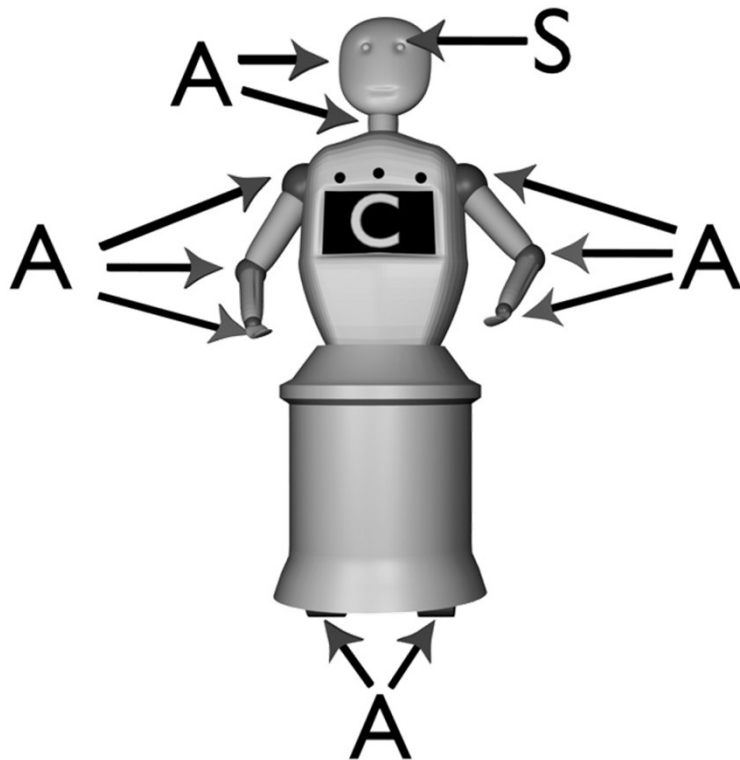




University of Pisa
Master of Science in Computer Science
Course of Robotics (ROB)
A.Y. 2018/2019

Scuola Superiore
Sant'Anna



Robotics basics

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<http://didawiki.cli.di.unipi.it/doku.php/magistraleinformatica/rob/start>



Robot definition

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What is a robot?





Robot definition

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Is a robot a
physical agent?





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Can a robot act?





Robot definition

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Can a robot sense?





Robot definition

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Is a robot
autonomous?





Robot definition

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Is a robot
intelligent?





Robot definition



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A robot is an autonomous system
which exists in the physical world,
can sense its environment,
and can act on it to achieve some goals



Maja J Mataric, *The Robotics Primer*, The MIT Press, 2007

A robot is an **AUTONOMOUS** system

Autonomous

- An *autonomous* robot acts on the basis of its own decisions, and is not controlled by a human

Non autonomous

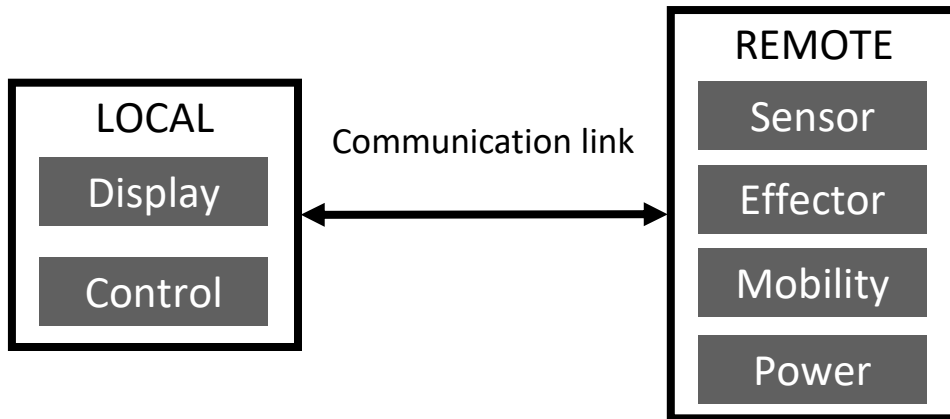
- A non-autonomous robot is commanded step by step by an operator (teleoperation)

Semi-autonomous

- Control is shared between robot and user; different levels of autonomy may exist



≠ from teleoperation



Robonaut

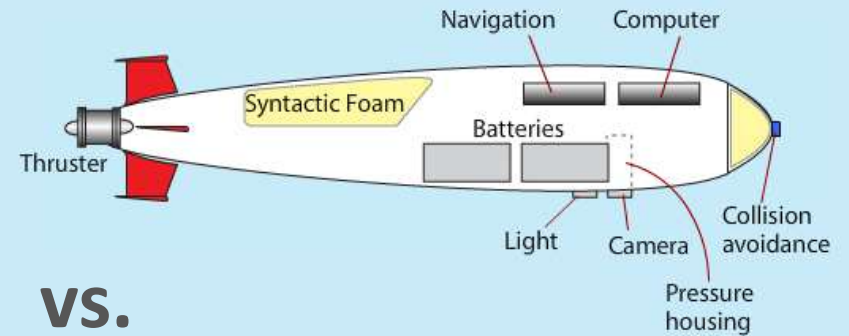
AUV Autonomous Underwater Vehicle

Has:

- Thrusters
- Batteries
- Navigation
- Onboard computer
- Pressure housing

Does not have:

- Tether
- Manipulator arm
- Sample basket
- Personnel sphere



VS.

