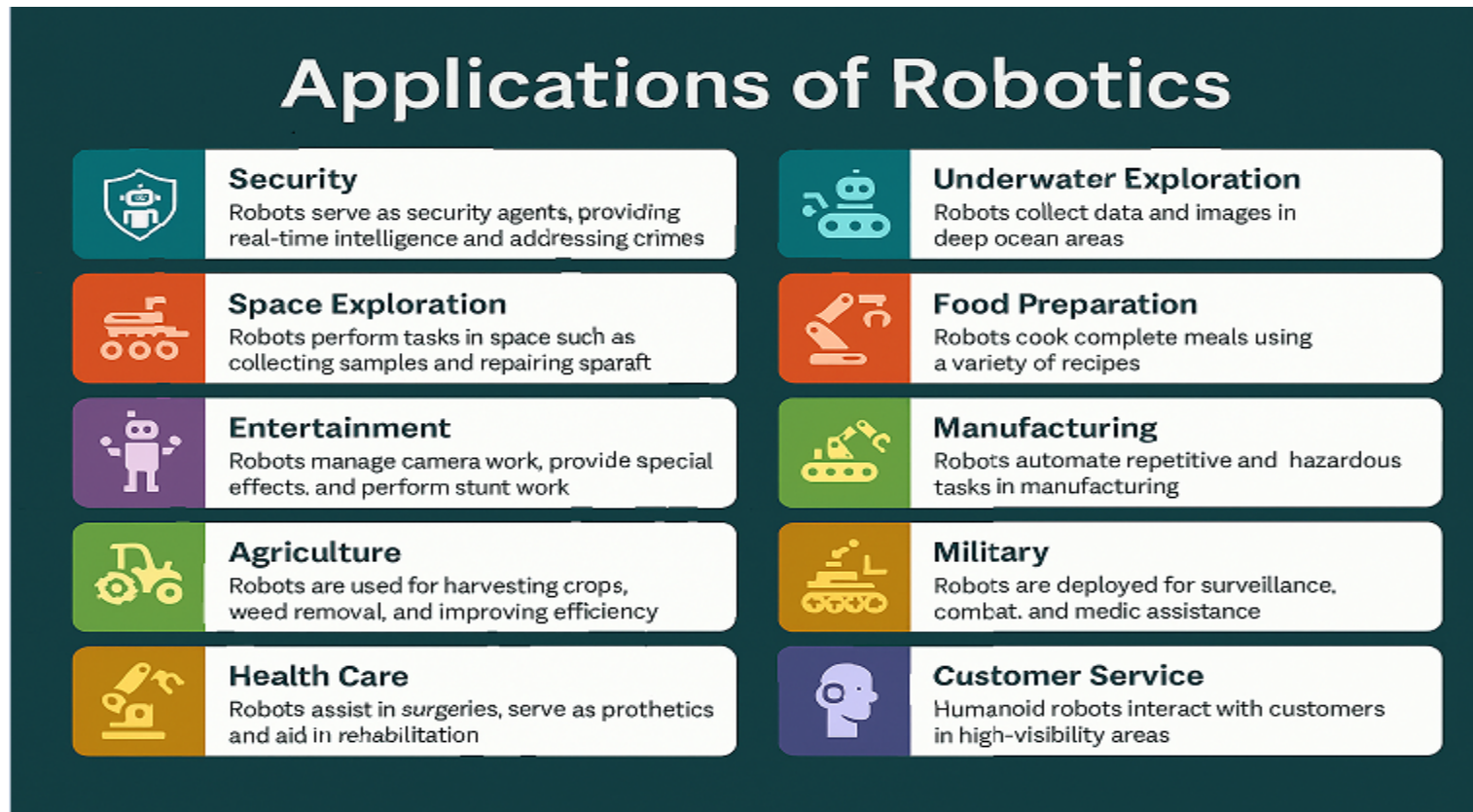


# Applications of Robotics

- Top 10 Applications in Real-World Scenarios



# 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