Lab-05: Intelligent Agents (Implementation of Simple Reflex Agent)

5.1 Objectives:

1. To learn intelligent agents and implement simple reflex agent using Python

5.2 Agents and Environment

An AI system is composed of an agent and its environment. The agents act in their environment. The environment may contain other agents.

An **agent** is anything that can perceive its environment through **sensors** and acts upon that environment through **effectors.**

- A **human agent** has sensory organs such as eyes, ears, nose, tongue and skin parallel to the sensors, and other organs such as hands, legs, mouth, for effectors.

- A **robotic agent** replaces cameras and infrared range finders for the sensors, and various motors and actuators for effectors.

- A **software agent** has encoded bit strings as its programs and actions.
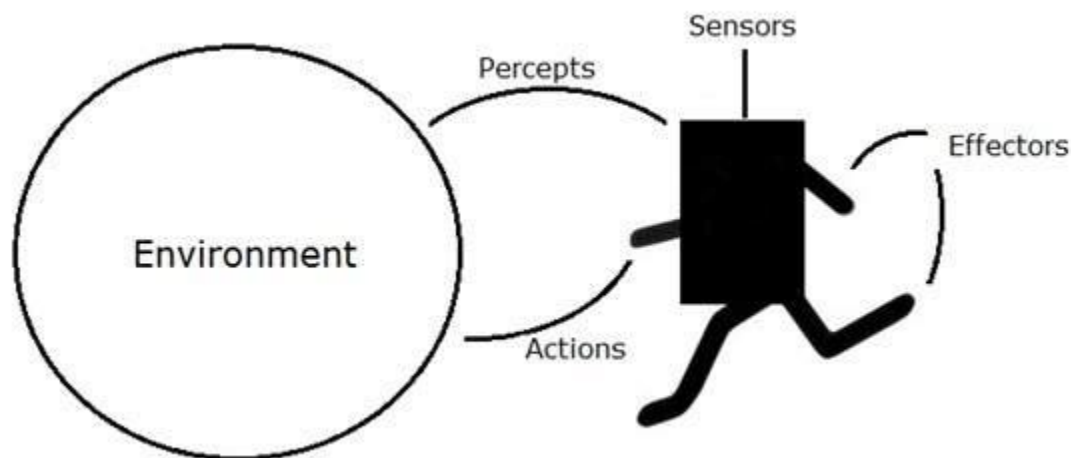
5.2.1 Agent Terminology

- **Performance Measure of Agent** – It is the criteria, which determines how successful an agent is.

- **Behavior of Agent** – It is the action that agent performs after any given sequence of percepts.

- **Percept** – It is agent's perceptual inputs at a given instance.

- **Percept Sequence** – It is the history of all that an agent has perceived till date.

- **Agent Function** – It is a map from the precept sequence to an action.

- **Agent has;**

  - Sensors

  - Actuators

  - Percepts

  - Actions

5.3   Types of Agents

1. Table-driven agent
2. Reflex agent
3. Model-based reflex agent
4. Goal-based agent
5. Utility-based agent
6. Learning agent

5.4   Simple Reflex Agent

Simple reflex agents act only on the basis of the current percept, ignoring the rest of the percept history. The agent function is based on the condition-action rule: if condition then action. This agent function only succeeds when the environment is fully observable. Some reflex agents can also contain information on their current state which allows them to disregard conditions whose actuators are already triggered. A schematic diagram of a simple reflex agent is shown below:
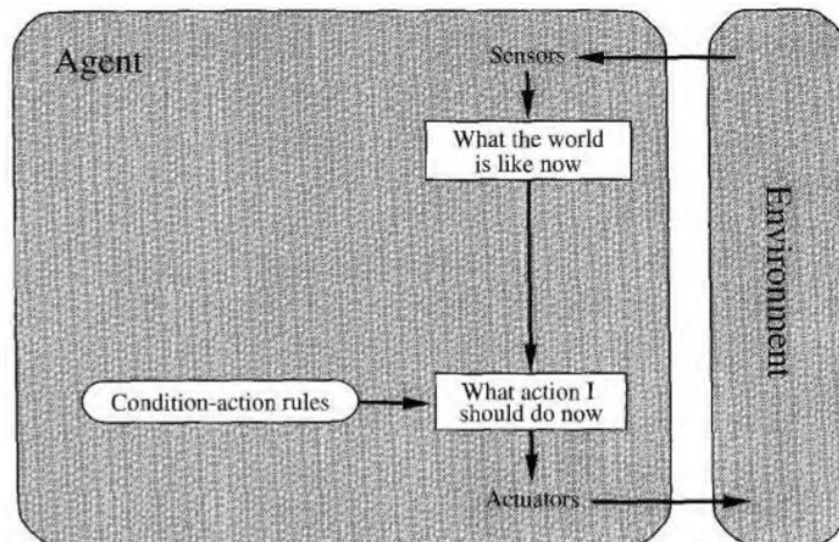
- They choose actions only based on the current percept.
- They are rational only if a correct decision is made only on the basis of current precept.

- Their environment is completely observable.

5.4.1 Pseudocode:

function SIMPLE-REFLEX-AGENT(*percept*) **returns** an action

    static: *rules*, a set of condition-action rules

    state ← INTERPRET-INPUT(*percept*)
    rule ← RULE-MATCH(*state*, *rule*)
    action ← RULE-ACTION[*rule*]
    return *action*

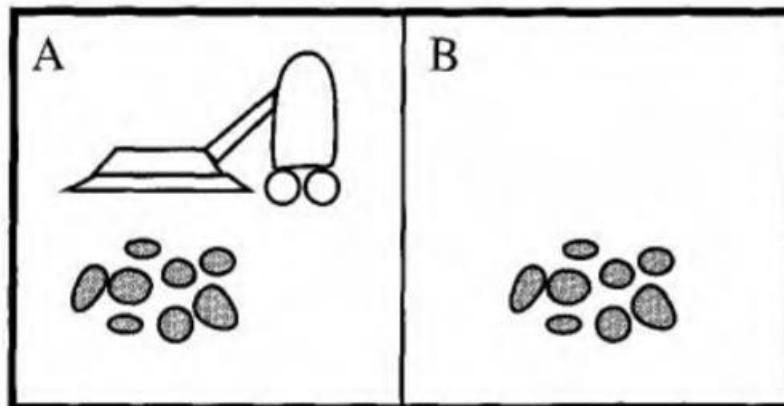Example: Room temperature controller

```python
sensor=[10,20,30,40,50]
def room_temperature(sensor):
    for sens in sensor:
        if sens<30:
            print("fan off")
        elif sens>30:
            print("fan on")
    return 0
print(room_temperature(sensor))
```

TASK:

Consider the vacuum world shown in the figure below:

This particular world has just two locations: squares A and B. The vacuum agent perceives which square it is in and whether there is dirt in the square. It can choose to move left, move right, suck up the dirt, or do nothing. One very simple **agent function** is the following: if the current square is dirty, then suck, otherwise move to the other square. Write a simple reflex agent for the vacuum cleaner. (Hint: Agent has no initial states knowledge)

If the current square is dirty, then suck; otherwise, move to the other square.

Pseudocode to the task is as follows;

```
function Reflex-Vacuum-Agent( [location,status]) returns an action
if status = Dirty then return Suck
else if location = A then return Right

else if location = B then return Left
```