ROV Remotely Operated Vehicle

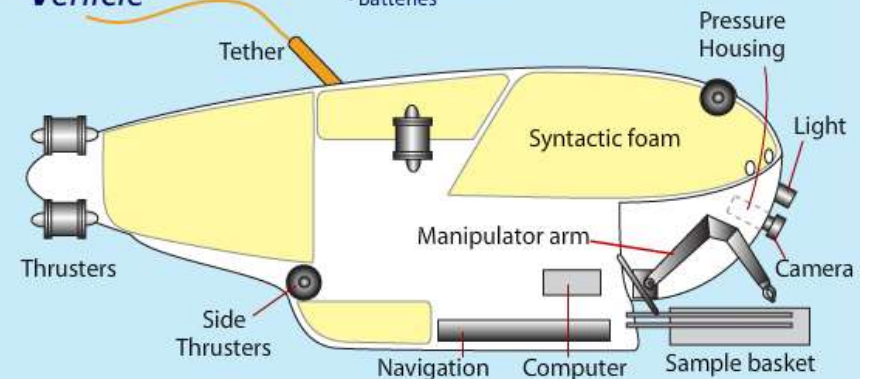
Has:

- Thrusters
- Navigation
- Sample basket

Does not have:

- Personnel sphere
- Batteries

- Tether
- Manipulator arm
- Onboard computer
- Cameras

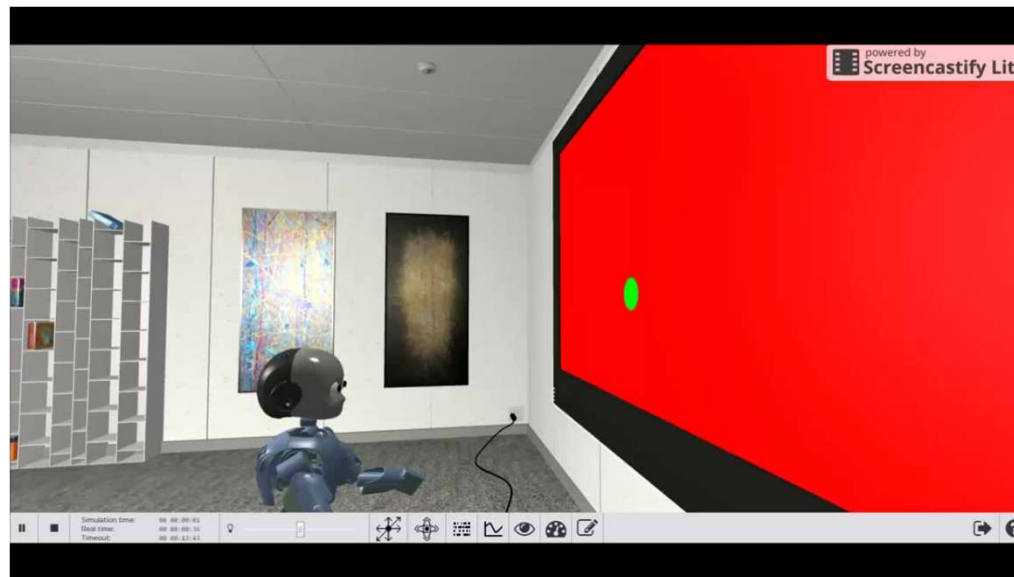


A robot is an autonomous system which exists in the PHYSICAL WORLD

- Subject to the laws of physics

≠ from simulations

The physical world, the physical laws and the interactions are simulated and somehow approximated



A robot is an autonomous system which exists in the physical world, can SENSE its environment

- the robot has *sensors*, some means of perceiving (e.g., hearing, touching, seeing, smelling, etc.) in order to get information from the world.



A robot is an autonomous system which exists in the physical world, can sense its environment, and can **ACT ON IT**

- the robot has *effectors* and *actuators*, for taking actions to respond to sensory inputs and to achieve what is desired



A robot is an autonomous system which exists in the physical world, can sense its environment, and can act on it to **ACHIEVE SOME GOALS.**

- Robot “intelligence”





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Assignment

Search the internet for a good example of a robot responding to our definition

- Present your robot
- Explain how it responds to the definition
- Show its main components
- If bioinspired, explain why/how/where

A robot is an autonomous system which exists in the physical world, can sense its environment, and can act on it to achieve some goals

