

Service robots and Exoskeletons: Part I

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8.3.2021



With the support of the
Erasmus+ Programme
of the European Union

Agenda: Training part I – 8. 3. 2021

Introduction

Lecture: Service robots (by Janika Tommiska)

Group work and presentations

Quiz (Kahoot)

Wrap-up and assignment for tomorrow

Learning objectives of the training

- Understand what a service robot is.
- Gain an overview of various service robots in smart manufacturing and other fields.
- Gain a deeper understanding of mobile robots.
- Understand the ease of programming a mobile robot.
- Gain an overview of industrial and medical exoskeletons.
- Learn about the possibilities for exoskeletons to be used in industry and healthcare.
- Learn about the health benefits of industrial and medical exoskeletons.
- Learn how to utilize Indego medical lower limb exoskeleton in rehabilitation.

Additionally, the training...

- Aims to present different teaching tools and methods
- Encourages you to collaborate in multidisciplinary and multicultural groups.

Training schedule

1pm-3pm (CET) / 2pm-4pm (EET) on

Monday 8.3., Wednesday 10.3. and Thursday 11.3.

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Background information and Networking

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Service robots

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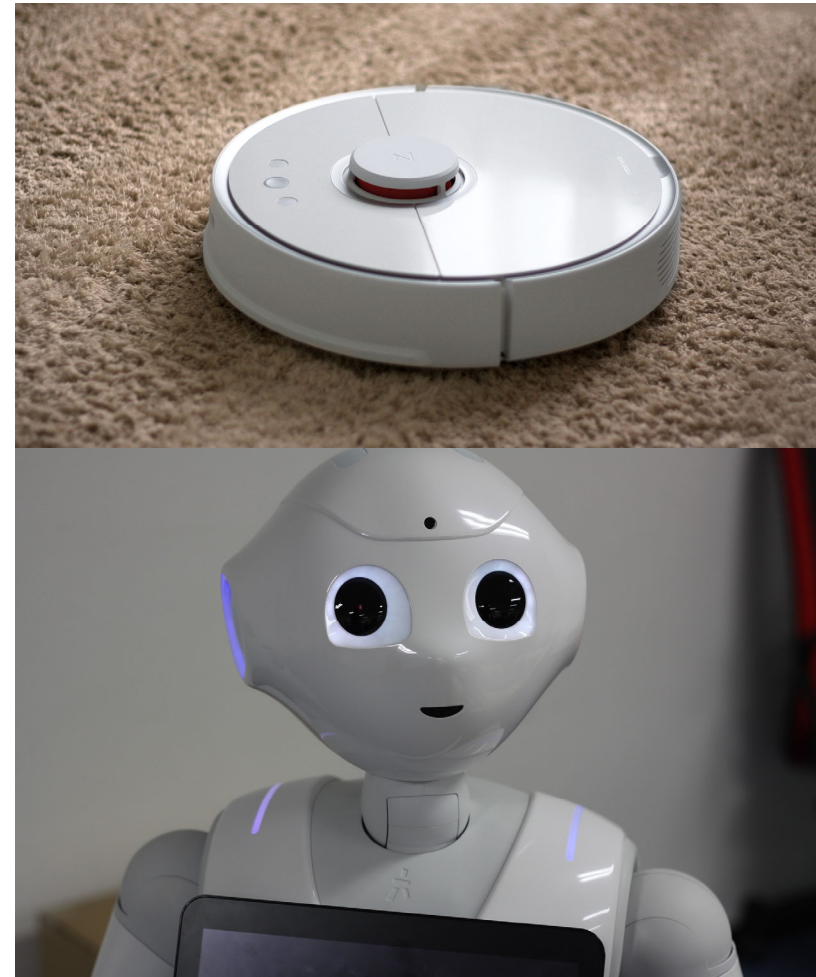
8.3.2021



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Service robots

- Assist human being
- Semi- or fully autonomous
- Domestic and Professional use
- Tasks:
 - Boring tasks
 - Dangerous tasks
 - Dirty tasks
 - Repetitive tasks
- Often includes multiple sensors and actuators



Definition

“that performs useful tasks for humans or equipment excluding industrial automation applications”

