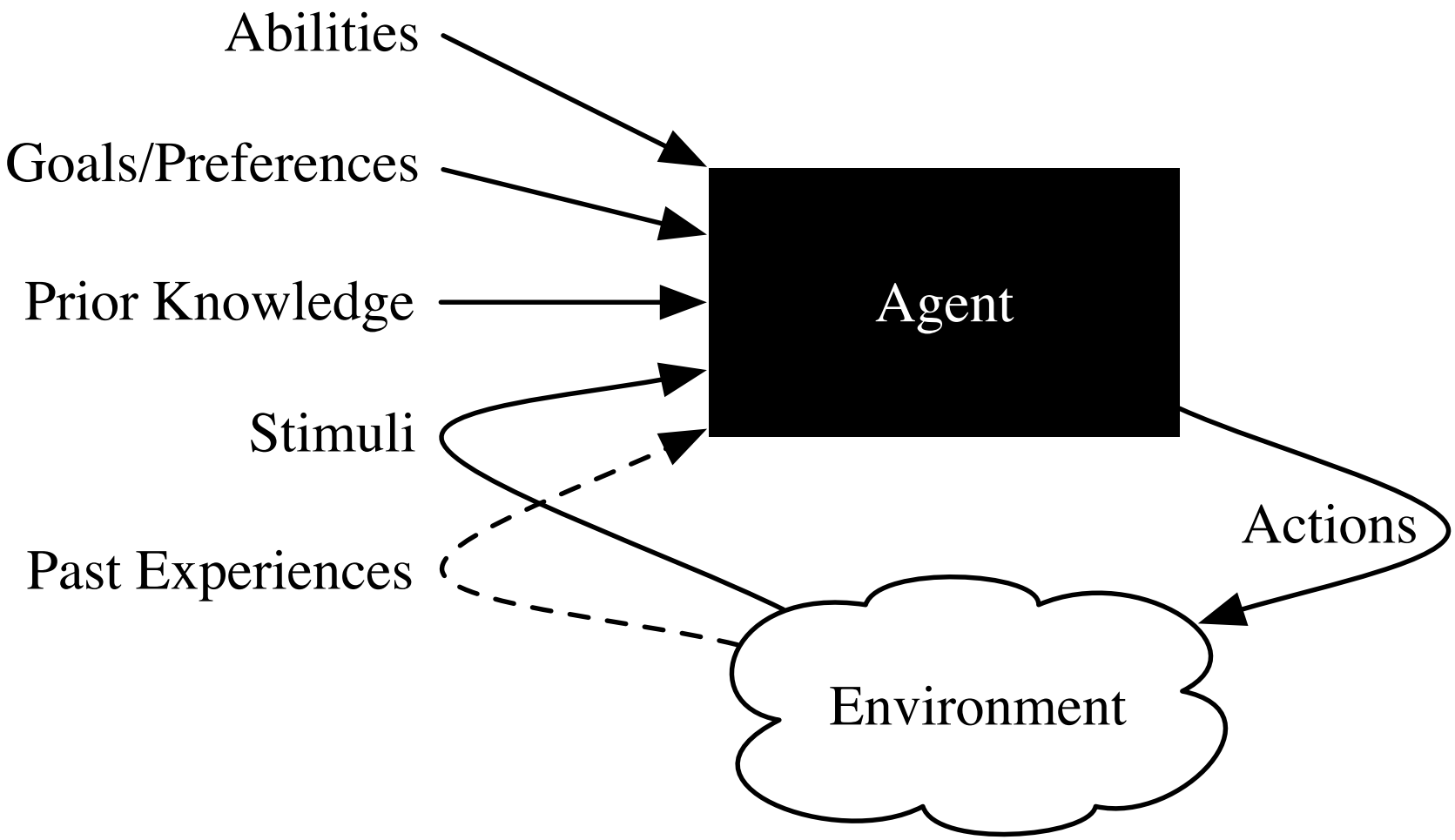
What is Artificial Intelligence?

