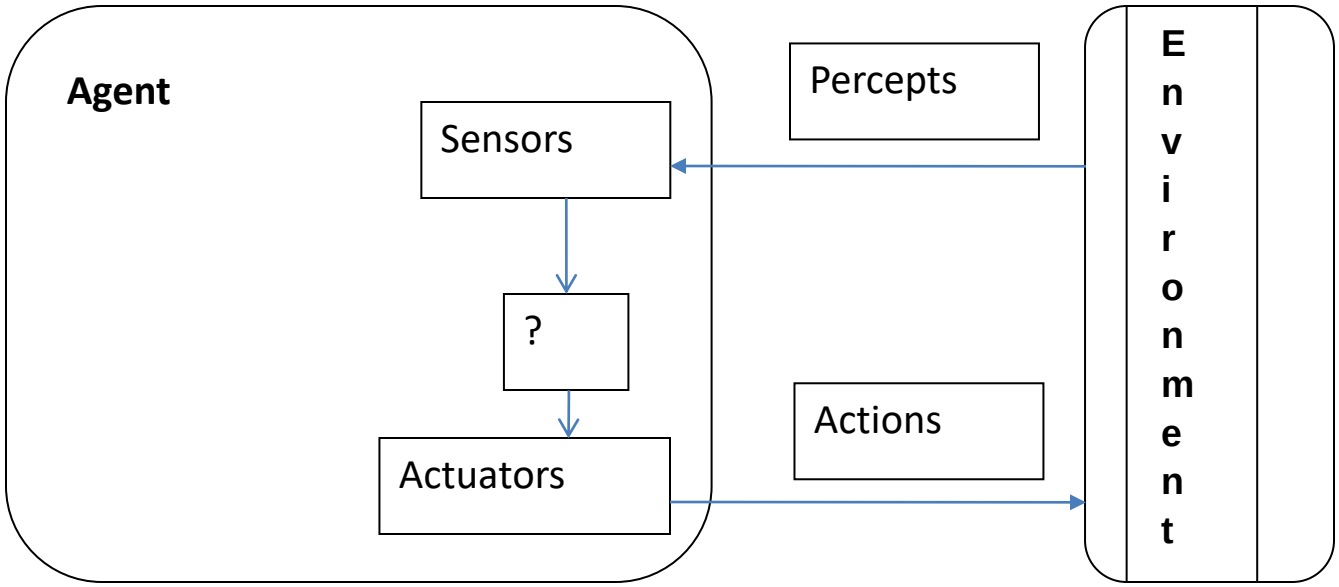
Topic 1.2 Systems that act rationally: Rational or Intelligent Agents

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 ≈ Agent Program

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

Start ***Agent***	1	2	3	…	End

- **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