Pre-requisites

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Theory:

What is Robotics?

Robotics is the interdisciplinary field focused on designing, building, and operating robots. It combines elements of computer science, engineering, and artificial intelligence to create machines that can perform tasks, either autonomously or with human guidance. These robots are used in a wide range of applications, from manufacturing and healthcare to space exploration.

Robotics combines:

- Mechanical engineering (building the physical structure),
- Electrical engineering (powering and controlling the robot),
- Computer science (programming the robot's behavior and decision-making),
- Artificial intelligence (making robots smarter and able to learn or adapt).

What are the companies hiring robotics engineers?

Companies in India:

ABB: A global leader in electrification and automation, known for its industrial robots and automation solutions.

FANUC: A leading manufacturer of industrial robots and factory automation equipment.

KUKA: Another major player in industrial robotics, offering a wide range of robotic solutions.

YASKAWA India: Part of the global YASKAWA Electric Corporation, specializing in robotics and automation.

Kawasaki Robotics: Offers a variety of industrial robots for diverse applications.

Tata Consultancy Services (TCS): A major IT services and consulting company with a growing focus on robotics and automation.

Infosys: Another leading IT company with a strong presence in robotics and automation solutions.
L&T Technology Services: Offers engineering and R&D services, including robotics and automation.
Amazon: Actively hiring for robotics engineers in its India operations.

Global Companies:

Tata Consultancy Services: A large IT services and consulting company with a significant presence in robotics engineering.
Wipro: Another major IT services company with a strong focus on digital transformation, including robotics.
Google: A tech giant known for its research and development in robotics and AI.
ABB: A leader in automation and robotics with diverse applications.
FANUC: A global leader in industrial automation, including robotics.
Johnson & Johnson: A large healthcare company that utilizes robotics in various applications.
NASA: The National Aeronautics and Space Administration, a top employer for robotics engineers in the aerospace sector.
Boston Dynamics: A company known for its advanced robotics research and development, particularly in mobile robots.
Anduril: A defense technology company that employs robotics in national security.

Popular Robotics Software

1. ROS (Robot Operating System)

- An open-source framework widely used for robot programming.
- Provides tools and libraries for hardware abstraction, device control, simulation, and more.
- Supports many types of robots and sensors, making development faster and modular.

2. Gazebo

- A powerful robot simulation tool often used alongside ROS.
- Allows testing robot models and environments in 3D before real-world deployment.
- Supports physics engines to simulate realistic movement and interactions.

3. MATLAB/Simulink

- Used for algorithm development, system modeling, and simulation.
- Offers toolboxes specifically designed for robotics and control systems.
- Widely used in academia and industry for prototyping and control design.

4. V-REP / CoppeliaSim

- A versatile robot simulation software that supports complex scenarios.
- Enables multi-robot simulation and easy integration with external programs.

What are the simulations being used ?

Gazebo: A powerful simulation tool that offers a robust physics engine and high-quality graphics, ideal for testing robotic algorithms and sensor simulations.
MATLAB/Simulink: A versatile environment for simulation and model-based design, widely used for algorithm development, data analysis, and visualization.
Robot Operating System (ROS): An open-source framework that provides libraries and tools to help software developers create robot applications, including simulation capabilities.

Conclusion:

Robotics is a multidisciplinary field that combines engineering and AI to create machines capable of performing automated tasks. It plays a key role in industries like manufacturing, healthcare, and logistics, supported by advanced software and simulation tools for development and testing.