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# From Robots to Cobots

An overview of the evolution and collaboration of robotic systems



## Difference Between a Machine and a Robot

- A machine performs tasks based on mechanical or electrical operations without real-time sensing.
- A robot is a programmable machine capable of sensing, processing, and acting in real-time.
- Robots can adapt to environments and make decisions using sensors and software.
- Example of a machine: a sewing machine, fan, or car engine.
- Example of a robot: a robotic vacuum, factory arm robot, or humanoid robot.

# What Makes a Robot?

- Must continuously sense the environment using sensors (e.g., camera, lidar, proximity sensors).
- Maintains speed and accuracy for repeated tasks.
- Follows a pre-defined program but adapts based on sensor inputs.
- Example: An assembly line robot senses object placement and adjusts accordingly.

# Identifying Machines vs Robots

- Machines lack sensors and real-time decision-making.
- Robots interact dynamically with their environment.
- Illustration Example: A washing machine vs. a robotic arm that sorts items based on color.

# What are Cobots?

- Cobots (Collaborative Robots) are designed to work alongside humans.
- They include human interaction in the control loop.
- Cobots are often part of a multi-robot system.
- They prioritize safety, ease of use, and adaptability.

## Difference Between Cobots and Robots

- Cobots are safe to interact with humans; robots often work in isolation.
- Cobots require minimal programming; robots are often pre-programmed.
- Cobots learn from demonstration; robots follow strict algorithms.
- Cobots share workspace with humans; robots have restricted zones.

## Cobots vs Robots

Feature	Cobots	Traditional Robots
Work Speed	Lower (for safety)	High-speed operations
Ease of Use	User-friendly, easy to program	Requires skilled programming
Flexibility	Easily adaptable, can work in multiple roles	Rigid and task-specific
Safety	Built-in safety features	Requires safety cages
Cost	More affordable	Expensive and requires additional infrastructure
Human Collaboration	Designed to work alongside humans	Typically isolated from human workers
Ideal Applications	Small businesses, dynamic environments	High-speed and high-accuracy manufacturing

# Importance of Cobots

- Increase productivity while ensuring human safety.
- Support human workers in complex tasks without replacing them.
- Flexible in industries like manufacturing, healthcare, and logistics.
- Improve efficiency and reduce fatigue or repetitive strain on workers.



# From Robots to Cobots – A Progression

- Traditional robots revolutionized automation with precision and speed.
- Limitations: lack of adaptability, no human interaction.
- Cobots introduce collaboration, flexibility, and learning capabilities.
- Represent the next step in intelligent and interactive automation.