Overview:

- Agents and Robots
- Agent systems and architectures
- Agent controllers
- Hierarchical controllers



A agent system is made up of



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- An agent receives stimuli from the environment
- An agent carries out actions in the environment.

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 - 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.

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- The command at any time can depend on the current and previous percepts.

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 - abilities:

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Image: Ima

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 - goals: mimimize price, don't run out of chips
 - stimuli: price, number in stock
 - prior knowledge: range of prices, consumption rates

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- A controller is an implementation of a transduction.

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- At every time a controller has to decide on:
 - What should it do?
 - What should it remember? (How should it update its memory?)
 - as a function of its percepts and its memory.

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Controller



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Functions implemented in a controller



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For discrete time, a controller implements:

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- belief state function remember(belief_state, percept), returns the next belief state.
- command function command(belief_state, percept) returns the command for the agent.

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• Percepts:

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average :=
$$average + (price - average) * 0.05$$

This maintains a discouning rolling avergage that (eventually) weights more recent prices more.

(see agents.py in AIPython distribution http://aipython.org)

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Percept and Command Traces (POMDP)



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 B_i agent's belief state at time *i*.

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 B_i agent's belief state at time $i.A_i$ agent's action.

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 B_i agent's belief state at time $i.A_i$ agent's action. O_i is what the agent observes.

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 B_i agent's belief state at time $i.A_i$ agent's action. O_i is what the agent observes. R_i is the reward. S_i is the world state.

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