



Introduction to Robotics

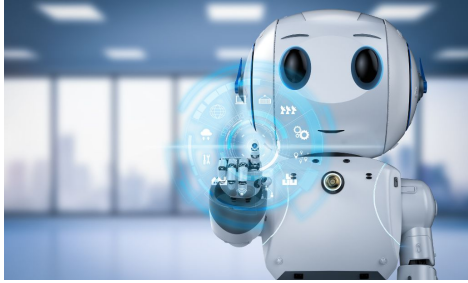
CSE 461

Lecture 1: Chapter 1(Introduction to robotics: basics)

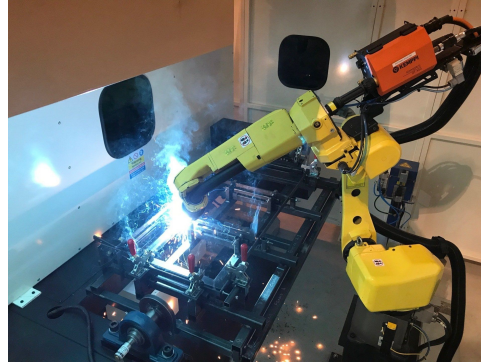
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Thanks to-

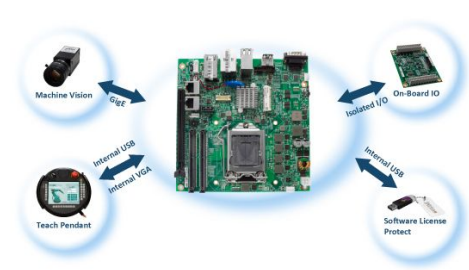
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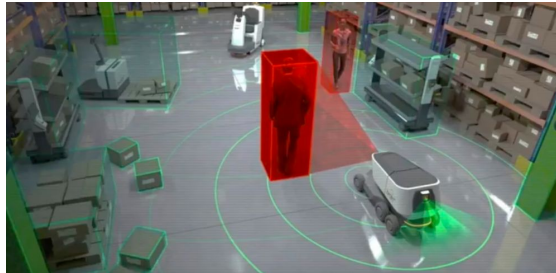
Chapter 1: Robotics Basics



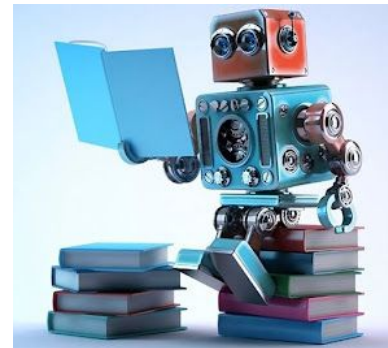
Chapter 2: Introduction to Industrial Arm



Chapter 3: Control System



Chapter 4: Robot Navigation



Chapter 5: Robot Learning

Syllabus

| Chapter | Description | Class |
|---|---|----------------|
| 1 . Robotics Basics | Definition of Robot, Robotics, Robotcity, Autonomy, Laws of Robotics, Types of robots, Paradigms, Subsystem | 1 - 4 |
| 2 . Introduction to Industrial Arm | Manipulator Types, Forward Kinematics, Inverse Kinematics | 5 - 8 |
| 3 . Control System | Types of Control, Block diagram solving, PID control, Fuzzy Logic Control | 9 - 12 |
| 4. Robot Navigation | Path Planning, Localization, Mapping, Exploration | 13 - 14 |
| 5 . Robot Learning | Machine Learning Reinforcement Learning Computer Vision | 15 - 18 |

Marks Distribution

- Quizzes/Class Tests: **15%**
- Assignment and surprise test: **5%**
- Attendance : **5%**
- Mid Term Examination: **20%**
- Final Examination: **30%**
- Lab: **15%**
- Project: **10%**
- Total: **100%**

What is a robot?

What is a robot?

An **embodied** agent that can be **programmed** to perform **physical** tasks.

What is a robot?

