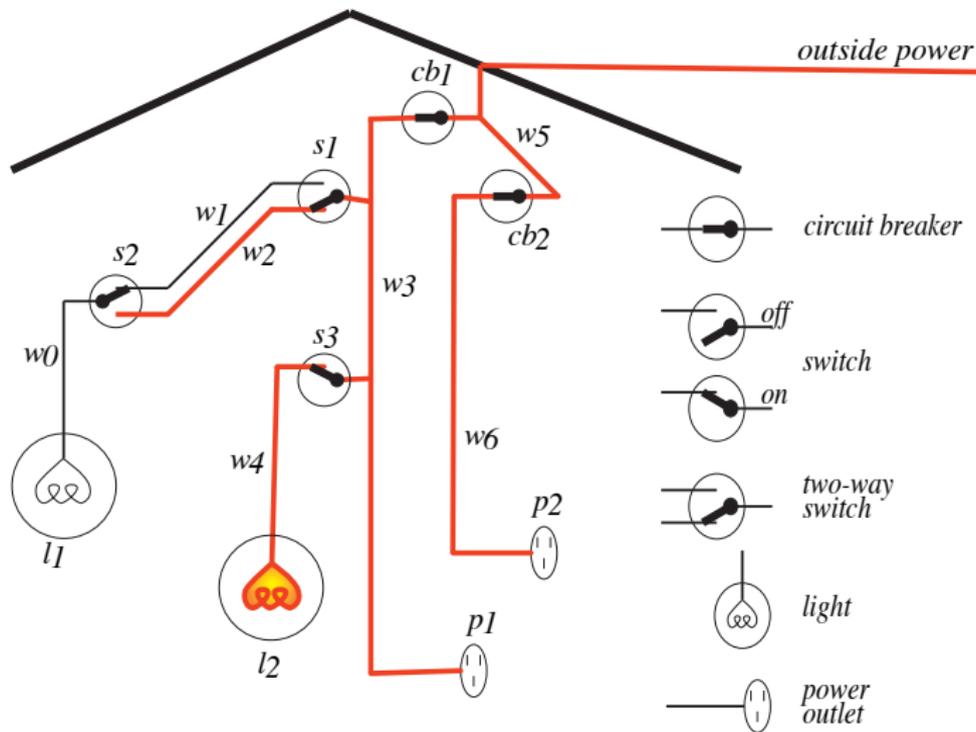
Example inputs:

- **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



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.

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.