

Tutorial 1: Design of Intelligent Agent.

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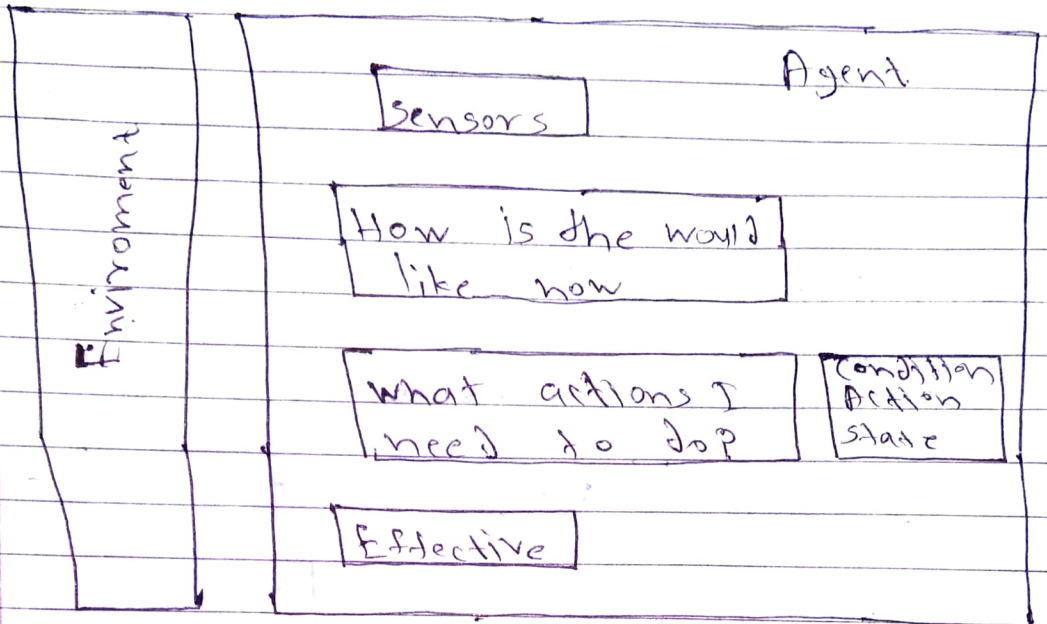
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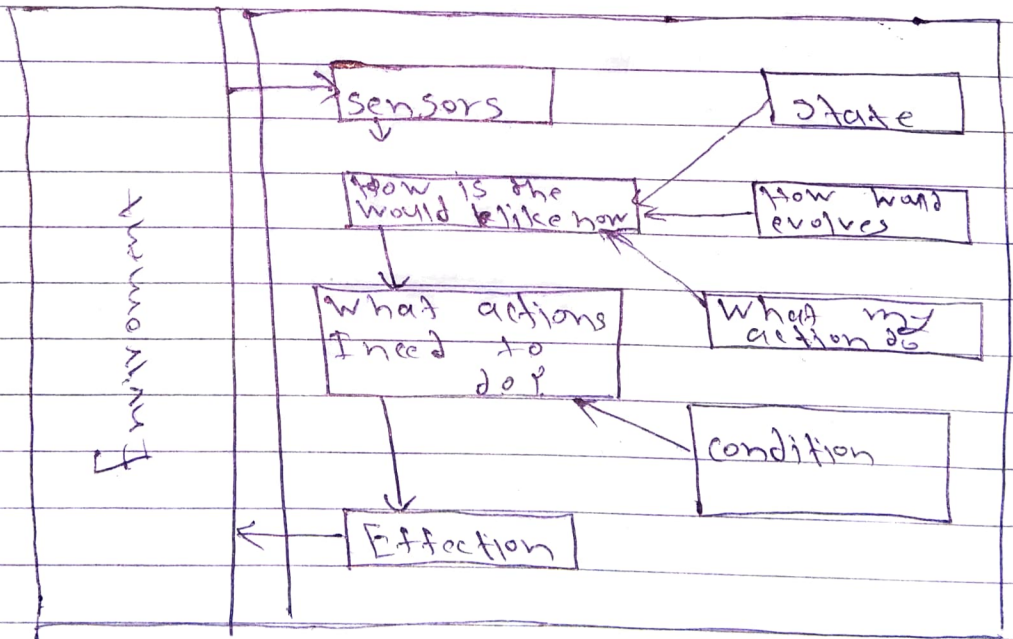
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Agent Architecture types

