



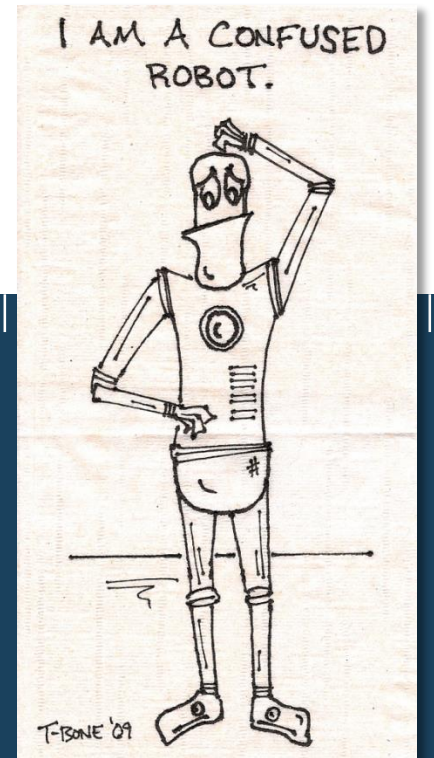
**POLITECNICO**  
MILANO 1863

# Robotics

*Course Introduction*

Matteo Matteucci  
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*Artificial Intelligence and Robotics Lab - Politecnico di Milano*



# About me and my lectures ...

Lectures given by Matteo Matteucci

- +39 02 2399 3470
- [matteo.matteucci@polimi.it](mailto:matteo.matteucci@polimi.it)

Research Topics

- Robotics and Autonomous Systems
- Computer Vision and Perception
- Pattern Recognition & Machine Learning
- Benchmarking in Robotics



*Aims of these lectures: learning how to design and implement the software which makes autonomous an autonomous mobile robot (e.g., symbolic planning, trajectory planning, localization, perception, mapping, etc.)*



## ... what about the course?

All the infos on the course website

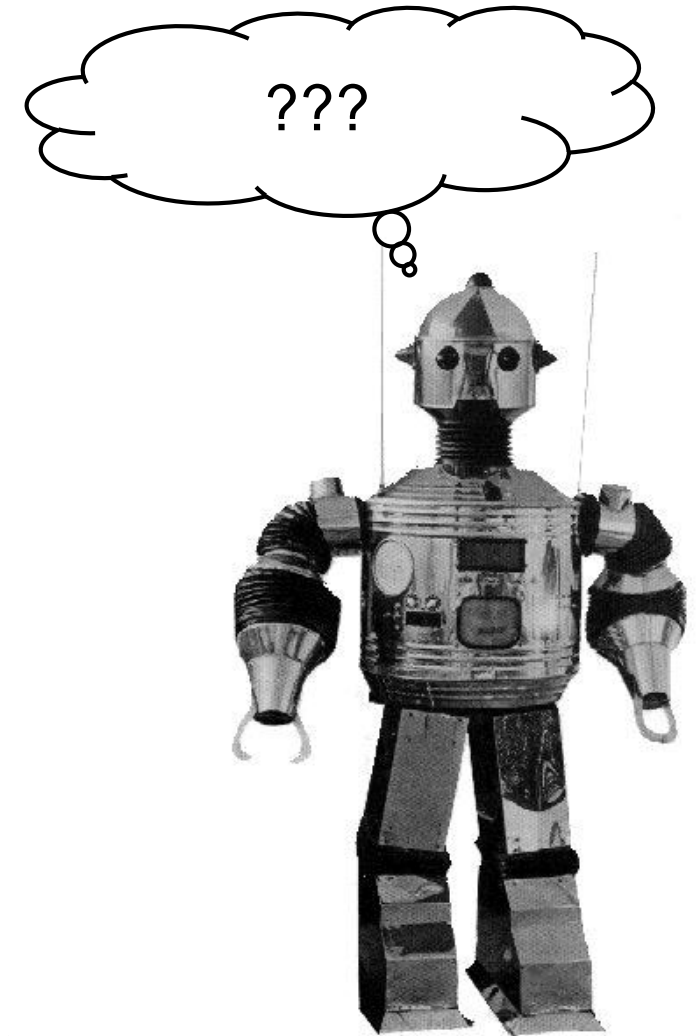
- <https://chrome.deib.polimi.it/index.php?title=Robotics>

Lectures given by:

- Matteo Matteucci (Lecturer – 30h)  
<http://www.deib.polimi.it/> ... then search ...  
[matteo.matteucci@polimi.it](mailto:matteo.matteucci@polimi.it)
- Simone Mentasti (Teaching Assistant – 20h )  
<http://www.deib.polimi.it/> ... then search ...  
[simone.mentasti@polimi.it](mailto:simone.mentasti@polimi.it)

Course in code sharing!!

- Robotics
- Perception, localization, and mapping for mobile robots



# Lectures outline / approach

## Introduction to (mobile) robotics

*The mind of a mobile robot*

## Anatomy of a mobile robot

- Sensors and actuators
- Common Kinematics

## Localization and Mapping

- Localization vs Mapping
- Simultaneous Localization & Mapping

## Robot autonomous navigation

- Motion control and obstacle avoidance
- Trajectory following
- Trajectory planning  
(graph and sample based)

«Theory»

## Middleware in robotics

- Motivations and state of the art
- ROS Installation party

## ROS Basics

- Publisher/subscriber
- Messages, services, parameters
- Bags, tb, actionlib, rqt\_tools
- Message filters, rospy

## ROS Advanced

- ROS on multiple machines
- Time synchronization
- Stage

## Navigation in ROS

## ROS & OpenCV

## Point Cloud Library

«Practice»



## Course organization / rules

Classes (no distinction between lecture and exercise day):

- Wednesday, 12:15 – 14:15, in 5.1.1
- Thursday, 14:15 – 16:15, in 6.0.1 (Ex. C.I.1)

Cum tempore!

Also known as Aula Natta

Detailed calendar online (updated weekly)

- <https://chrome.deib.polimi.it/index.php?title=Robotics>

Grading policy:

- Written examination covering the whole program up to 27/32 +
- Home project in simulation graded up to 05/32 =
- Final score will be the sum of the grades of the two ... 32/32

*In some (exceptional) cases the home project can be replaced by a lab project, possibly with a slightly higher grade, but this has to be motivated and discussed with the teacher in advance.*



# Course material

## Material available on the course website

- Check <https://chrome.deib.polimi.it/index.php?title=Robotics>
- Slides from the teachers (not necessarily available in advance)
- Link to online sources, books and papers
- Link to other websites for tools and digital resources

## Past exams and sample questions

- Expect 3 theoretical questions + 2 practical exercises (on average)
- No coding exercise since you have it in the home project
- Few past exam examples are available on the course website

Do you need any further info?

