OpenDR

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Open Deep Learning Toolkit for Robotics

Project start date: 01/01/2020
Duration: 36 months
Lead contractor: Aristotle University of Thessaloniki

Deliverable D9.1: Factsheet and project presentation

Date of delivery: 31/1/2020

Contributing Partners: Aristotle University of Thessaloniki

Version: v3.0

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Title:	**D9.1: Factsheet and project presentation**	
Project:	**OpenDR** (ICT-10-2019-2020 RIA)	
Nature:	DEC	**Dissemination Level:** PUblic
Authors:	Anastasios Tefas, Nikos Nikolaidis, Nikolaos Passalis	
Lead Beneficiary:	AUTH (Aristotle University of Thessaloniki)	
WP	9	
Doc ID:	OPENDR_D9.1.pdf	

Document History

Version	Date	Reason of change
1.0	15/1/2020	First complete draft
1.1	20/1/2020	Final draft for internal review
2.0	22/1/2020	Revised version including internal reviewer's comments
2.1	28/1/2020	Final draft to be circulated
3.0	31/1/2020	Final version

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Executive Summary

Several aspects of the OpenDR project branding, including its a) project logo, b) factsheet and c) initial project presentation, are described and provided in this document. The technical specifications that are related to OpenDR branding and should be followed when preparing dissemination material are also provided.

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1. Introduction

This document describes several important aspects of the OpenDR project branding, including the **a) project logo, b) factsheet** and an **c) initial project presentation**. Additional material regarding the OpenDR's visual identity and branding, will be provided in several upcoming deliverables, including D1.1 - Documentation standards on M2, D2.1 - Website development and setup of social accounts on M2 and D9.4 - OpenDR video presentation on M08.

2. Logo

OpenDR's logo is the centerpiece of its visual identity, facilitating many dissemination activities, ranging from presentations and exhibitions to the online presence of OpenDR to various social media and online source code repositories, e.g., GitHub. OpenDR's consortium proposed several different logo designs, among which four were shortlisted, as shown in Fig. 1.

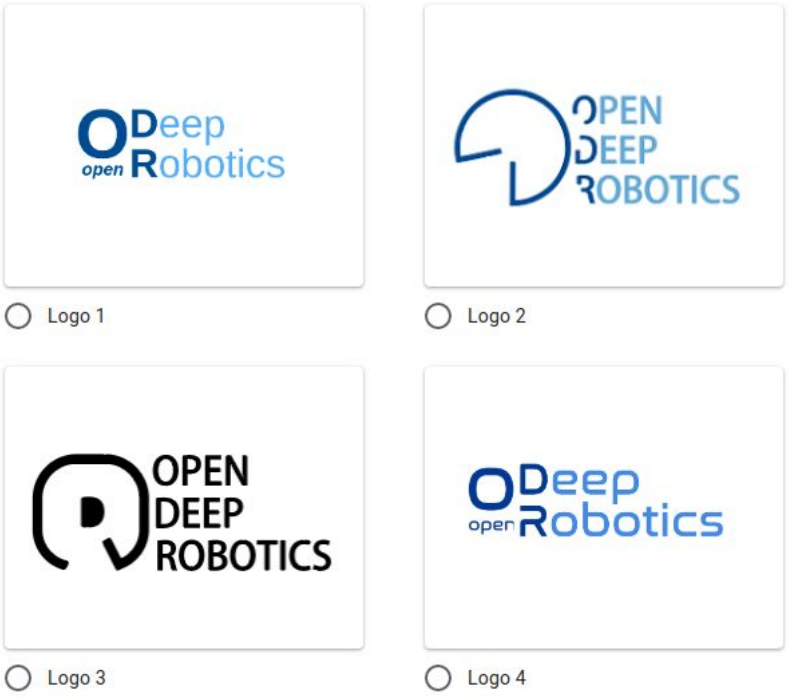

Fig.1: Candidate logos produced by the consortium.

Then, partners voted for each of these logos and the logo with the most votes was selected. Logo 1 received the largest number of votes among the 4 logos.