Simple Reflex Agent



Model based Reflex Agent



Tutorial 1: Design of intelligent agent

* **AIM:** To understand the concept of Agent authorization by studying definition of rational Agent, Agent environment, Task environment, Description, environment types

* **Theory:**

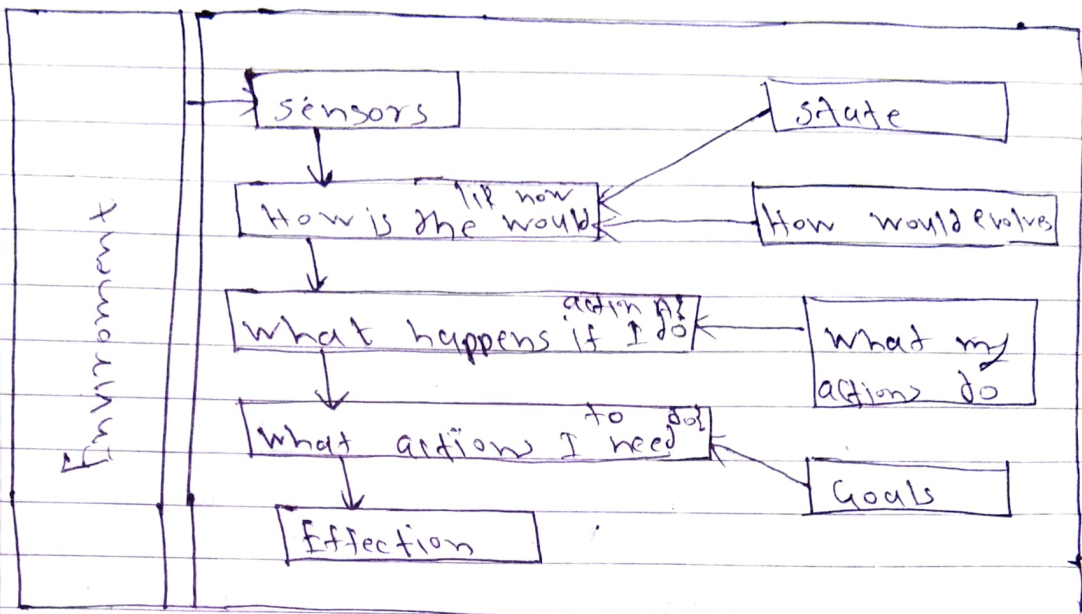
An Artificial intelligent system is composed of an agent and its environment. The agents act in their environment. An agent is anything that can perceive its environment through senses and acts upon that environment through effects.

An agent in particular can be Human agent: has sensory agent like eyes, ears and other agent like effectors.

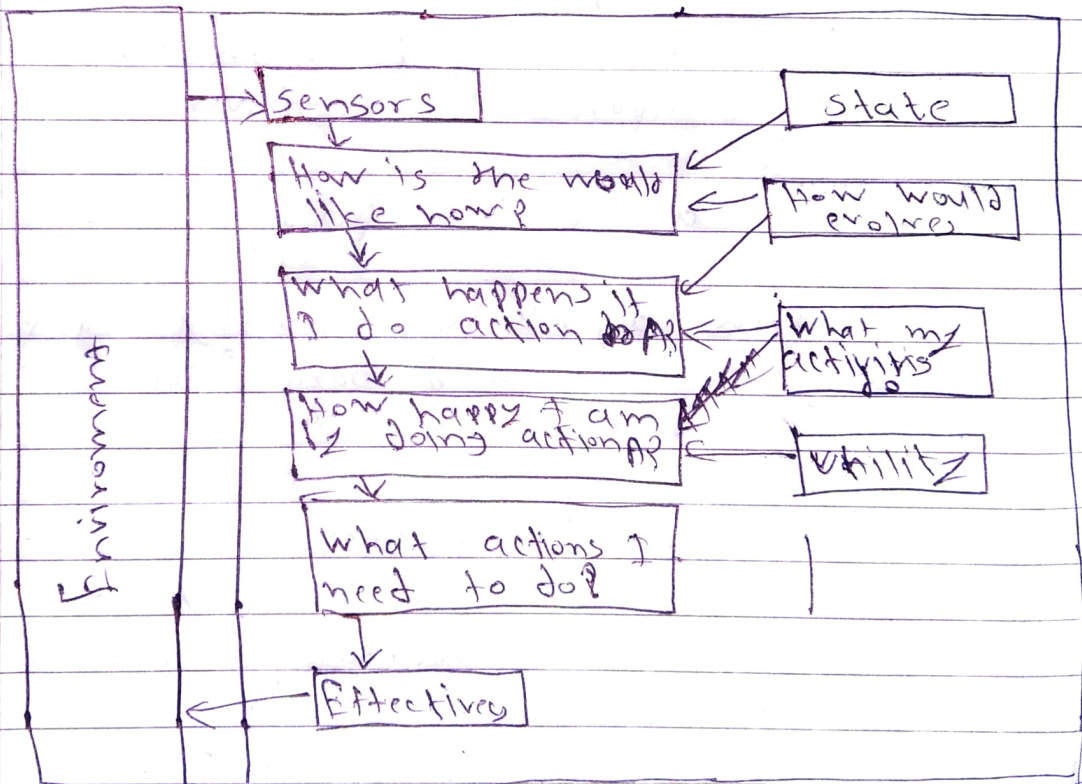
Robotic agent: Replaces cameras and manages finders for the sensors and various modules and actuators for effectors.

