Tutorial No: 01

⇒ Aim :- Design of Intelligent Agent

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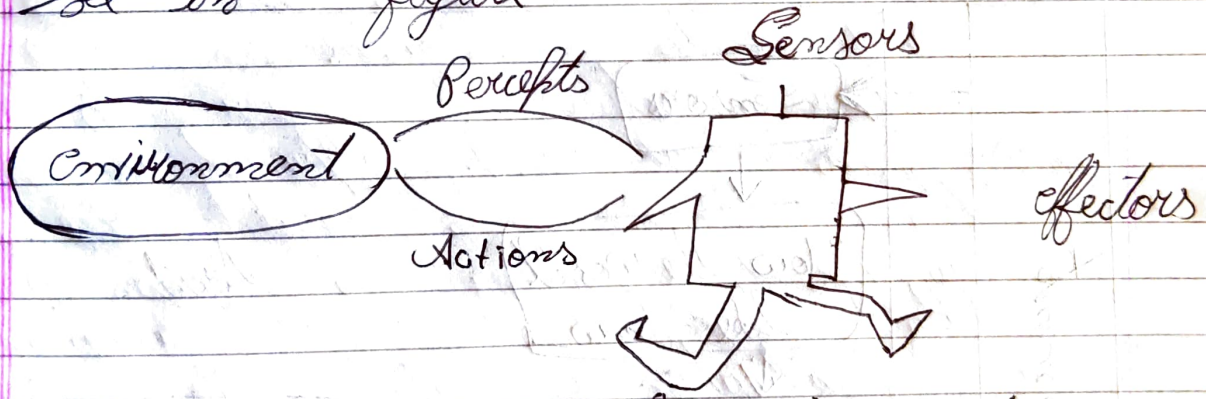
Tutorial 1: Design of Intelligent Agent

⇒ Aim :- To Understand the concept of Agent Abstraction by studying defination of Rational Agent, Agent environment, Task Environment Description, Environment Types.

+ Theory :- As an Artificial Intelligent (AI) System is composed of an agent and its Environment. The agents act in their environment. An agents is anything that can perceive its environment through sensors and acts upon that environment through effectors. This can be clearly see in figure.