The selected logo is shown in a larger format in Fig. 2. This logo has clear, yet sleek and modern lines, fitting the philosophy and core objectives of the project, while also allowing OpenDR to be easily identifiable. The logo was built around a textual description,

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instead of a pure graphical design, since this provides a self-interpretable and easy to understand communication medium.

Fig.2: OpenDR logo.

The color scheme that was selected to represent OpenDR project follows the colors used in its logo and it is depicted in Fig. 3. This color palette will be used, when possible and appropriate, in all the dissemination material produced by OpenDR (e.g., website, flyers, etc.). Note that an alternative, grayscale, palette was also defined. The project logo using the alternative palette is shown in Fig. 3. This palette will be used when the corresponding media/documents are to be reproduced in grayscale or when the main color palette cannot be used for any reason, e.g., when the background color is close to the colors used in the logo of Fig. 2.

Fig.3: OpenDR color and grayscale palettes.

Fig.4: OpenDR logo using the alternative, grayscale palette.

Project's logo will be available for download in OpenDR's website (www.opendr.eu) to further facilitate the dissemination of the project for anyone that wants to use OpenDR logo (e.g., for presentations, products that utilize OpenDR library, etc.).

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3. Factsheet

A four-page factsheet was created. It describes the key aspects of the OpenDR project, as well as the main objectives and expected impacts. The factsheet will be available for download on the project's website and will be used as dissemination material in various dissemination events organized by OpenDR or in which OpenDR will participate. The factsheet is shown in Fig. 5 and it is also included in Appendix A. Note that the main color palette was used when preparing the factsheet.

4. Project Presentation

A project presentation has been created to further assist the presentation of the project at various events. The structure of the project presentation is the following:

- Title slide
- OpenDR in a glance
- OpenDR context
- OpenDR overall objectives
- OpenDR technical objectives
- OpenDR expected impact
- OpenDR ecosystem & development cycles
- OpenDR workplan
- OpenDR consortium
- OpenDR consortium's infrastructure
- OpenDR use cases
- Collaboration with robotics DIHs
- Contact information

Again, the main color palette was used when creating the project presentation, as shown on Fig. 6. The project presentation is also included in Appendix A.

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Fig. 5: First version of project's fact sheet.

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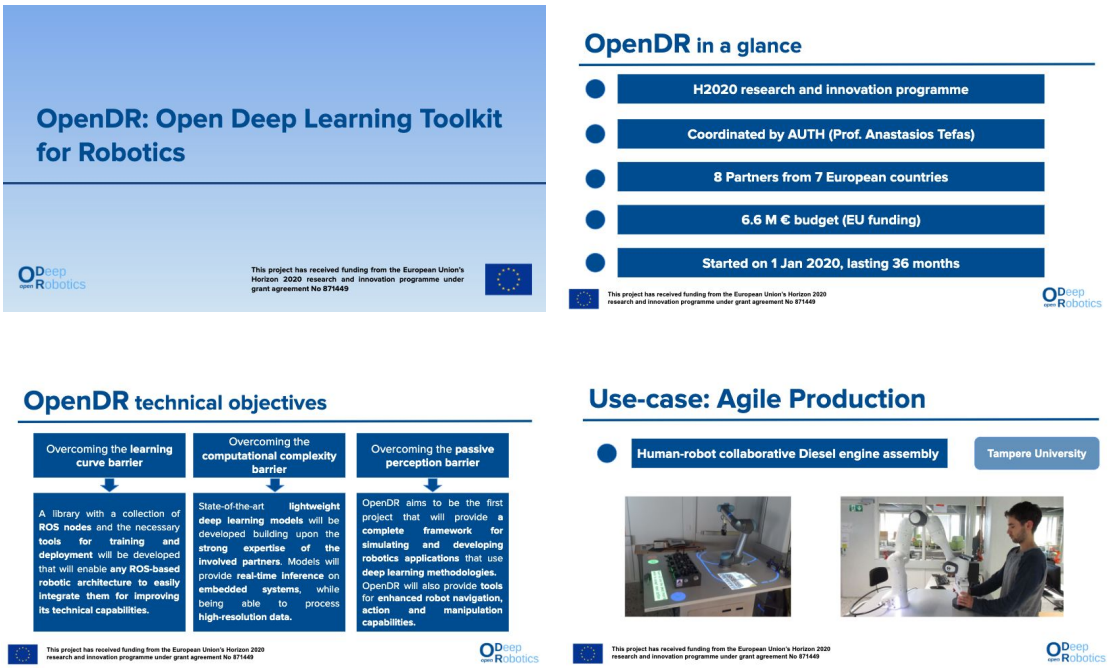