- Moves in its environment and performs the tasks assigned to it
- interact with their surroundings
- a programmable device with **at least two degrees of freedom**

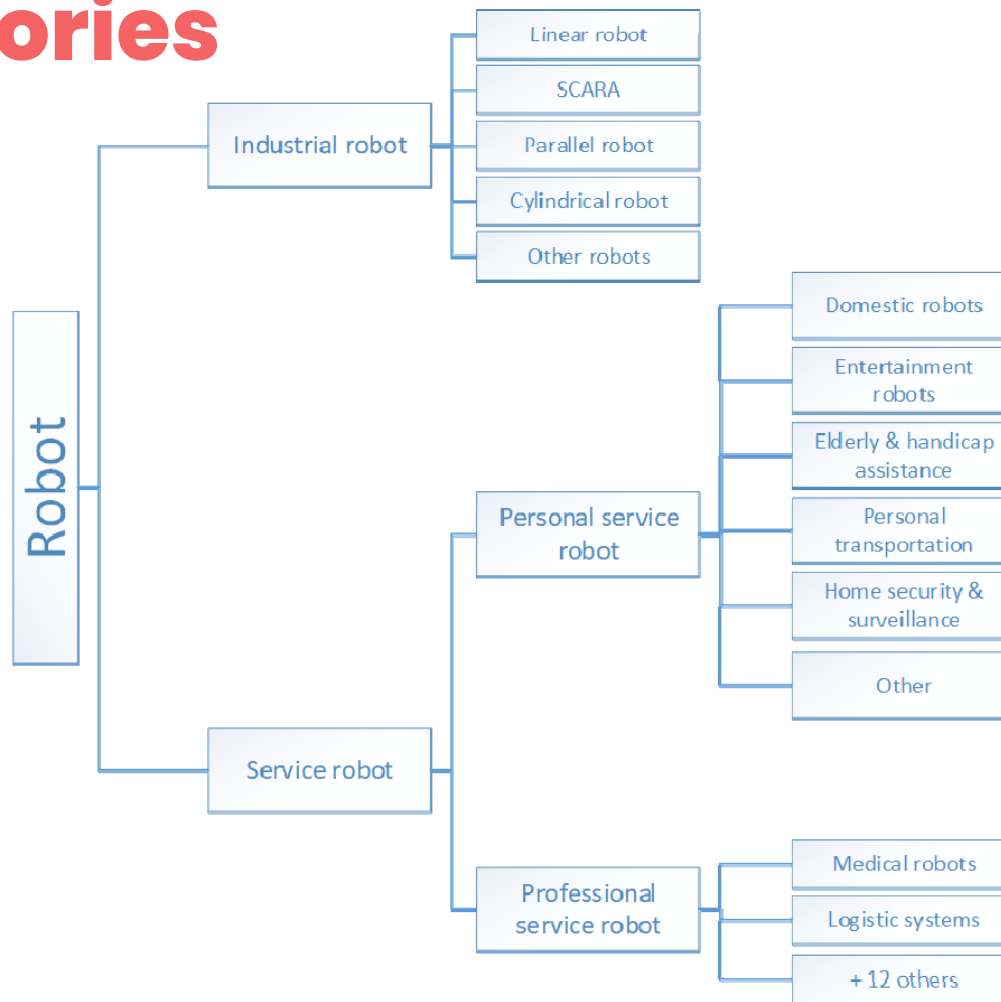


