Name : Ruhi R. Shaikh

Class : BE - IT

Roll no : 59

Subject : IS Lab.

DOP	DOA	Remark	Sign.

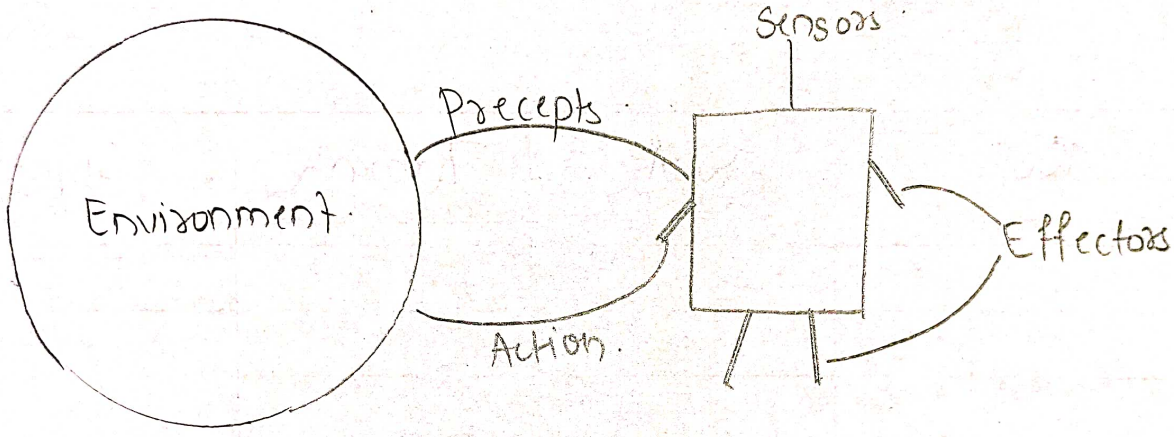
Tutorial 1 : Design of Intelligent Agent.

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

Theory :

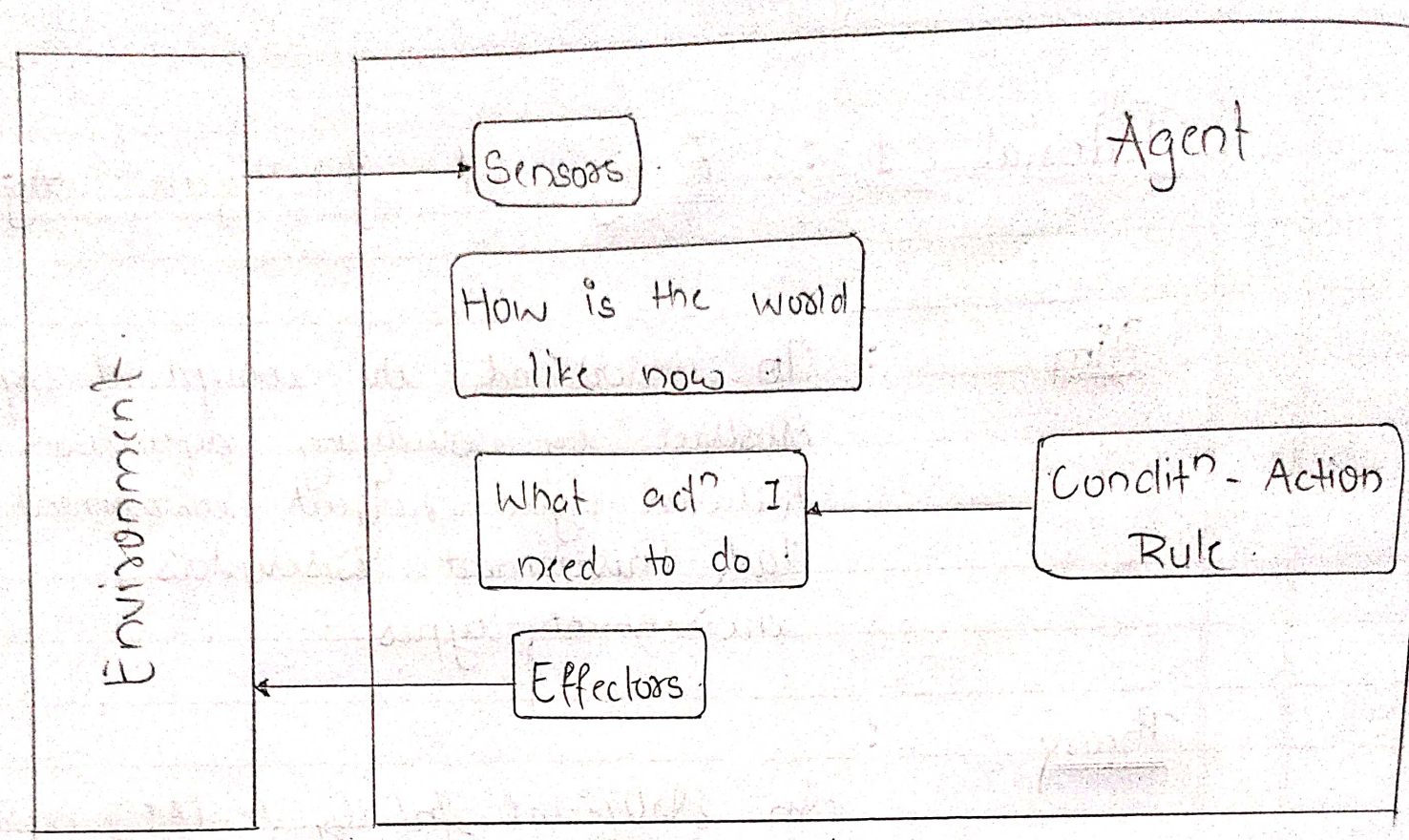
An Artificial Intelligent (AI) system is composed of an agent and its environment. The agents act in their environment. An agent is anything that can perceive its environment through sensors and acts upon that environment through effectors. This can be clearly seen. An agent in particular can be:

