



# AI IN ROBOTICS

## Trends, Challenges, Commercial Applications

### BENEFITS OF AI

AI is accelerating the next wave of robotics. While it is not new to robotics, it now becomes more capable and accessible, integrating AI into robotics enhances capabilities, increases efficiency and improves adaptability.

### INDUSTRIES AT THE FOREFRONT

Logistics and warehousing



Automotive Industry



Electronics



General manufacturing industries



Service sector

### MACROECONOMIC TRENDS

ECONOMIC AND SOCIAL PRESSURE

LABOR SHORTAGES

INVESTMENT AND STRATEGIC

IMPORTANCE

SAFETY AND GOVERNANCE

CYBERSECURITY



### SAFETY AND SECURITY ASPECTS

CYBERSECURITY

DATA PRIVACY AND PROTECTION

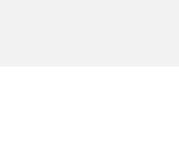
TRANSPARENCY, ACCOUNTABILITY

AI MODEL INTEGRITY

PHYSICAL SAFETY & HUMAN INTERACTION RISKS

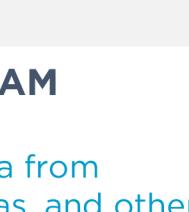
### COMPUTER VISION

Enables robots to see and interpret visual data for object recognition, sorting, barcode reading, and real-time production monitoring.



### SUPERVISED LEARNING

Uses labeled data for defect detection, predictive maintenance, quality inspection, and process optimization.



### NATURAL LANGUAGE PROCESSING



Allows robots to understand and respond to spoken or written commands in human-robot interaction.

### REINFORCEMENT LEARNING

Supports motion and path planning, grasping, and adaptive control through trial-and-error learning in dynamic environments.



### SENSOR FUSION & SLAM



Combines data from LiDAR, cameras, and other sensors to enable navigation and mapping in warehouses and factories

### GENERATIVE AI

Enables robots to generate code for entire functions based on natural language instructions



### AI IS RESHAPING WORK

#### SHIFT IN WORK ROLES

Increasing demand for digital and cognitive skills.

#### WORKPLACE TRANSFORMATION

Reshaping teamwork and decision-making

#### BOOSTING PRODUCTIVITY AND GROWTH

#### CONTINUOUS RESKILLING AND UPSKILLING NEEDED

### ADDRESSING SUSTAINABILITY

- Enabling the **Green Transformation**
- Addressing & mitigating the **ecological costs** of AI
- Energy efficiency**: reducing energy consumption of robots
- Waste reduction** & circular economy
- Longevity**, maintenance & reliability



### FULL POSITION PAPER



### CASE STUDIES & SUCCESS STORIES