VS



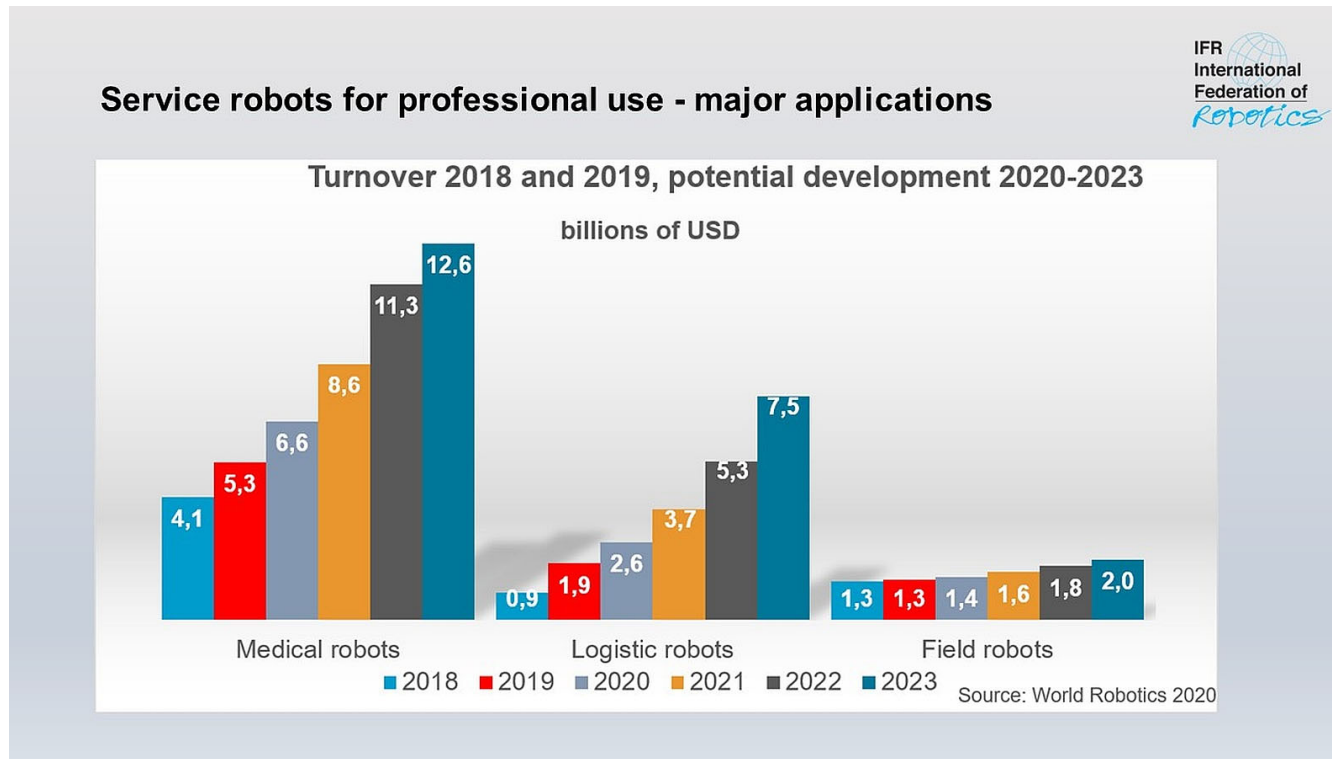
- Moves in its environment and performs the tasks assigned to it
- Interact with objects
- programmable **in three or more axes**