- 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, for various motors and actuators for effectors.
- Software agent has encoded bit string as its program and action.

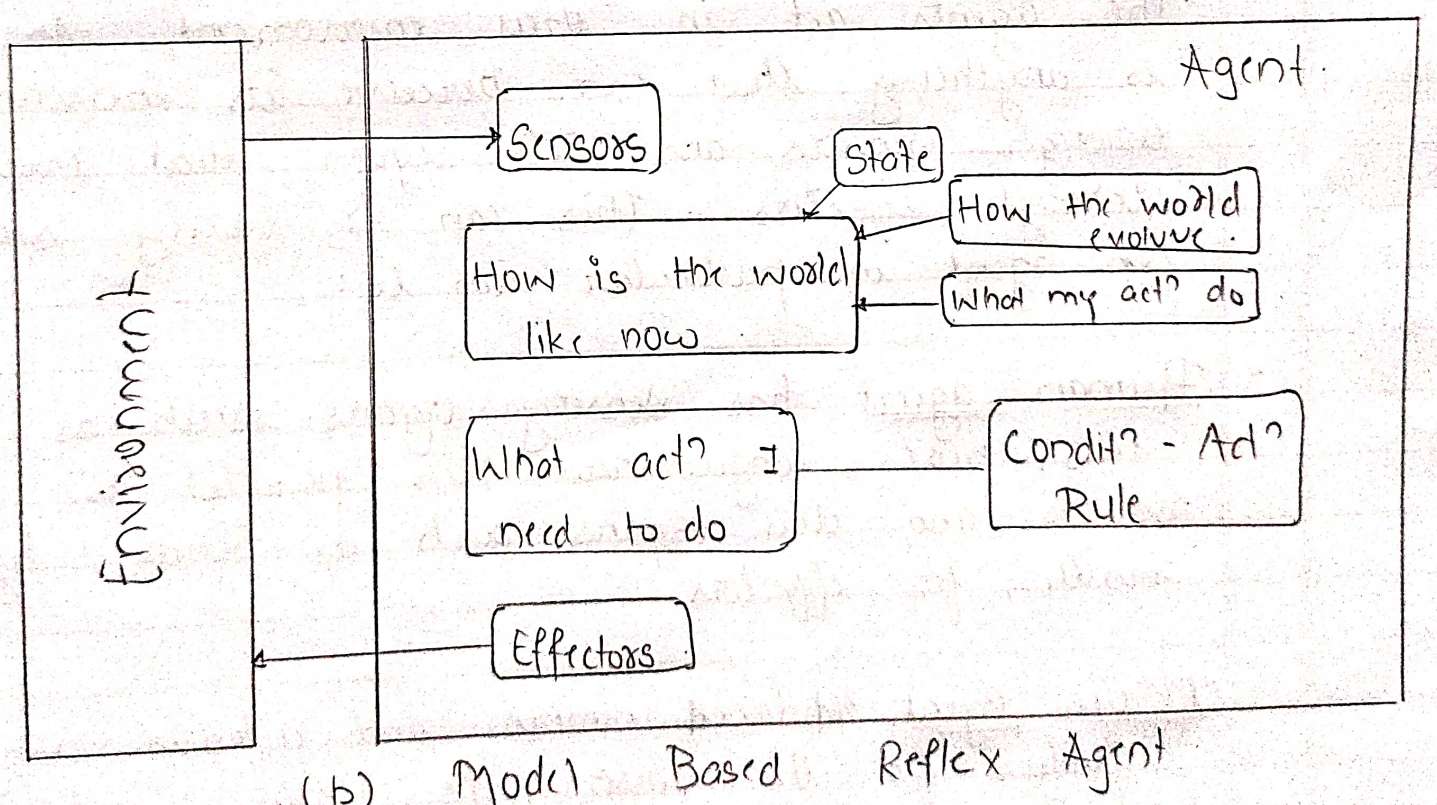

Sensors
Precepts
Environment
Effectors
Action

Agent Structure can be viewed as a combinat? of Agent architecture and Agent program. Agent Architecture refers to the machinery that an agent executes on whereas Agent Program is an implementat? of an Agent funct?.

Simple Reflex agent choose action only based on the current percept only. They are rational only if a correct decision is made only on the basis of current percept. Agent use a model of the world to choose their actions. They maintain an internal state as a persistent informat?. Here the model means knowledge about how the things happen in the world that is representat? of unobserved aspects of current state depending on percept history. Agent take into account, how its act? in order to achieve goals. Goal-based approach is more flexible than reflex agent since the knowledge supporting a decision is explicitly modeled, thereby allowing for modificat?. Goal is the descript? of desirable situat?. Finally, the Utility Based Agents choose act? based on a preference (utility) for each state. Goal are inadequate when there are conflicting goals, out of which only few can be achieved, goals have some uncertainty of being achieved and you need to weigh likelihood of success against the importance of a goal. On the other hand utility funct?



(a) Simple Reflex Agent



(b) Model Based Reflex Agent

funct° objectively map how much being in a particular state is desirable.

An AI agent is refferred to as Rational Agent. A rational agent always performs right action, where the right act° means the action that causes the agent to be most successful in the given percept sequence. The problem the agent solves is characterized by Performance Measure, Environment, Actuators, and Sensors (PEAS). These are collectively refered to a PEAS discript° for the agent task environment. PEAS descriptors provide important insight into agent and the task environment it operates in. These insights are very useful in agent design.

Another important piece of info is task environment properties. While analyzing task environment the agent architect needs to consider following properties:

