TUTORIAL 1 : Design of Intelligent Agent

Name :- Rahul Ravindra Shinde

Roll No. :- 64

Class :- BE.IT

Subject :- IS Lab

Sem :- VII

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Design of Intelligent Agent

* **Aim :** To understand the concept of Agent Abstraction by studying definition of Rational Agent, Agent environment, Task Environment Descriptors, environment types.

* **Theory :-**

- An Artificial Intelligent (AI) system is composed of an agent and its environment.
- The agents act in their environment.
- An agent is anything that can perceive its environment through sensors and acts upon that enviroment through effectors. This can be clearly seen in Fig. 1. An agent in particular can be:-

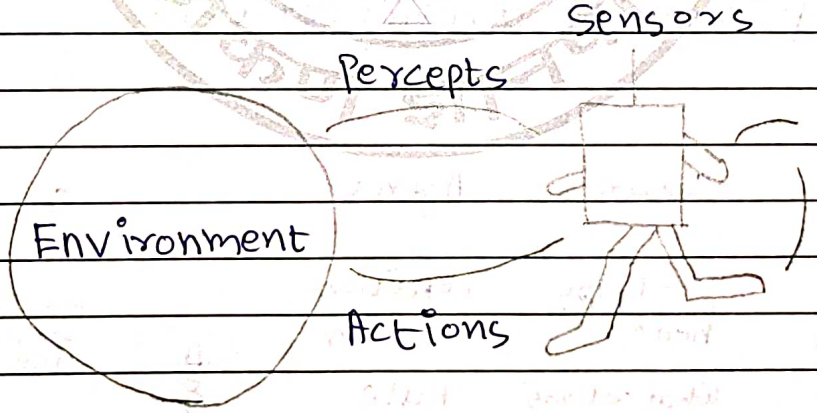


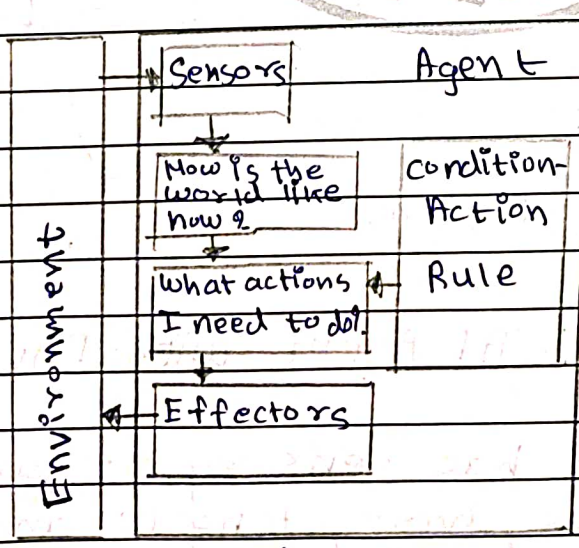
Fig. 1 : AI Agent with Environment

* Human agent has sensory organs such as eyes, ears, nose, tongue and skin parallel to the sensors and other

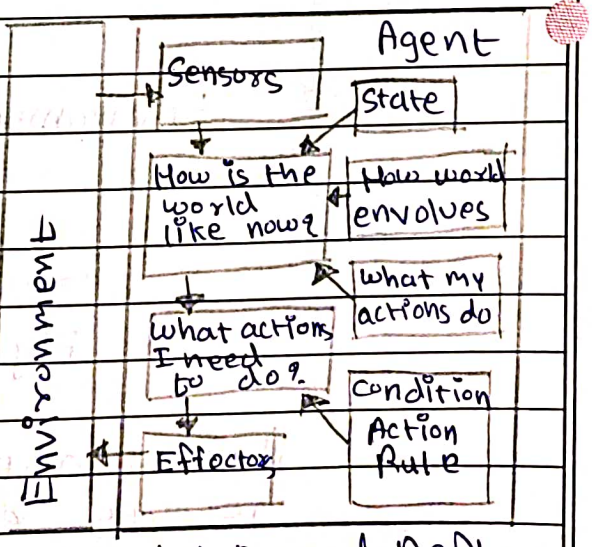
organs such as hands, legs, mouth for effectors.

* Robotic agent :- replaces cameras and infrared range finders for the sensors and various motors and actuators for effectors.
* Software agent has encoded bit strings as its programs and actions.