- Artificial Intelligence is the synthesis and analysis of computational agents that act intelligently.
- An agent is something that acts in an environment.
- Aspects of intelligence includes:
  - acting appropriately given goals and circumstances;
  - being flexible in changing environments;
  - reasoning;
  - learning from experience; and
  - dealing with perceptual and computational limitations.

Agents acting in an environment

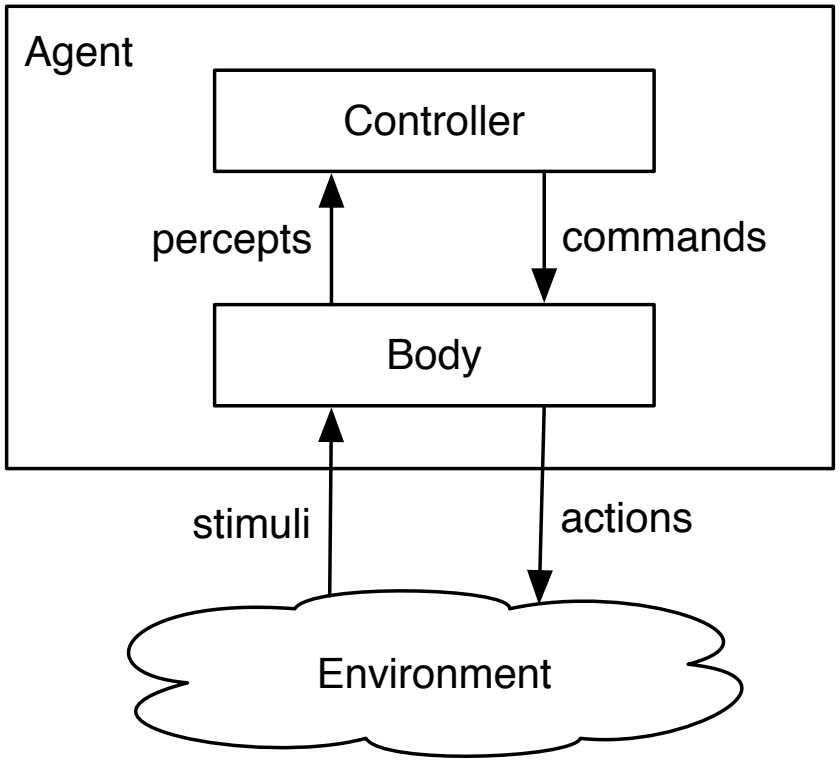


Example: autonomous car

- abilities: steer, accelerate, brake
- goals: safety, get to destination, timeliness,...
- prior knowledge: what signs mean, what to stop for
- stimuli: vision, laser, GPS...
- past experiences: streetmaps, how breaking, steering affects direction..

Agent architecture

An agent is made up of a body and a controller.