1. Discrete or continuous - If there are a limitied no of distinct, clearly defined, states of the environment, the environment is discrete; otherwise it is continuous (For eg, automated driving)
2. Observable or Partially Observable - If it is possible to determine the complete state of the environment at each time pt from the

precepts it is Observable; otherwise it is only partially Observable.

3. Static or Dynamic - If the environment does not change while an agent is acting, then it is static; otherwise it is only partially observable.

4. Deterministic or Non-deterministic - If the next state and the act? of the agent, then the environment is deterministic; otherwise it is non-deterministic.

5. Episodic or Sequential - In an episodic environment, each episode of event consists of the agent perceiving and then acting. The quality of its action depends just on the episode itself. Subsequent episodes do not depend just on the actions in the previous episodes. Episodic environment are much simpler bcoz the agent does not need to think ahead. Eg: Part picking robots. Complementary to this sequential environment where act? dictates the future act?.

6. Single agent or Multiple agents - The environment may contain single agent or other agent which may be of the same or different kind as that of the agent. These agents may be co-operating or competing with each other.

7. Accessible or Inaccessible - If the agent's sensory apparatus can have access to the complete state of the environment, then the environment is

accessible to that agent.

Working :

Search internet for AI based applicat? in following scenarios and identify who is agent for that applicat?. Further list out PEAS descriptors for agent environment in each of the case. Finally try to classify task environment properties like a list of attributes from above list of 7 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 by Joseph Weizenbaum.
4. Automatic portfolio management.
5. Sophia is a social humanoid robot developed by Hong Kong based company Hanson Robotics.
6. AlphaGo is a computer program that plays the board game Go. It was developed by Alphabet Inc DeepMind lab in London.
7. Apples virtual assistance Siri.
8. Endurance : A companion for Dementia Patients.
9. Casper : Helping Insomniacs Get Through the Night.
10. Marvel : Guarding the Galaxy with Comic-Book Crossovers.
11. Automated cross word solver.