Professional Certificate in AI-Driven Architectural Innovation

Autonomous Robots in Architecture

Action Selection: The process of choosing an action to perform in a given situation, often used in the context of autonomous robots. Related terms include decision-making, planning, and control. Action selection is a fundamental component of autonomous robots, allowing them to navigate and interact with their environment in a goal-directed manner.

AI: Artificial intelligence, the simulation of human intelligence in machines that are programmed to think and learn. In the context of autonomous robots, AI refers to the algorithms and techniques used to enable the robot to perceive, reason, and act in complex and dynamic environments.

Autonomous Robots: Robots that can operate independently and make decisions on their own, without the need for human intervention. Autonomous robots are often used in applications where human presence is not possible, such as in space exploration or underwater research. Related terms include robotic systems, robotic agents, and autonomous systems.

BDI: Belief-Desire-Intention, a computational model used to represent the decision-making process of autonomous agents. The BDI model includes three main components: beliefs (information about the world), desires (goals or objectives), and intentions (plans or actions taken to achieve the goals).

Computer Vision: The field of study concerned with enabling computers to interpret and understand visual information from the world, such as images and videos. In the context of autonomous robots, computer vision enables the robot to perceive and interpret its environment, allowing it to navigate and interact with objects.

Control Systems: The systems used to manage, regulate, and direct the behavior of a machine or process. In the context of autonomous robots, control systems refer to the algorithms and techniques used to manage the robot's movements and actions.

Decision-Making: The process of choosing among multiple alternatives in order to achieve a goal. In the context of autonomous robots, decision-making refers to the algorithms and techniques used to enable the robot to make decisions based on its perceptions, knowledge, and goals.

Embedded Systems: Computer systems that are integrated into larger systems or devices, often used in the context of autonomous robots. Embedded systems are designed to perform specific tasks and are typically optimized for low power consumption and high reliability.

Environment Perception: The process of using sensors and algorithms to gather information about the environment and interpret that information in a meaningful way. In the context of autonomous robots, environment perception enables the robot to understand its surroundings and make decisions based on that understanding.

Human-Robot Interaction: The study of how humans and robots can interact and communicate effectively. In the context of autonomous robots, human-robot interaction is concerned with developing interfaces and communication methods that allow humans to interact with robots in a natural and intuitive way.

Intelligent Systems: Systems that are capable of learning, reasoning, and making decisions based on their environment and goals. In the context of autonomous robots, intelligent systems refer to the algorithms and techniques used to enable the robot to operate autonomously and adapt to changing conditions.

Knowledge Representation: The way in which information is stored and organized in a computer system. In the context of autonomous robots, knowledge representation refers to the methods used to store and retrieve information about the world, such as maps, object models, and rules.

Machine Learning: A subfield of AI concerned with developing algorithms that allow computers to learn from data and make predictions or decisions based on that learning. In the context of autonomous robots, machine learning is used to enable the robot to learn from its experiences and adapt to new situations.

Motion Planning: The process of determining the sequence of movements required to achieve a desired goal. In the context of autonomous robots, motion planning is used to enable the robot to navigate through its environment and reach its destination.

Navigation: The process of moving from one place to another in a goal-directed manner. In the context of autonomous robots, navigation refers to the algorithms and techniques used to enable the robot to move through its environment and reach its destination.

Planning: The process of determining the sequence of actions required to achieve a desired goal. In the context of autonomous robots, planning is used to enable the robot to determine the best course of action to take in a given situation.

Probabilistic Robotics: The use of probability theory and statistical methods in the design and operation of autonomous robots. Probabilistic robotics is used to enable the robot to make decisions and predictions based on uncertain or incomplete information.

Robot Operating System (ROS): An open-source framework for developing robotic applications. ROS provides a collection of tools and libraries for building complex robotic systems, including support for multiple sensors, actuators, and communication protocols.

Robotics: The field of study concerned with the design, construction, and operation of robots. In the context of autonomous robots, robotics refers to the algorithms and techniques used to enable the robot to perceive, reason, and act in complex and dynamic environments.

SLAM: Simultaneous Localization and Mapping, the process of creating a map of an environment while simultaneously determining the robot's location within that environment. SLAM is used to enable the robot to navigate and interact with its environment in a goal-directed manner.

Sensors: Devices used to measure physical quantities and convert them into electrical signals. In the context of autonomous robots, sensors are used to gather information about the environment and the robot's

internal state.

Swarm Robotics: The study of how large groups of autonomous robots can work together to achieve a common goal. Swarm robotics is based on the principles of self-organization and emergent behavior, and is used to enable the robot to operate in complex and dynamic environments.

Teleoperation: The remote control of a machine or process by a human operator. In the context of autonomous robots, teleoperation is used to enable humans to interact with the robot and control its actions from a distance.

Unmanned Aerial Vehicles (UAVs): Also known as drones, UAVs are autonomous aerial vehicles used for a variety of applications, including surveillance, delivery, and reconnaissance.

Unmanned Ground Vehicles (UGVs): Autonomous vehicles that operate on the ground, used for a variety of applications, including transportation, exploration, and delivery.

Unmanned Surface Vehicles (USVs): Autonomous vehicles that operate on the surface of water, used for a variety of applications, including marine research, surveillance, and transportation.

Vision-Based Navigation: The use of computer vision to enable a robot to navigate and interact with its environment. Vision-based navigation is used to enable the robot to understand its surroundings and make decisions based on that understanding.

Waypoint: A specific location or point that a robot must reach as part of its mission or task. Waypoints are used to guide the robot's movements and ensure that it reaches its destination.