UNIVERSITÀ DEGLI STUDI DI PADOVA

パドヴァ大学

INTELLIGENT ROBOTICS

A.A. 2024-25

prof. Emanuele Menegatti

DIPARTIMENTO DI INGEGNERIA DELL'INFORMAZIONE

INTELLIGENT AUTONOMOUS SYSTEMS LAB

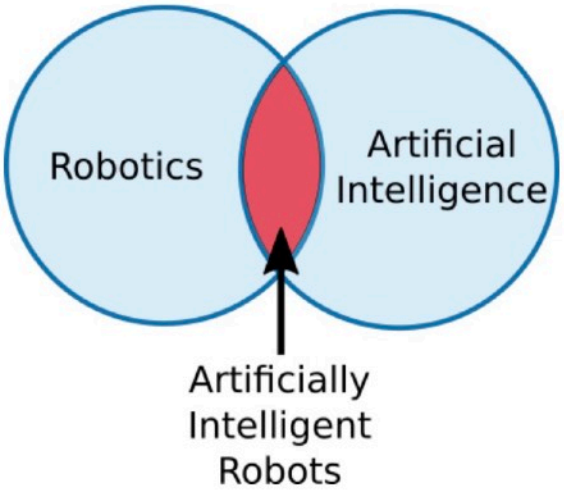
A robot is not a computer…
it is a physically situated agent…
…possibly interacting with humans.

So, a robot must be provided with
'intelligence'.

Are robotics and artificial intelligence the same thing?

The first thing to clarify is that robotics and artificial intelligence are not the same things at all. In fact, the two fields are almost entirely separate.

A Venn diagram of the two fields would look like this:



As you can see, there is one area small where the two fields overlap: Artificially Intelligent Robots. It is within this overlap that people sometimes confuse the two concepts.

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EXAMINATION PROCEDURE

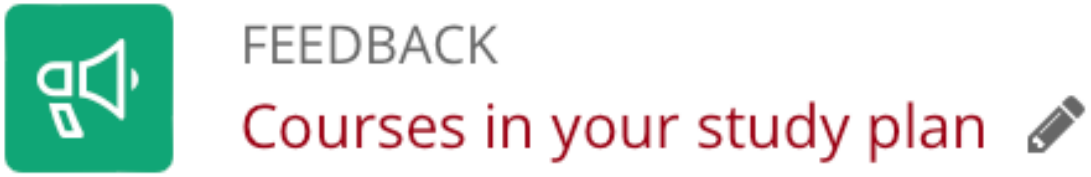
- Written Exam (40% of the final grade)
  - (dates TBD)
- Laboratory Tutorials + Homework (1 extra point).
- Laboratory Project (60% of the final grade):
  - Mail to the three TAs with code, report and video

Winter session:
Assignment 1: 24/12/2024
Assignment 2: 20/01/2025
ORAL Exam:
- from 25/01/2025 to 22/02/2025

Summer session
-3 pts. on evaluation
Assignment 1 & 2: 10/06/2025
ORAL Exam:
- from 16/06/2025 to 21/06/2025

Autumn session (tbc)
-3 pts. on evaluation
Assignment 1 & 2: 22/08/2025
ORAL exams:
from 01/09/2025 to 06/09/2025

- Who are you?
- Fill in the feedback in the Moodle page of Intelligent Robotics:



What Are Intelligent Robots?

- **Reactive Functionality**
  - Sensing
  - Locomotion
  - Behaviour
- **Deliberative Functionality**
  - Navigation
  - Localization and Mapping
  - Path Planning
- **Interactive Functionality**
  - Human-Robot Interaction
  - Human-Robot Interfaces

- ROS (Robot Operating System) Middleware [i.e. C++ or Python]
- **Main ROS packages for intelligent robots**