Categories

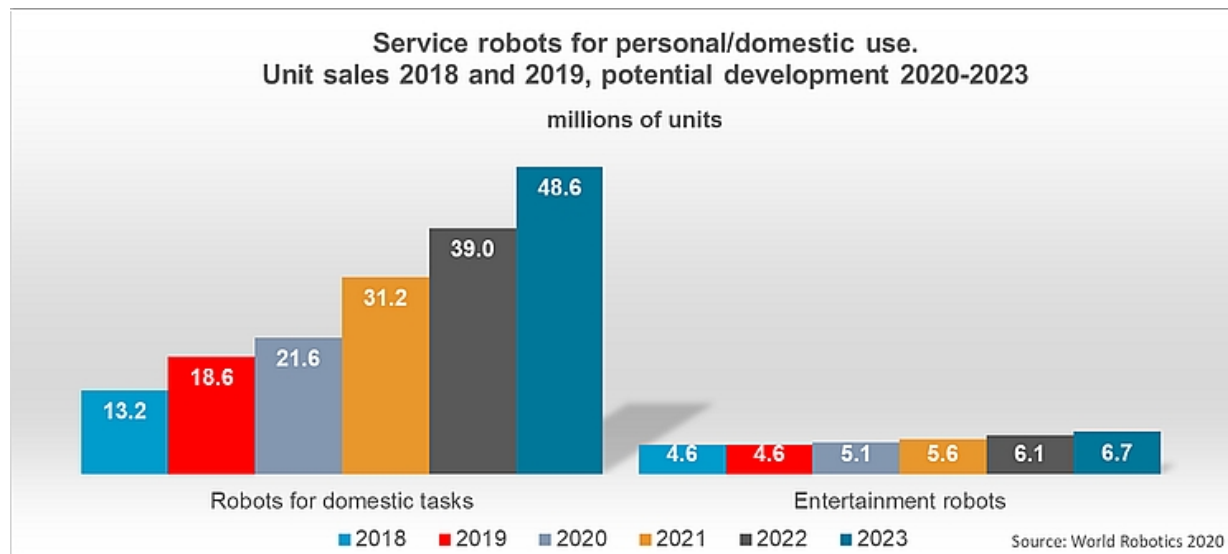


Source:
International
Federation of
Robotics

Service robots



Service robots



Personal use

Domestic robots



Photo by [Kowon vn](#) on [Unsplash](#)



- Help the user
- Various tasks:
 - Household chores
 - Education
 - Therapy
- Free people's time
- Growing all the time

Entertainment robots

- Produce pleasure for the user
- Tasks:
 - Dancing
 - Singing
 - Moving around the perform other tasks
- includes many different types of sensors and actuators

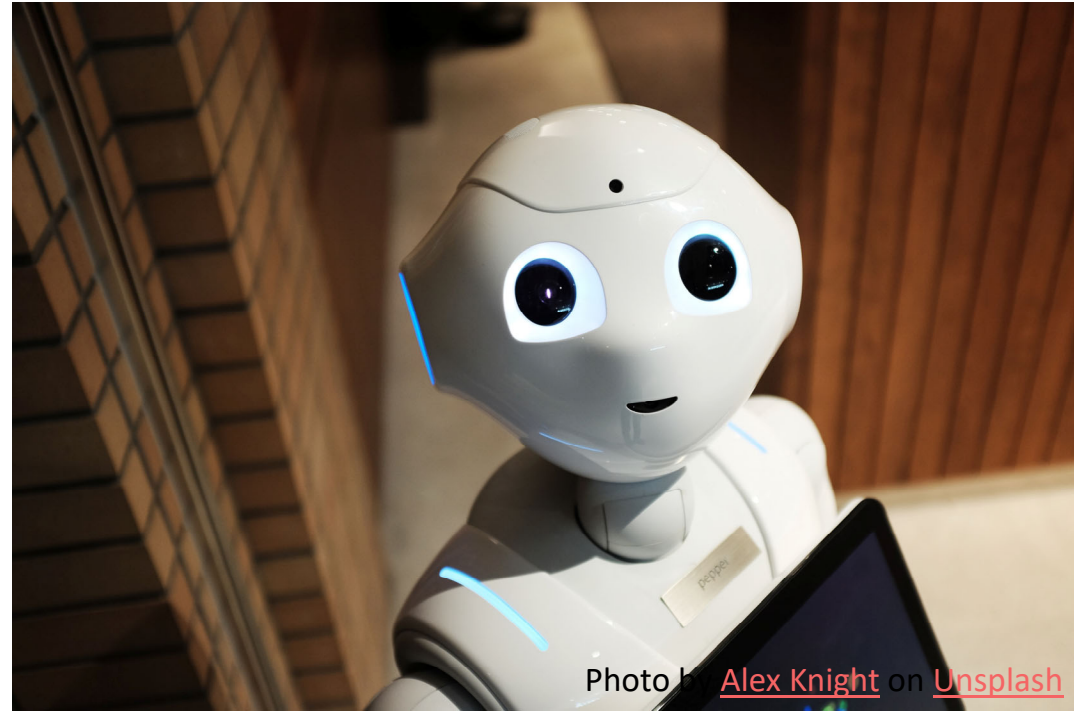


Photo by [Alex Knight](#) on [Unsplash](#)