- Ultimately, all proposed definitions have some issues
- Is this a robot?



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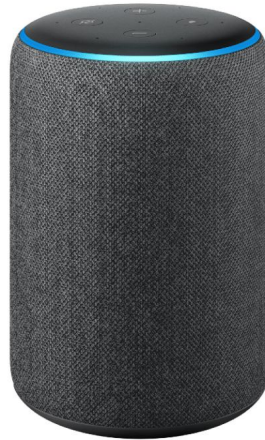
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Degrees of *roboticity*?

An embodied agent that can be programmed to perform physical tasks

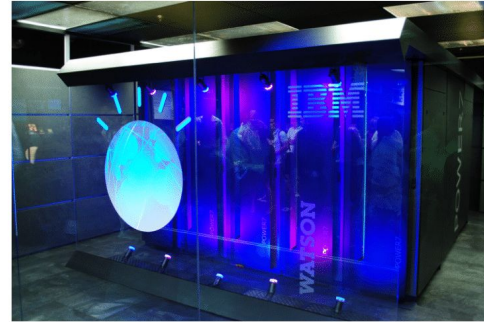
- Lack of universally acceptable definition hints at some deep philosophical questions
- Could also be an indicator of the youth of the field
- Probably need to measure degree of “*roboticity*”
 - In terms of degree of embodiment, autonomy, complexity, programmability, ...
 - But we don't have formal definitions for these concepts

Robotics

Robotics is a branch of engineering and computer science that deals with the [design, construction, operation, and use of robots](#).

Robotics vs. Artificial Intelligence

- This is something most roboticists agree on
- A robot needs to be embodied
- Artificial Intelligence (AI) need not be embodied

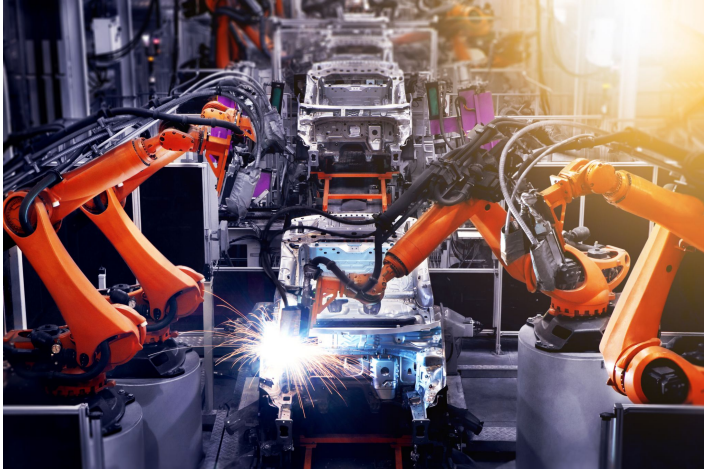


AI is Replacing Us!

- ✓ AI can now make reasoning better than human , with long context documents
- ✓ **AlphaProof by DeepMind** → solved 4/ 6 IMO problems 2024, equivalent to silver medalist
- ✓ **OpenAI's o3 Model:** Codeforces ranking 2727! Better than 99.8% human

| Statistic | Source |
|--|------------------------------|
| 92% of IT jobs will be transformed by AI, with mid-level (40%) and entry-level (37%) positions experiencing the most significant changes. | CIO.com |
| 300 million jobs could be displaced globally by AI by 2030. | Litslink.com |
| 14% of workers have already experienced job displacement due to AI. | SEO.ai |
| Demand for AI-related roles (e.g., data scientists, software engineers, machine learning engineers) has more than doubled over the past three years and is expected to continue growing. | Brainhub.eu |

AI + Robotics?



How Robots Are Used Across Industries

- Industrial
- Farming and Agriculture
- Healthcare
- Logistics
- Family Robots

Think of some features for your own family
robot !

https://www.youtube.com/watch?v=-e1_QhJ1EhQ

Next Class

- Laws of Robotics
- Primitives
- Paradigms

Thank You