Fig. 6: Selected slides from the project presentation.

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Appendix A: Additional Material

The project factsheet and project presentation follow.

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Open Deep Learning toolkit for Robotics

FACTSHEET

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Open Deep Robotics

FACTSHEET

Open Deep Learning toolkit for Robotics

Context

Almost everything we hear about artificial intelligence today is thanks to deep learning (DL). This category of algorithms have been proved to be immensely powerful in mimicking human skills such as our ability to see and hear. To a very narrow extent, it can even emulate our ability to reason. These capabilities power Google's search and translation services, Facebook's news feed, Tesla's autopilot features and Netflix's recommendation engine and are transforming industries like healthcare and education. Deep learning has achieved tremendous performance jumps in the last decade in several Computer Vision (CV) and Machine Learning (ML) tasks, achieving in many cases super-human performance. However, DL cannot be currently fully exploited in robotics scenarios due to a number of barriers.

Learning Curve Barrier

DL has a **steeper learning curve** than traditional CV and ML methods

Computational Complexity Barrier

DL requires vast amounts of computational power and **energy**

Static Perception Barrier

DL is applied on **static environments** and **does not exploit spatial or temporal embodiment**

The need for an open deep learning toolkit that contains easy to train and deploy real-time, lightweight, Robot Operating System (ROS) compliant deep learning models for robotics is evident.

www opendr.eu

@opendr.eu

fb.com/opendr.eu

GitHub opendr-eu

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OpenDR

OpenDR aims to develop a **modular**, **open** and **non-proprietary toolkit** for **core robotic functionalities** by harnessing **deep learning** to provide **advanced perception and cognition capabilities**, meeting in this way the general requirements of robotics applications in the applications areas of **healthcare**, **agri-food**, and **agile production**.

H2020 Research and Innovation Project

8 partners from 7 countries

6.6M € budget, started on 1 Jan 2020 (36 months)

Coordinated by Aristotle University of Thessaloniki

Prof. Anastasios Tefas (tefas@csd.auth.gr)

Objectives

- To provide a modular, open and non-proprietary toolkit for core robotic functionalities enabled by lightweight deep learning
  - enhance the **robotic autonomy** exploiting **lightweight deep learning for on-board deployment**
  - provide **real-time deep learning tools** for robotics visual perception on **high-resolution data**
- To leverage AI and Cognition in robotics: from perception to action
  - propose, design, train and deploy models that **go beyond static computer perception, towards active robot perception**
  - provide deep **human-centric active robot perception tools,** as well as **tools for enhanced robot navigation, action and manipulation capabilities**
- To propose **a co-integration of simulation and learning methodology** for deep learning in robotics and demonstrate the potential of OpenDR in three prioritized application areas
- To establish strong links to robotics Digital Innovation Hubs

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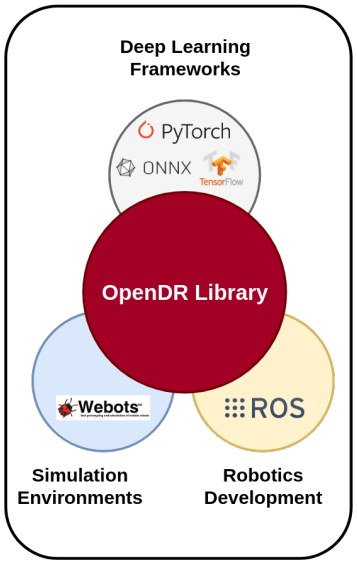
OpenDR