CLASSICAL ARTIFICIAL INTELLIGENCE PARADIGM

REASONING

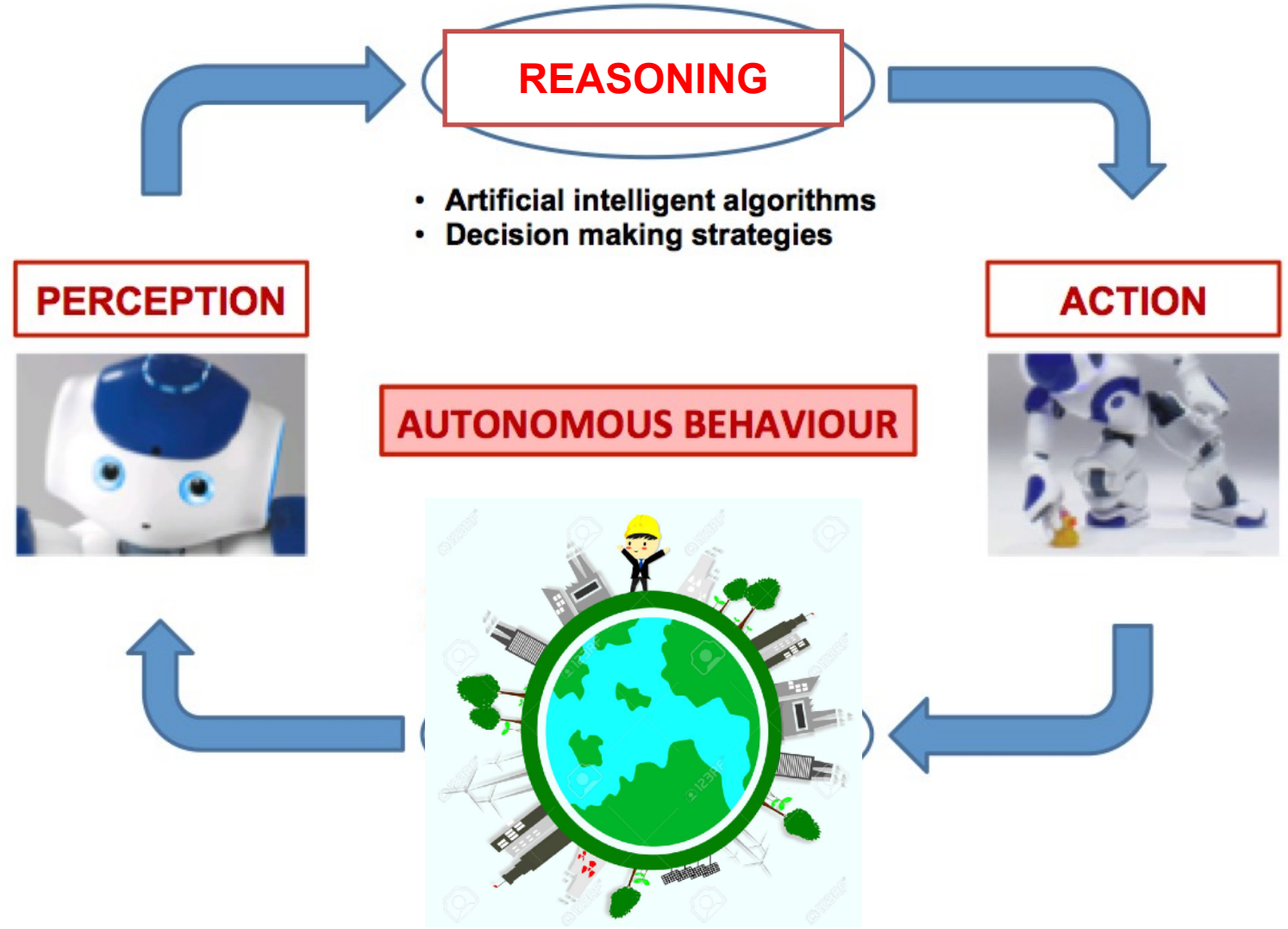
- Artificial intelligent algorithms
- Decision making strategies

PERCEPTION

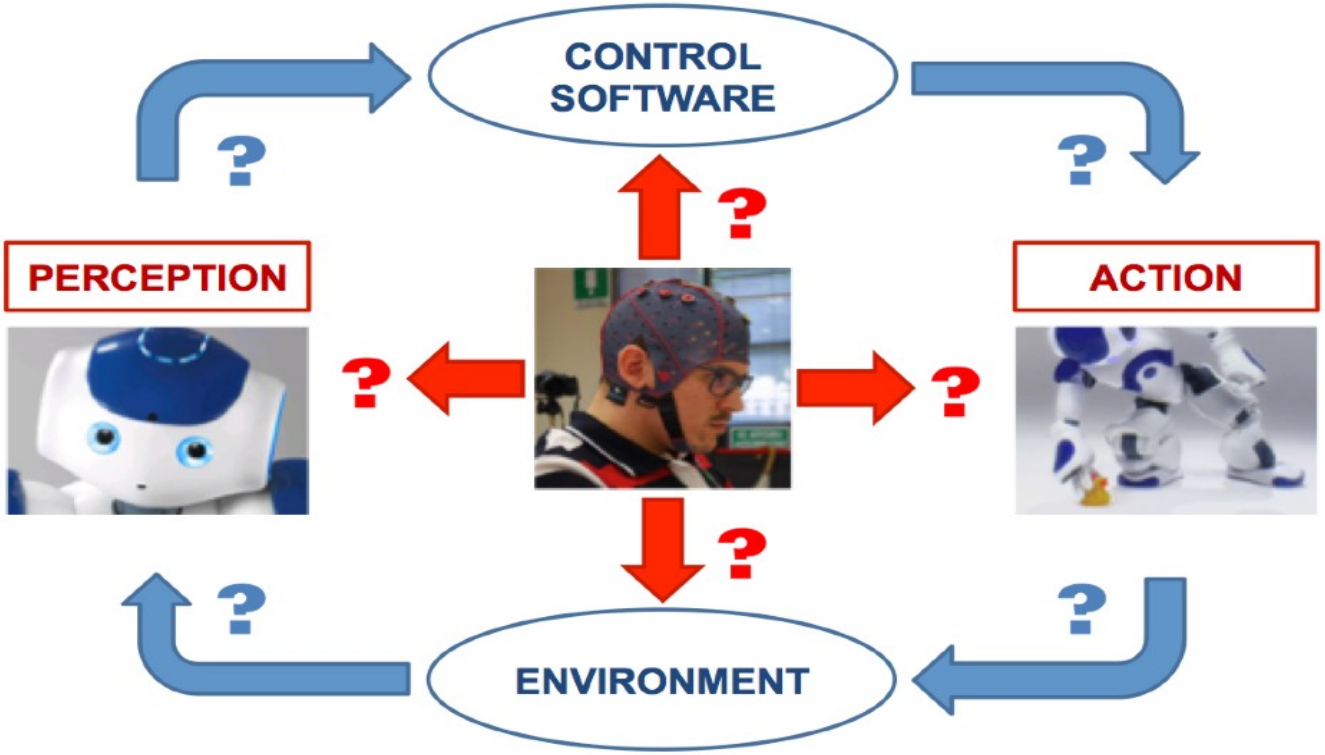
ACTION

SENSE ⟹ PLAN ⟹ ACT

INTELLIGENT ROBOTICS PARADIGM



COLLABORATIVE ROBOTICS PARADIGM



Where is the intelligence located?

Should the robot just execute commands or interpret them?

We need a Hybrid System: *namely the Shared-intelligence approach!*

Applications of Mobile Robots