CO541 – Assignment 2

# E/19/166

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1. **Agent**

An agent is an entity that can perceive its environment through sensors and acts upon that environment through actuators based on its goal. It can make decisions and perform actions to achieve its objectives. Examples of agents include robots, software programs like web crawlers, or even humans. The key aspect of an agent is its ability to take autonomous actions in order to achieve specific goals.

**Agent Function**

An agent function is the rule or set of rules that an agent follows to decide what actions to take based on its percepts. It’s essentially a mapping from percept sequences to actions. The agent function takes into account the agent’s history of percepts and decides the best action to take in response. The goal of the agent function is to enable the agent to act in a way that is most likely to achieve its objectives. The agent function is typically implemented as part of the agent program, which runs on the agent’s architecture (hardware).

**Agent Program**

An agent program is the actual code or software that implements the agent function. It’s the part of the agent that processes the percept sequence (the history of all that the agent has perceived) and decides on the action to take. The agent program runs on the physical hardware (or ‘architecture’) of the agent. It’s important to note that while the agent function is a theoretical concept (a mathematical function mapping percepts to actions), the agent program is a concrete implementation of this function in a specific programming language. It includes the algorithms and data structures needed to make the decision-making process efficient and effective. The design of the agent program depends on the nature of the percepts, the actions, the goals, and the environment in which the agent operates.

**Rationality**

Rationality refers to the quality of making decisions that are optimal or at least satisfactory given the available information and the agent’s goals. A rational agent is one that, given its perceptual inputs, makes decisions that maximize its chances of achieving its goals. This doesn’t necessarily mean that a rational agent always makes the “best” decision, as it may not have complete information or may be operating under constraints (like limited time or computational resources). Instead, rationality is about making the best decision possible given the circumstances. It’s important to note that different agents might have different goals, so what’s rational for one agent might not be rational for another.

**Autonomy**

Autonomy refers to the ability of an agent to operate independently, without the need for external control or intervention. An autonomous agent can make its own decisions and take actions based on its perceptions of the environment and its internal goals. It has the capacity to learn from its experiences and adapt its behavior over time. Autonomy is a key characteristic of intelligent systems, enabling them to handle complex, dynamic environments and to perform tasks without constant human supervision. Examples of autonomous systems include self-driving cars, autonomous drones, and certain types of AI software.

**Reflex Agent**

A reflex agent is a type of agent that makes decisions based on the current percept, without considering the history of past percepts. It responds immediately to stimuli from its environment. The decision-making process of a reflex agent is often simple and can be described by condition-action rules (also known as “if-then” rules). For example, a reflex agent in a video game might have a rule like “if an enemy is in sight, then attack”. While reflex agents can be effective in certain situations, their lack of memory or state can limit their ability to handle complex environments or tasks that require longer-term planning or reasoning.