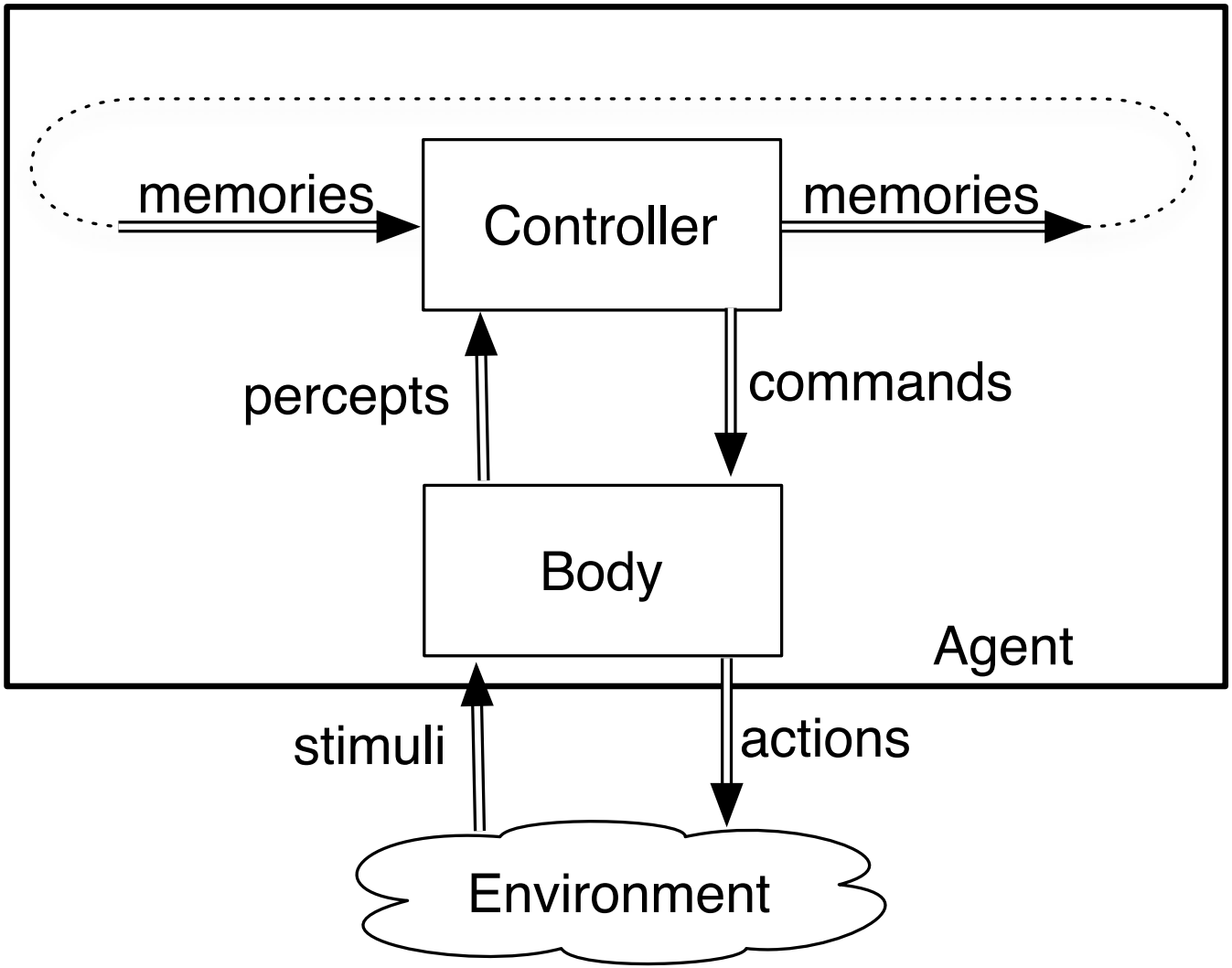
- An agent interacts with the environment through its body.
- The body is made up of:
  - sensors that interpret stimuli
  - actuators that carry out actions
- The controller receives percepts from the body.
- The controller sends commands to the body.
- The body can also have reactions that are not controlled.

Controller

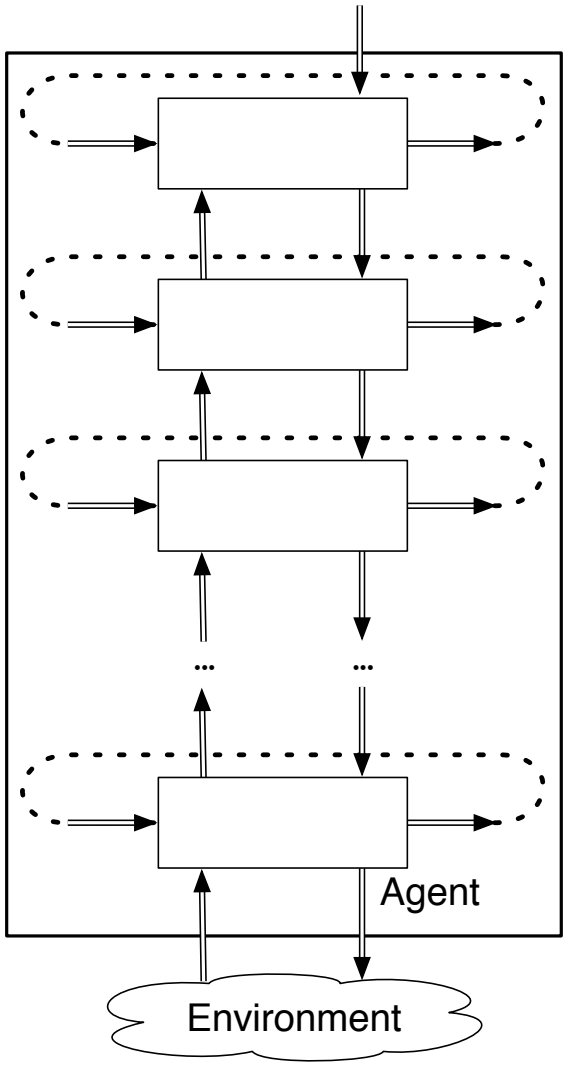
- Controllers are the "brains" of the agents.
- Agents are situated in time, they receive sensory data in time, and do actions in time.
- Controllers have (limited) memory and (limited) computational capabilities.
- The controller specifies the command at every time.
- The command at any time can depend on the current and previous percepts.

