



Introduction to Robotics

CSE 461

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

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Marks Distribution

- Quizzes/Class Tests: **15%**
- Attendance : **5%**
- Mid Term Examination: **20%**
- Final Examination: **35%**
- Lab: **15%**
- Project: **10%**
- Total: **100%**

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. Trajectory Planning and Wrists mechanism	Joints space, Linear Path Planning, Non Linear Path Planning	9 - 10
4 . Control System	Types of Control, Block diagram solving, PID control, Fuzzy Logic Control	11 - 13
5. Robot Navigation	Path Planning, Localization, Mapping, Exploration	14 - 15
6 . Robot Learning	Machine Learning Reinforcement Learning Computer Vision	16 - 18

What is a robot?

What is a robot?

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

What is a robot?

"A **reprogrammable, multifunctional manipulator** designed to **move material, parts, tools, or specialized devices** through various programmed motions for the performance of a variety of task."

[Robot Institute of America, 1979]

"An **automatic device** that performs functions normally **ascribed to humans or a machine in the form of a human.**"

[Webster's Dictionary]

"a **reprogrammable** manipulator device"

[British Department of Industry]

"Robotics is that field concerned with the **intelligent connection of perception to action.**"

[Mike Brady]

What is a robot?

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



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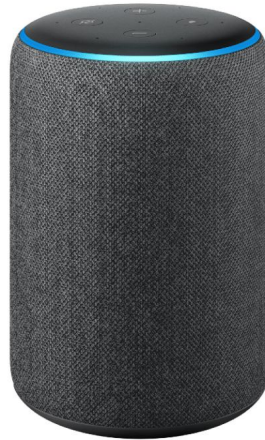
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Degrees of *roboticity*?

An embodied agent that can be programmed to perform physical tasks

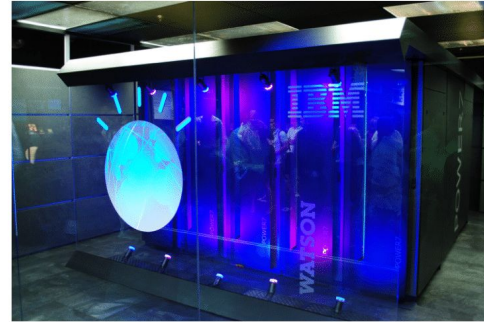
- Lack of universally acceptable definition hints at some deep philosophical questions
- Could also be an indicator of the youth of the field
- Probably need to measure degree of “*roboticity*”
 - In terms of degree of embodiment, autonomy, complexity, programmability, ...
 - But we don't have formal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









<https://www.ubs.com/global/en/investment-bank/in-focus/research-focus/china-360/2020/warehouse-robotics.html>

How Robots Are Used Across Industries

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

Think of some features for your own family
robot !

Next Class

- Laws of Robotics
- Primitives
- Paradigms

Thank You