Entertainment robots

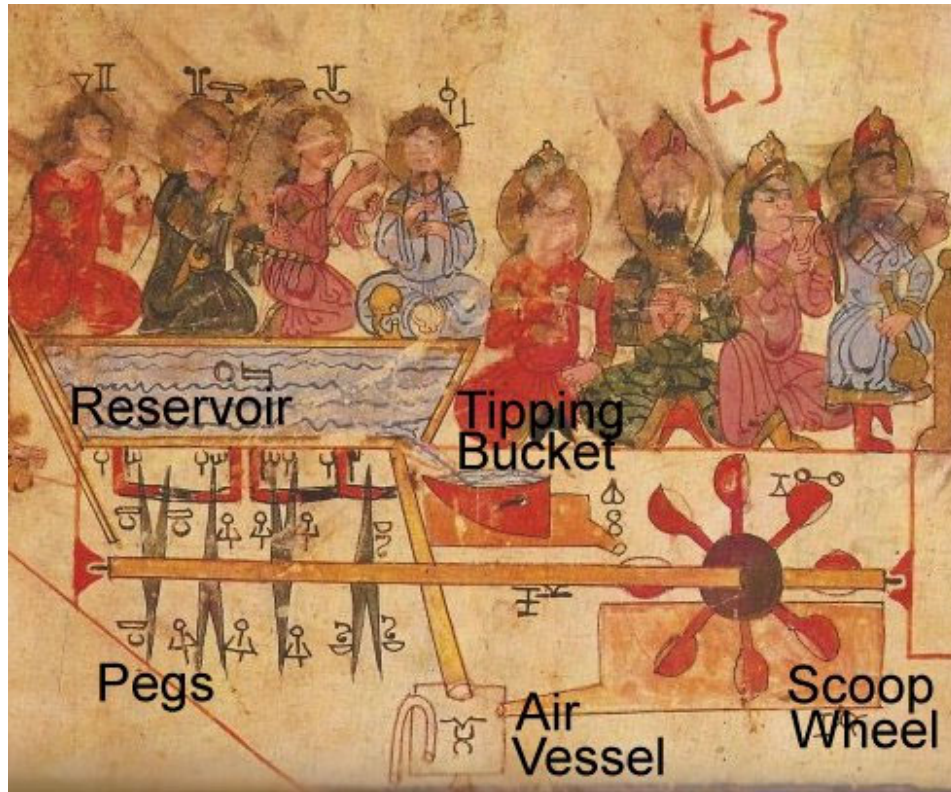


Photo via website:

<https://aljaribook.com/en/2019/08/07/the-musical-boat-en/>

Service robots and exoskeletons

Assistance robots

- Helps human with a variety of tasks
- Allow humans to be independent for longer time
- Increase both the users' personal integrity and their self-esteem
- Tasks:
 - hygiene robot
 - transfer solutions
 - pill dispenser