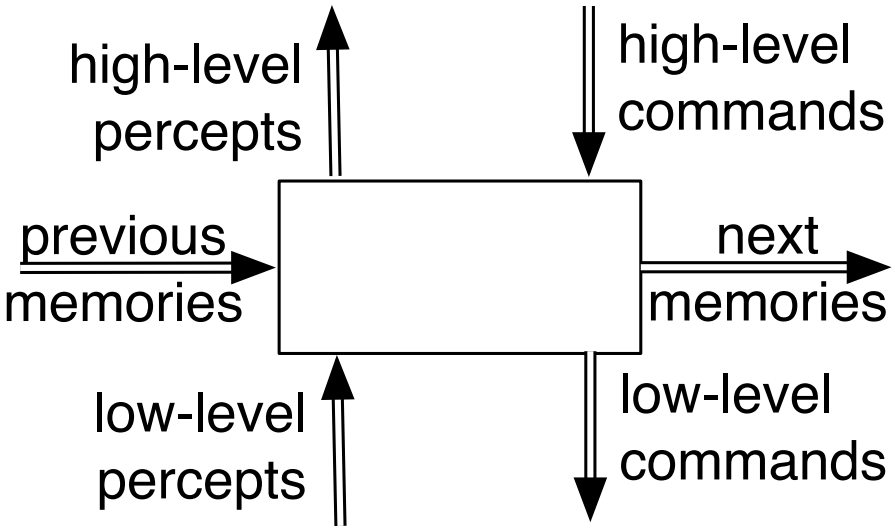
Controller with memory

Controllers may have states or collect past experiences.

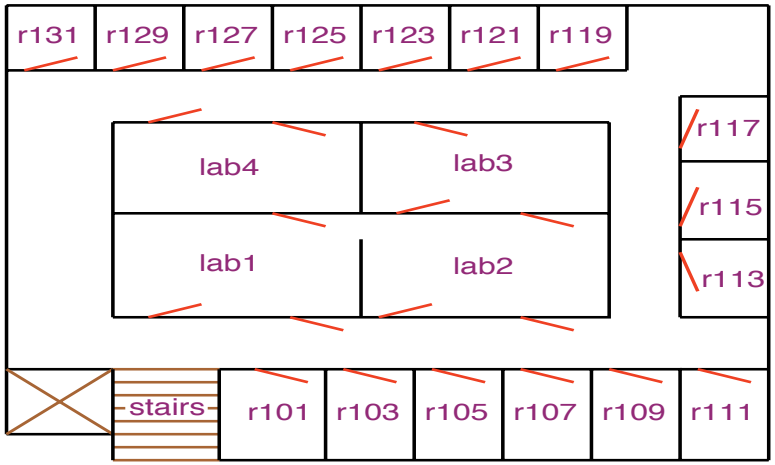


Hierarchical design





Example: office delivery robot



- The robot has three actions: go straight, go right, go left.
- It can be given a plan consisting of sequence of named locations for the robot to go to in turn.
- The robot must avoid obstacles.
- It has a single whisker sensor pointing forward and to the right. The robot can detect if the whisker hits an object. The robot knows where it is.
- The obstacles and locations can be moved dynamically.

A decomposition of the delivery robot controller