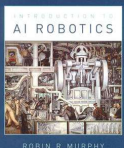# 2 A Brief History of AI Robotics

- Chapter Objectives
  - Have a feel for the history of robotics and how the different approaches to intelligence arose.
  - Be able to describe the difference between designing a robot as a tool, agent, or joint cognitive system in terms of the use of artificial intelligence.

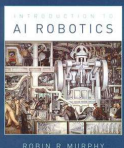# 2 Robots as Tools, Agents, or Joint Cognitive Systems

- Historically, designers have assumed robots were either tools, agents, or joint cognitive systems.
  - These initial assumptions impact whether artificial intelligence is use.

- A robot is often treated as a tool, that is a device that can perform specific, often highly limited or specialized, functions.
  - A welding robot is an example of a robot as a tool.
  - The design process concentrates on how the robot can be optimized to perform a specific function.
  - For tool design, artificial intelligence is often considered superfluous.
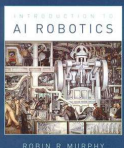
2 Robots as Tools, Agents, or Joint Cognitive Systems (Cont.)

- The opposite of treating a robot as a tool is to treat it as an agent
  - An entity that can sense its surroundings and take actions that change the environment.
  - A robot vacuum cleaner is an example of an intelligent physically situated agent.
  - The design process for an agent concentrates on how the agent will interact with the world, particularly via sensing and planning, and how it can adapt to new, but often similar, tasks or situations.
  - As a result, artificial intelligence is used to provide the needed functionality.

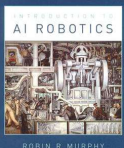# 2 Robots as Tools, Agents, or Joint Cognitive Systems (Cont.)

- A newer approach, *joint cognitive systems*, treats a robot as part of a human-machine team.
  - The intelligence is synergistic, arising from the contributions of each agent.
  - Self-driving cars, where a person turns on and off the driving, is an example of a joint cognitive system.
  - The design process concentrates on how the agents will cooperate and coordinate with each other to accomplish the team goals.
  - Joint cognitive systems approaches treat robots as helpers such as service animals or sheep dog.
  - Artificial intelligence is used along with human-robot interaction principles to create robots that can be intelligent enough to be good team members.
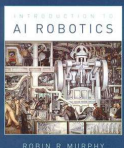
2   The Move to Joint Cognitive Systems

- Three reasons for the move to joint cognitive system design for all applications
  - Robots are now being used for tasks that involve humans
    - Autonomously driven cars
    - Eldercare robots
  - Recent applications of robots have led to barriers and frustrations.
    - Increased overall manpower with using drones
    - More than 50% of the failures were due to human errors
  - Every conceivable application of a robot has a human in the system somewhere.

Timeline of major milestones in intelligent robotics

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