Software agent: Has encoded bit as its perceptions and action.

Goal based Agent



Utility based Agent



Simple Reflex Agents choose activities only based on the current percept only. They are rational only if a causal decision is made only or on the basis of current percept. Agent environment for such agents is fully observable.

Model based Reflex agents use a model of the world to choose their action. They maintain an internal state as a potential information. Hence the model means knowledge about how the things happen in the world that is representation of understanding aspects of current state depending on percept history. Agent takes into account how its actions affect the world.

Goal based agents choose their action in order to achieve goals. Goal-based approach is flexible than the reflex agent since the knowledge supporting a decision is explicitly modeled, thereby allowing for modification.

Utility based agents choose actions based on an utility for each state. Goals are inadequate when there are conflicting goals - out of which for only few can be achieved. Goals have some uncertainty of being achieved and you need to weight like either a success.

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sensors (PEAS). These are affectively referred to as PEAS descriptions while analyzing that environment the agent architect needs to consider following properties.

- 1) Discrete or continuous: If there are a limited number of distinct clearly defined states of the environment. The environment is discrete.
 - 1) observable or partially observable: If it is possible to determine the complete state of the environment at each time point from the percept.
- 2) static or dynamic: If the environment does not change while an agent is acting, then it is static.
- 3) Deterministic or non-deterministic: If the next state of the environment is completely determined by the current state and the action of the agent, then the environment is deterministic.
- 4) Episode or no-episode: In an episodic environment each episode or episode consists of the agent perceiving and then acting. The quantity or its actions depends on what on the episode itself.

6. Single agent or multiple agents:
The environment may contain multiple agents or then agents which may be of the same or different kind as that of agent.

These agents may be cooperating or competing with each other.
7. Accessible or Inaccessible: If the agent's sensory apparatus can have access to the complete status of the environment.

Working:

Search internet for all based applications in following scenarios and identify who is agent for that application, further list out PEAS descriptions for agent environment in each of the case. Finally try to classify task environment properties.

1. Deep Blue has playing computer program.

Performance measure: win/lose/draw,
Safety of chess pieces, safety of king piece not move, time you each move.

Environment: chess board, chess pieces
Actuators: - Push/pull server, cpu

Sensors :- chess Board

Task environment properties :- Discrete,
fully observable, static, deterministic

2. ELIZA, the MLP computer program
cleared from 1964 to 1966
at the MIT artificial intelligence
laboratory by Joseph

performance measure: understanding users
maintaining conversation Environment
users, program, keyboard, user text
impacts.

Actuators: Texts

sensors: user text inputs

Task environment properties: continuous,
fully observable, static, deterministic,

3) ~~sepi~~ Sophia is social humanoid developed
by hong kong based company
static.

performance measure: understanding user,
maintaining conversation, facial expression
response time

Environment: Humors, objects

Actuals: Arms, mouth, legs, speaker

sensors: Eyes, mic, audio-sensors

Task Environment property:-

continuous, fully observable, Dynamic,
Deterministic, sequential, Single Agent

4. Apple's Virtual Assistant

performance ~~have~~ measure: Understanding
uses text and speech providing
best results, Summing.

Environment: user, speech, text

Actual loss: mobile screen, speaker

Task Environment properties

continuous, fully observable, static,
deterministic, Episode single agent
accessible

5. Automated ~~Crossword~~ ^{Crossword} Solver

performance measure: understanding
chars, analyzing and usability editor
Time to solve

Environment: visibility letter, crossword

Actuators: Desktop screen, programmer
sensors: consumers board

Task Environment properties

Discrete, fully observable, static,
deterministic, single agent, Accessible.