AI Agent with Environment

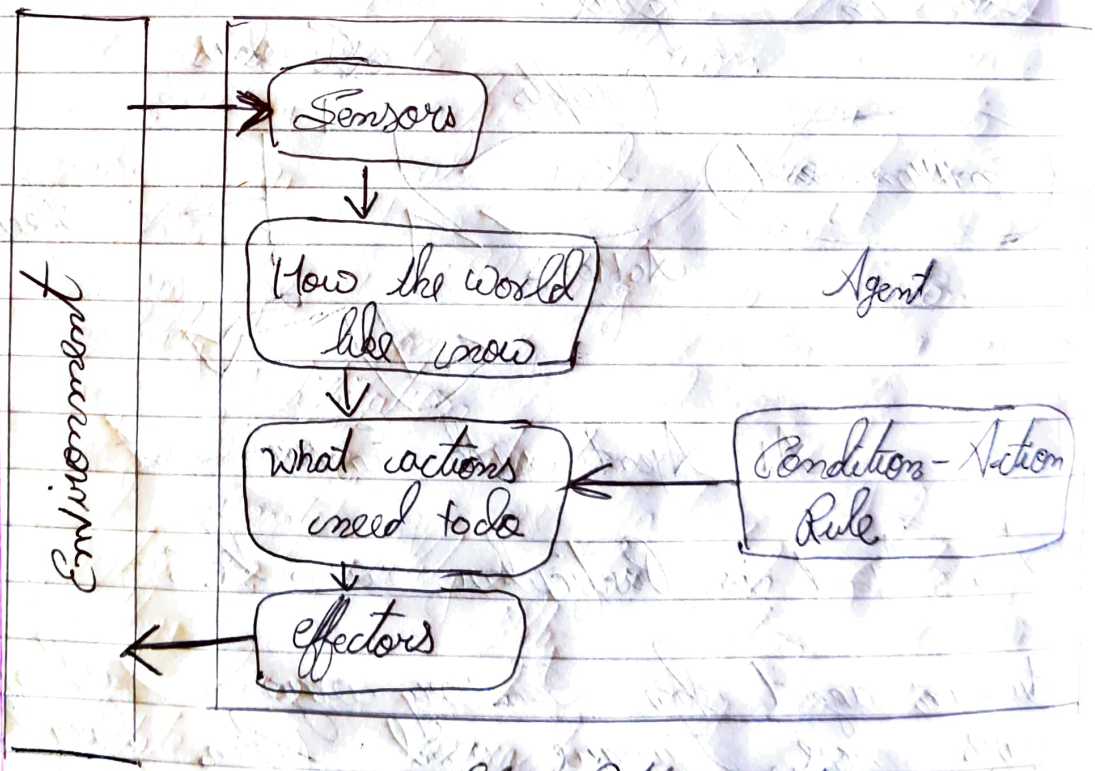
An Agent in Particular can be :-

- Human agent has Sensory organs such as eyes, ears, nose, tounge and skin parallel to the sensor, and other organs such as hands legs, mouth, for effectors.

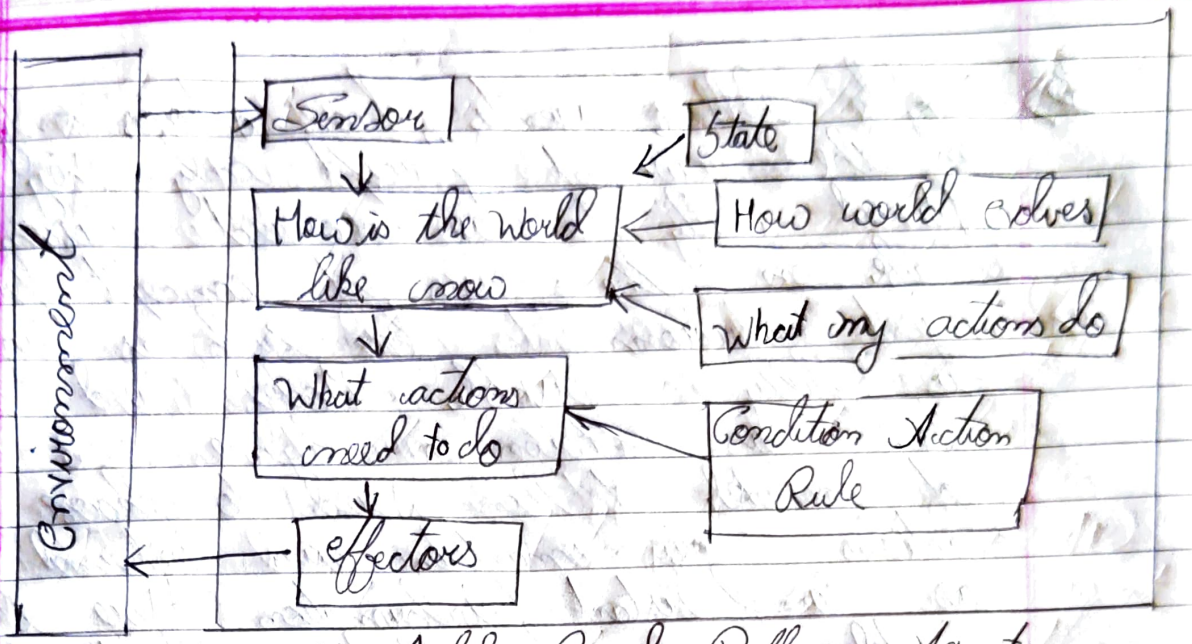
⇒ Robotic agent replaces cameras and infrared range finders for the sensors, and various motors and actuators for effectors.

⇒ Software Agent has encoded bit strings its programs and actions.

