



Robotic systems control

Just an introduction



Last update: September 30, 2024

Agenda

- Short introduction
- History of robots
- Types of robots
- Course overview
- Practicalities and evaluation



Introduction



Introduction

Name: Tassos Natsakis



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Name: Tassos Natsakis

Citizenship: Greek



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a



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Introduction

Name: Tassos Natsakis

Citizenship: Greek

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Mechanical engineering (AUTh)

α



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Mechanical engineering (AUPh)

Biomedical engineering (KU Leuven)

α



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Name: Tassos Natsakis

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Mechanical engineering (AUTh)

Biomedical engineering (KU Leuven)

Robotics and Non-linear control (UTCluj)

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Robots

A brief history

Etymology:

Hint: every word comes from the Greek



Robots

A brief history

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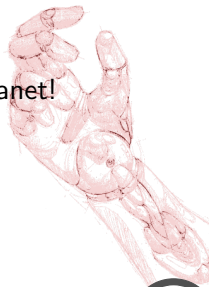
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Robots

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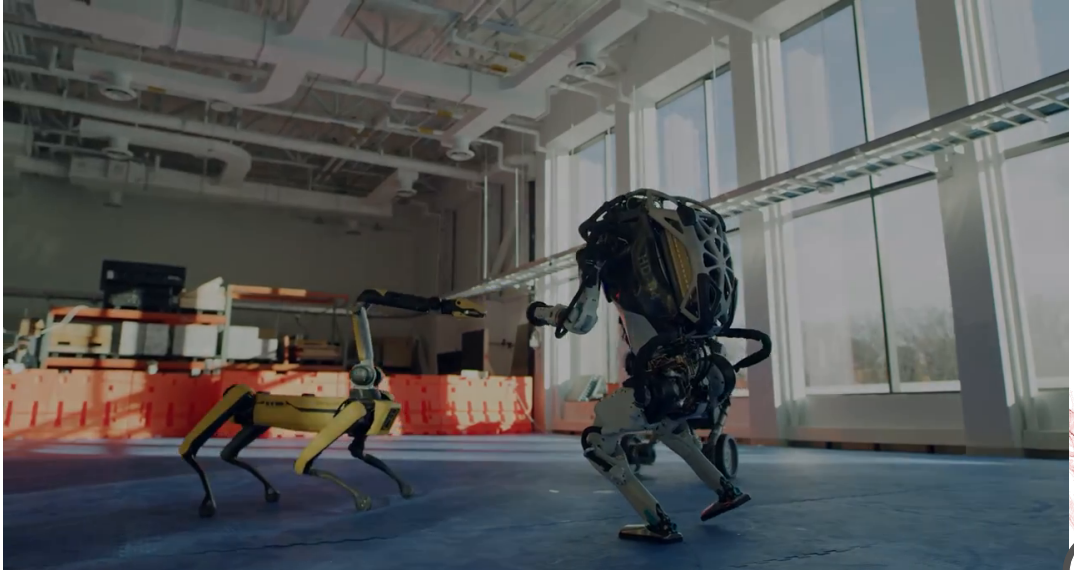
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- 2017: Atlas performs its first backflip
- 2020: Boston Dynamics does it again!



Robots

A brief history



Robotics

Definition

Definition of robotics

A branch of engineering which include computer science, mechanical, and electrical engineering. These techniques are used to develop machines which contribute to human work, can work automatically.



Robots

Applications

Where are robots used?



Robots

Applications

Where are robots used?

- Welding



Robots

Applications

Where are robots used?

- Welding
- Assembly



Robots

Applications

Where are robots used?

- Welding
- Assembly
- Packaging/Palletizing



Robots

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Robots

Applications

Where are robots used?

