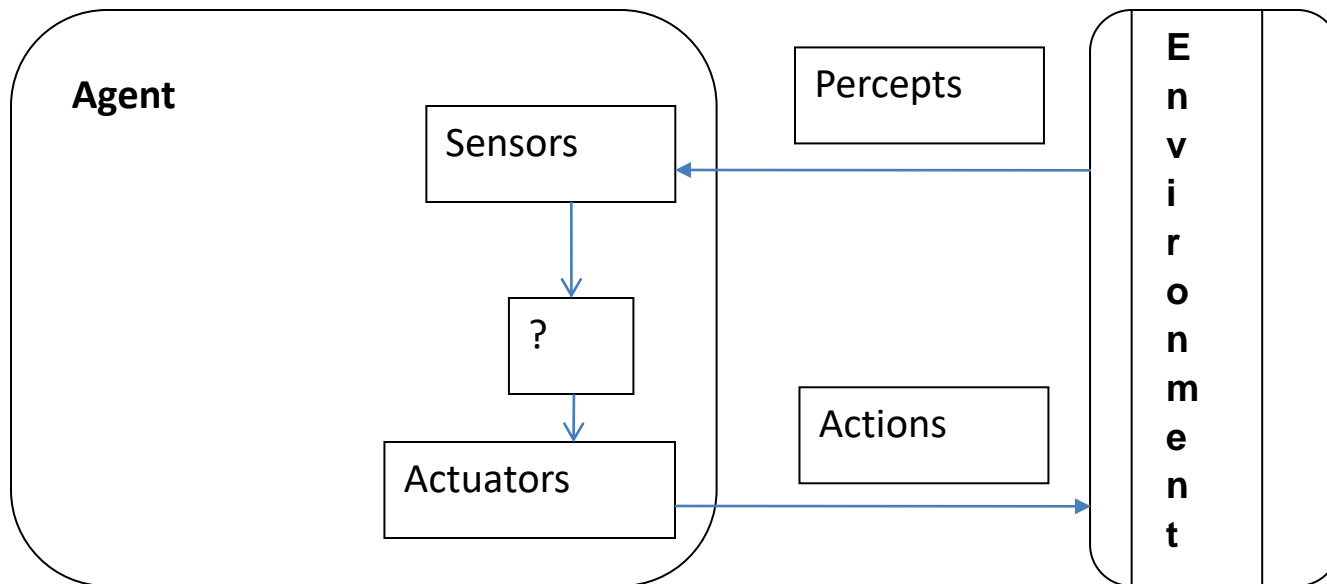


## Topic 1.2 Systems that act rationally: Rational or Intelligent Agents

### A. Agent

An agent is anything that interacts with its environment through sensors and actuators.

i) Most simple schema of an agent:



ii) **Agents:** Humans, Robots, Softbots, Thermostats, ....

iii) Agent  $\approx$  Agent Program

iv) Example from a simplified 'Vacuum-cleaner World'

Start <i>Agent</i>	1	2	3	...	End
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- **Percepts:** [1, Clean], [2, Dirty], ...; [*Location, Status*]
- **Actions:** PickDirt, MoveToRight, Halt, ...
- **Sensors:** Dirt finder, Location detector, ...
- **Actuators:** Suction pump, Locomotive, ...

## ▪ Agent program

While switched on, perform sequentially the actions returned by the following function:

```
Function Agent1 ([Location, Status])  
  if Status = Dirty then Action ← PickDirt  
  else if Location = End then Action ← Halt  
  else Action ← MoveToRight  
  return Action
```

## B. Rational Agent

- A rational agent chooses actions that optimize expected performance given percept sequence and knowledgebase at the time.
- It learns, that is, improves performance based on experience.
- It functions autonomously.

## C. Basic types of agents / agent programs

- Simple reflex agents [VacuumCleaner001]
- Model-based reflex agent [GateMan77]
- Goal-based agents [Planner999]
- Utility-based agents [ChessMaster111]

## **D.** Task environment specification for designing a rational agent

- P – Performance measure
- E – Environment of functioning
- A – Actuators for acting upon the environment
- S – Sensors to perceive the environment

## E. Major types of environment contrasts to be considered for designing a rational agent

- Fully Observable / Partially Observable
- Deterministic / Stochastic
- Episodic / Sequential
- Static / Dynamic
- Discrete / Continuous
- Single Agent / Multiple agent