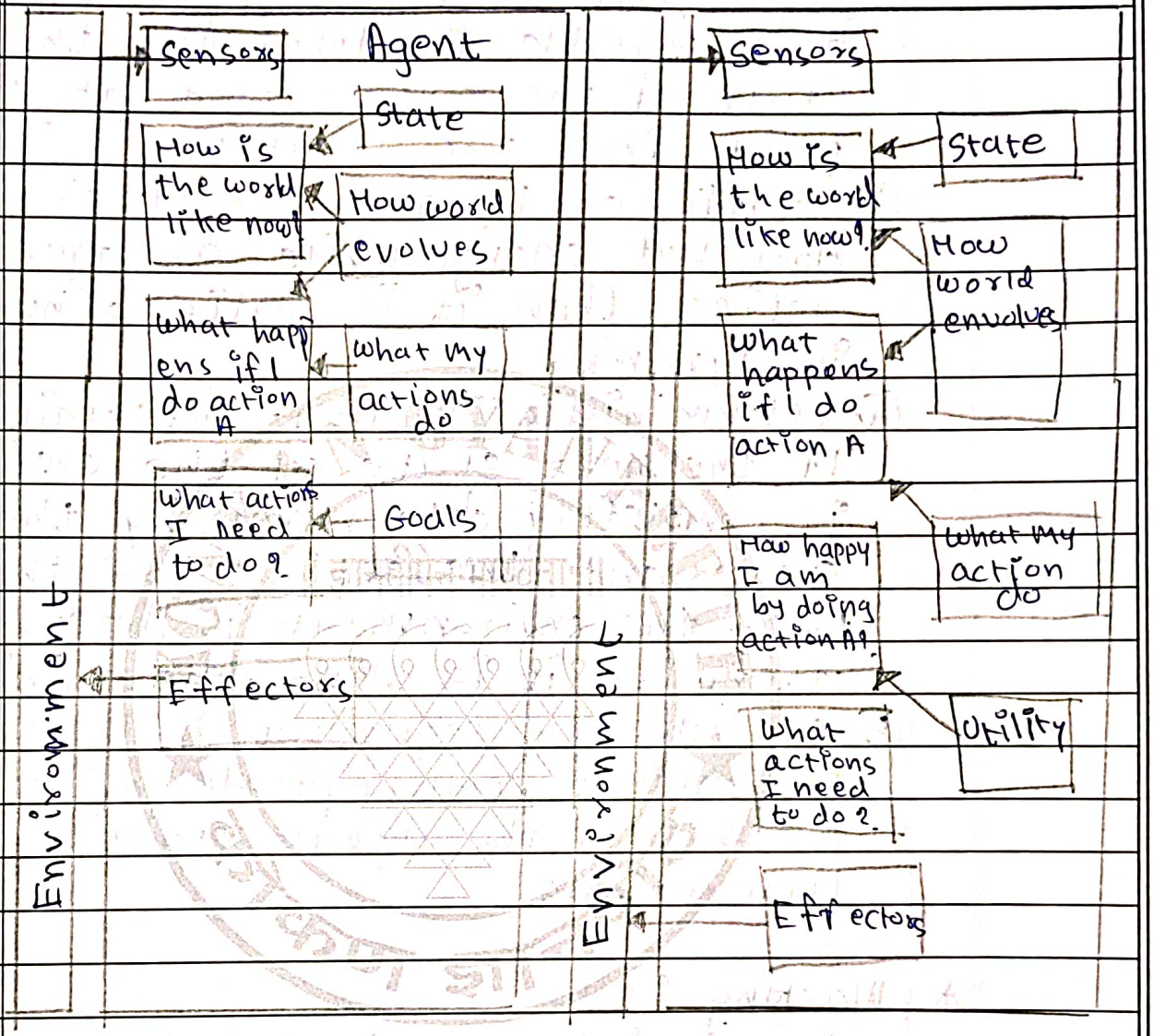
* - Agent struture can be viewed as a combination of Agent architecture and Agent program.
- Agent Architecture refers to the machinery that an agent executes on whereas Agent program is an implementation of an agent function.
- Figure 2 show four important types of agent architecture.



(a) Simple Reflex Agent



(b) Model Based Reflex Agent



(c) Goal Based Agent (d) Utility Based Agent

Figure 2: Agent Architecture Types

* Another important piece of information is task environment properties.

(1) Discrete or Continuous - if there are a limited number of distinct, clearly defined, states of the environment, the environment is discrete (For Example, Chess) (automated driving).

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(2) observable or partially observable :- if it is possible to determine the complete state of the environment at each time point from the precepts it is observable

(3) Static or Dynamic :- If the environment does not change while an agent is acting, then it is static otherwise it is dynamic.

(4) Deterministic or Non-deterministic :- If the next state of the environment is completely determined by the current state and the actions of the agent then the environment is deterministic otherwise it is non-deterministic

(5) Episodic or sequential :- In an episodic environment, each episode of events consists of the agent perceiving and then acting

* Working :-

- Search internet for AI based applications in following scenarios and identify who is agent for that application.
- & task environment properties

(1) Autonomous Lunar Rover

(2) Deep Blue chess playing computer program.

(3) Eliza the natural language processing computer program created from 1964 to 1966 at the MIT Artificial Intelligence Laboratory be Joseph Weizenbaum.

④ Automatic Portfolio management
⑤ Sophia is a social humanoid robot developed by Hong kong based company Hason Robotics.
⑥ Apples virual assistance Siri
⑦ Endurance : A companion for Dementia Patients

* Resources :-
- The above diagrams are taken from online tutorial available at Tutorials points on topic AI - Agents and Environments.