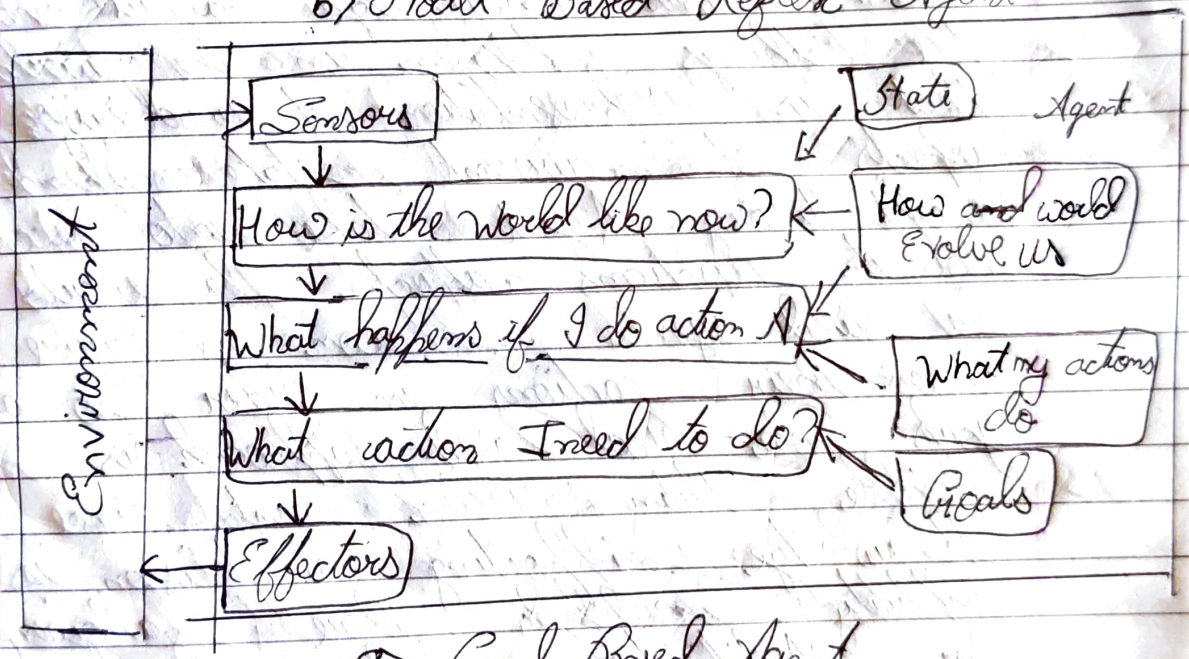
* Agent Structure :- Can be viewed as Combination of Agent architecture and Agent Program. Agent architecture can refers to the machinery that an agent executes on, whereas Agent program is an implementation of an agent function. Figure 2.4 for important types of agent architecture



a) Simple Reflex Agent



b) Model Based Reflex Agent



c) Goal Based Agent

⇒ Simple Reflex agents choose actions only based on the current percept only. They are rational only if a correct decision is made on the basis of concept percept. Agent environment for such as agent is fully observable. Model Based Reflex Agent As shown in figure 2B uses of model of the world to choose actions. They maintain an internal state as a persistant information. Here the model means knowledge about how the things happen in the world that is representation of unobserved aspects of current state depending on percept History. Agent take into account how its actions affect the world. Goal based agents shown in figure 2C choose their actions in order to achieve goals. Goal - Goal based approach is more flexible than reflex agent since the knowledge supporting a decision is explicity modeled, thereby allowing for modification. Goal is the description of desirable situation. Finally, the utility based agents choose action based on preference (ability) for each state. On the other hand utility function objectively measure how much being in a particular state is desirable.

An AI Agent is referred to a Rational agent. A rational agent always performs right actions, where the right actions means the action that causes the agent to be most sucessful in the given percept sequence. The problem the agent solve is characterized by performance measure Environment, Actuators, and Sensors (PEAS), These are collectively referred to as PEAS descripts for the agent task environment. These insights are very useful in agent design.

Another important piece of information is task environment properties while analyzing task environment the agent architect needs to consider following properties.

1) Discrete or Continous If there are a limited number of distinct, clearly defined states of the environment, the environment is discrete, otherwise it is continious for Example :- automated driving.

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 otherwise it is only partically observable.

3) Static or Dynamic if the environment does not while an agent is acting then its 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 determined otherwise it is non-deterministic.

5) Episodic or Sequential In an episodic environment each episode of event consist of the agent perceiving and the acting. The quality of its action depends just on episode itself. Subsequent episodes do not depend on the actions in the previous episodes.

6) Single agent or Multiple agents The environment may contain Single agent or other agents 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 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 applications in following Seneries & identify who is agent for that application. Fosthen list out PEAS descriptors for agent environment in each of the case. Finally try to classify task environment properties like a list of attribute from above lists of 7 task environment properties.

1) Autonomus 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.
4 Automatic Portfolio ~~Environment~~ management
5 Sophia is a Social Humanoid robot developed by Hong Kong based Company Hanson Robotics.
6 Alpha Go is a Computer program that plays.
7 Apple virtual assistant Siri.
8 Endwave: A companion for Dementia Patients.

9 Casper: Helping Insomniacs Get Through the night

10 Marvel: Guardian the Galaxy with Comic Book Crossover

11 Automated Cross word solver.

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