Photo by BangBang robot



Photo by Robotics care AB

Transportation robots

Self Driving Vehicle (SDV) Overview

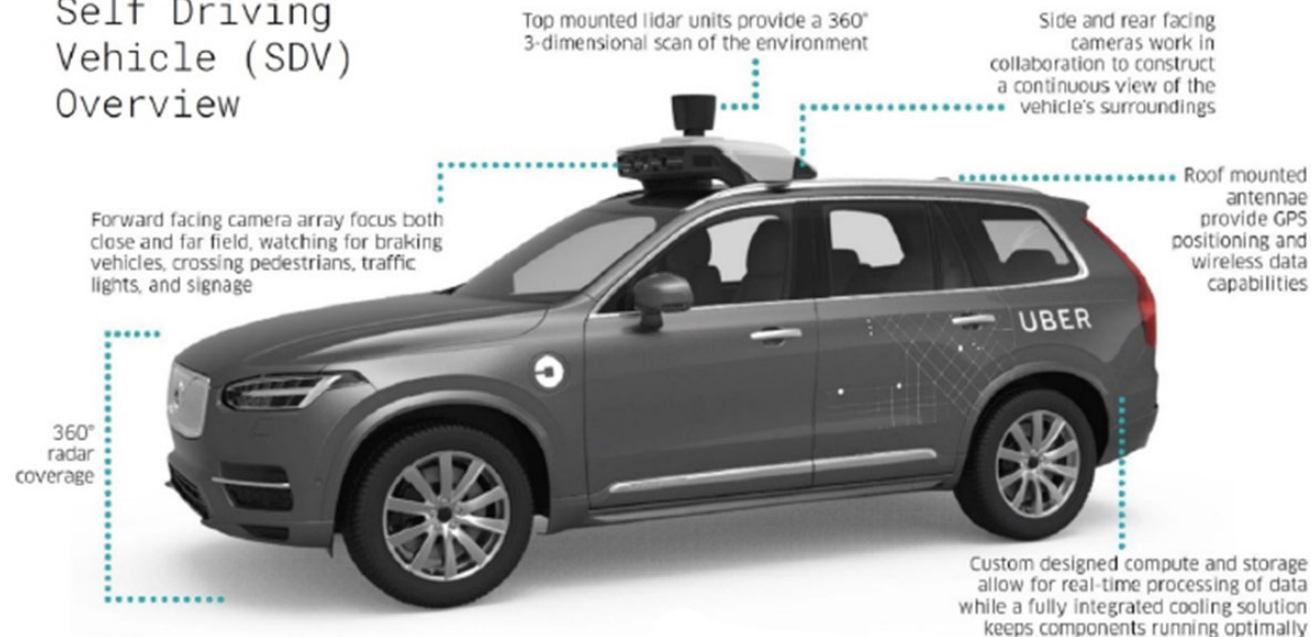


Photo by NTSB/Uber ATG

Home security robots

- Protect the home
- Often connected to smartphone via Wi-Fi network
 - stream live video
 - control the robot remotely
- Compatible with various other safety devices
 - door sensors
 - window alarm
 - indoor surveillance camera
 - security monitor
 - motion sensors
 - smart smoke detector
 - a floor detector



Photo by Amazon, Appbot Riley

Professional use

Medical robots

- Tasks:
 - In surgeries
 - Rehabilitation
 - As clinical training bots
 - Telepresence robot surrogates
 - Robotic nurses
 - As the blood draw device



Photo by Coherent Market Insights

Sanitizing robots



Photo by Omron

Service robots and exoskeletons

Defense applications

- Designed for military use
- Tasks:
 - Carry heavy goods and equipment
 - Rescue soldiers from the battlefield
 - Keep the soldier far enough away from dangerous situations
 - Patrol



Service robots and exoskeletons

Public relation robots

- Designed to increase the value and interest of a company
- Tasks:
 - Supervise
 - Guide
 - Deliver goods
 - Monitor



Field robots

- Operate on land
- Tasks:
 - Planting and seeding
 - Fruit harvesting
 - Crop harvesting
 - Weed control
 - Livestock Ranching
 - Pollution monitoring



photo via public website <https://www.researchgate.net/>

Exoskeletons

More information on
Wednesday



photo via public website therobotreport.com

Service robots and exoskeletons

Logistic systems

- Mobile robots, AGV, drones, etc.
- Tasks:
 - Moves equipment's from one place to other
 - Guides the user
- Place of use:
 - Warehouse
 - Hospitals
 - Shopping center
 - Wherever you need to move equipment's



Photo by Omron

Extra materials

- Samsung : <https://www.youtube.com/watch?v=cDDiUplpcZs>
- Lego mindstorm: <https://www.youtube.com/watch?v=ntBkg2x3EJ0>
- ABB Omnicare: <https://www.youtube.com/watch?v=hVB2IGd-TY4>
- Mobile robot: <https://www.youtube.com/watch?v=jwu9SX3YPSk>
- Blood test robot: <https://www.youtube.com/watch?v=YxtkTKbvBNg>
- Field robots: <https://www.youtube.com/watch?v=jvblvtwEDTY>
- Honda self-driving car: https://www.youtube.com/watch?v=zH08zn_7jOQ

30 minutes

Group work

Instructions

Ideate how could a mobile robot be combined with / connected to other devices/technologies in the future?

- Think of AI, collaborative robots, sensors etc.
- describe ideas, even if the realizations of them are right now impossible, crazy and futuristic looking

Write your ideas on Padlet under your group's column.

<https://padlet.com/anjapoberznik/4lhoniab7d8dhan7>

Choose one person from your group who will present the ideas.

Quiz

Use your smart phone and go to

www.kahoot.it

Part II: 10. 3. 2021

1pm – 3pm (CET) / 2pm – 4 pm (EET)

Sneak peek...

Mobile robot live coding

Lecture: Exoskeletons



Thank you!

See you tomorrow!