

Applications of Robotics

- Top 10 Applications in Real-World Scenarios

Applications of Robotics

	Security Robots serve as security agents, providing real-time intelligence and addressing crimes		Underwater Exploration Robots collect data and images in deep ocean areas
	Space Exploration Robots perform tasks in space such as collecting samples and repairing spacecraft		Food Preparation Robots cook complete meals using a variety of recipes
	Entertainment Robots manage camera work, provide special effects, and perform stunt work		Manufacturing Robots automate repetitive and hazardous tasks in manufacturing
	Agriculture Robots are used for harvesting crops, weed removal, and improving efficiency		Military Robots are deployed for surveillance, combat, and medic assistance
	Health Care Robots assist in surgeries, serve as prosthetics and aid in rehabilitation		Customer Service Humanoid robots interact with customers in high-visibility areas

1. Security

- Robots can serve as security agents, providing real-time intelligence.
- Example: Knightscope robots used for crime prevention in the USA.

2. Space Exploration

- Used by organizations like NASA to collect samples and repair spacecrafts.
- Example: Mars Rover captures and sends images of Mars.

3. Entertainment

- Robots assist behind the scenes in movies, manage cameras, do stunts, and enhance theme park experiences.
- Example: Disney uses robots in theme parks.

4. Agriculture

- Robots automate harvesting and weed control, improving efficiency.
- Example: Ecorobotix, a solar-powered robot for precise weed spraying.

5. Health Care

- Robots aid in surgery, therapy, and rehabilitation.
- Example: da Vinci robot for heart and brain surgeries, robotic exoskeletons.

6. Underwater Exploration

- Robots are used to explore ocean depths that are inaccessible to humans.
- Example: Remote-controlled robots collect underwater data.

7. Food Preparation

- Robots prepare complete meals using various recipes.
- Example: Moley Robotics' robot chef with a full robotic kitchen.

8. Manufacturing

- Robots automate repetitive and hazardous tasks like welding, assembly, and packaging.
- Improves precision and safety.

9. Military

- Robots are used for surveillance, combat, and medical aid.
- Examples: MAARS (armed robot), DOGO (combat robot with camera and pistol).

10. Customer Service

- Humanoid robots offer personalized service in high-visibility areas.
- Examples: Nadine (Singapore), Junko Chihira (Japan).

AI in Logistics

- 1. Route Optimization:
 - AI helps find the most efficient delivery routes.
 - Example: Ride-sharing apps like Uber, and Google Maps.
- 2. Demand Forecasting:
 - Machine learning models predict product demand trends.
- 3. Warehouse Automation:
 - AI robots sort, pack, and manage inventory in warehouses.
- 4. Real-time Decision Making:
 - AI systems respond to dynamic conditions (traffic, weather).

Real-World Example: DART

- DART (Dynamic Analysis and Replanning Tool) was used in the 1991 Gulf War.
- Managed logistics for 50,000 vehicles and personnel.
- Automated scheduling, route planning, and resource allocation.
- Saved significant time and improved efficiency.

AI in Expert Systems

- 1. Knowledge-Based Systems:
- Encode expert knowledge into rules.
- 2. Inference Engines:
- Reason using facts and rules to reach conclusions.
- 3. Applications:
- Medical Diagnosis (e.g., MYCIN)
- Chemistry Analysis (e.g., DENDRAL)
- Computer Configuration (e.g., XCON/R1)

Notable Expert Systems

- DENDRAL: Analyzed chemical compounds using mass spectrometry data.
- MYCIN: Diagnosed bacterial infections and recommended antibiotics.
- XCON/R1: Configured DEC computer systems automatically, saving millions.

Advantages of Expert Systems

- Consistency and Accuracy
- Available 24/7
- Reduces workload on human experts
- Cost-effective for repetitive, rule-based decisions