- Welding
- Assembly
- Packaging/Palletizing
- Food industry
- Special applications



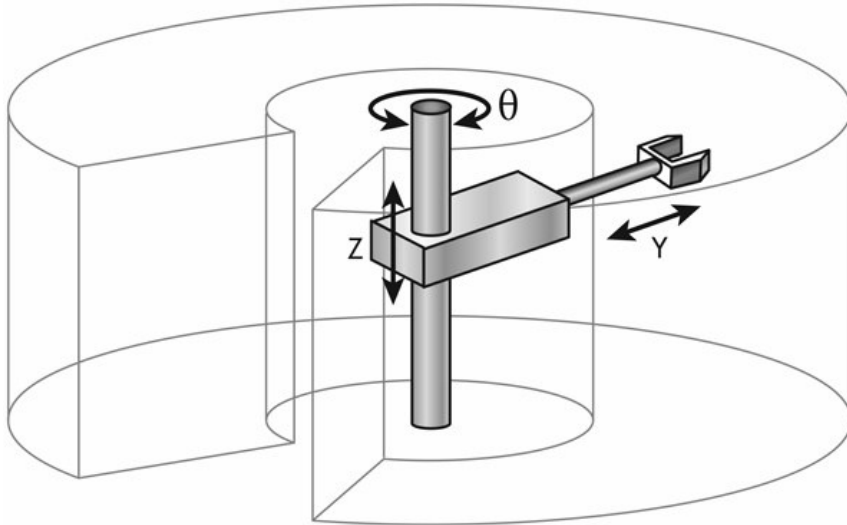
Types of robots

Cartesian coordinate robots



Types of robots

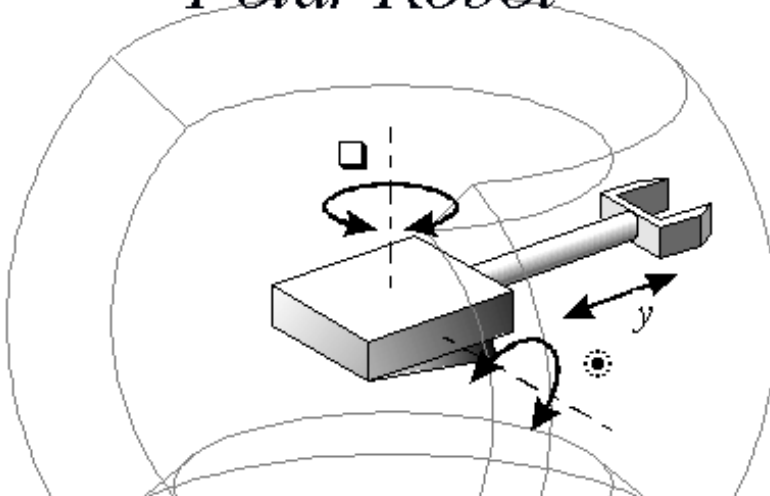
Cylindrical robots



Types of robots

Polar robots

Polar Robot



Types of robots

Articulated robots



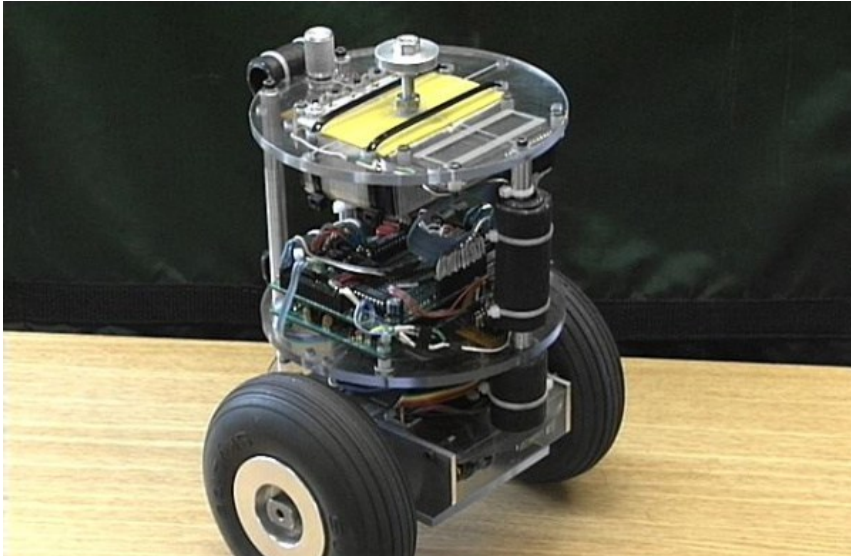
Types of robots

Three wheeled robots



Types of robots

Two wheeled robots



Types of robots

Hexapod robots



Types of robots

Quadrupedal robots



Types of robots

Humanoid robots



Types of robots

Hybrid robots



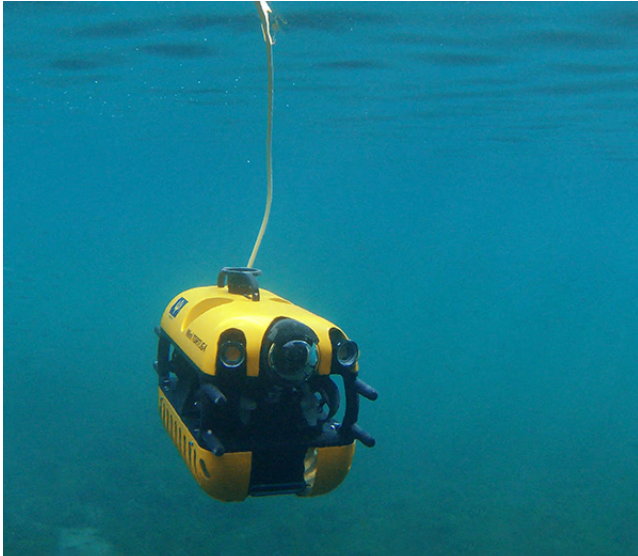
Types of robots

Parallel robots



Types of robots

Underwater robots



Types of robots

Flying robots



Course overview

Scope of this course



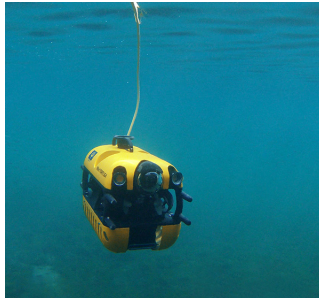
Course overview

Scope of this course



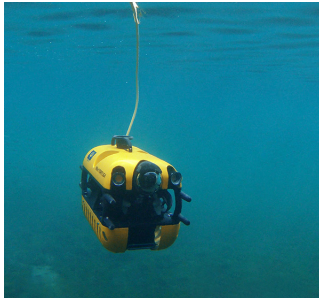
Course overview

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Course overview

Topics



Course overview

Topics

- Mathematical background



Course overview

Topics

- Mathematical background
- Kinematics robot model



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- Kinematics robot model
- Inverse kinematics



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- Mathematical background
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- Trajectories and planning



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- Dynamic modeling



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- Control strategies



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- Mathematical background
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- Dynamic modeling
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- Simulating robots, implementing controllers



Course overview

Topics

- Mathematical background
- Kinematics robot model
- Inverse kinematics
- Trajectories and planning
- Dynamic modeling
- Control strategies
- Simulating robots, implementing controllers
- Drones, mobile, underwater robots modeling



Extra reading material

Curated list on Teams -> Class Notebook -> Robotics resources



Extra reading material

Curated list on Teams -> Class Notebook -> Robotics resources

Extra material on each module of Teams classwork



Stranded on Mars

The year is 2023. An international cooperation between **NASA**, **ESA**, **JAXA**, and **CSA** has managed to send the first crewed mission to Mars...



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Course overview

Evaluation

Course evaluation: exam at the end of the semester (60%)

Laboratory evaluation: average of grades for each lab (30%)

Project: individual grade of the project (10%)



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-1 penalty in case you don't deliver it





Questions?