Expected Impact

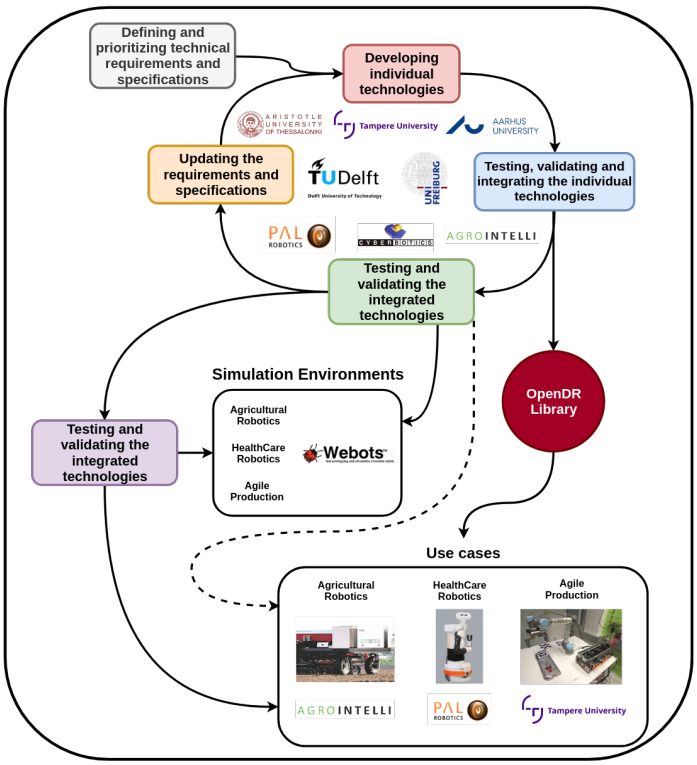
- Improve the technical capabilities in robotics by providing easily deployable, efficient and novel DL tools.
- Lower the technical barriers by providing a modular and open platform for developing DL models.
- Enable a greater range of cognitive applications in agri-food, healthcare robotics and agile production (TRL 3+).
- Strengthen the competitiveness of companies by lowering the cost to access robotics-oriented DL tools.

OpenDR at glance

OpenDR Toolkit



OpenDR Development and Validation Cycle



Consortium

ARISTOTLE UNIVERSITY OF THESSALONIKI

TU Delft

AARHUS UNIVERSITY

Tampere University

UNI FREIBURG

CYBERBOTICS
robot simulation

PAL ROBOTICS

AGROINTELLI

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OpenDR: Open Deep Learning Toolkit for Robotics

OpenDR Deep Robotics

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OpenDR at a glance

- H2020 Research and Innovation Action
- Coordinated by Aristotle University of Thessaloniki (Prof. Anastasios Tefas)
- 8 Partners from 7 European countries
- 6.6 M € budget (EU funding)
- Start date: January 1st 2020, duration: 36 months

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OpenDR Deep Robotics

OpenDR context

Deep Learning in robotics leads to research questions that are typically not fully addressed within the deep learning community

Steep Learning Curve

Difficult for robotics laboratories/companies to employ deep learning methodologies to their research/products

Provide a modular, open easy-to-use toolkit

Computational complexity

DL requires powerful and specialized hardware which makes using DL models on embedded systems difficult

Provide lightweight DL models

Passive Perception

Traditional Computer Vision approaches do not consider the interaction between a robot and the world

Provide active perception DL methods

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OpenDR Deep Robotics

OpenDR overall objectives

To develop a **modular**, **open**, and **non-proprietary toolkit** for **core robotic functionalities** by harnessing **deep learning** to provide **advanced perception** and **cognition capabilities**, meeting in this way the **general requirements of robotics applications** in different areas.

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Deep Robotics

OpenDR technical objectives

Overcoming the **learning curve barrier**	Overcoming the **computational complexity barrier**	Overcoming the **passive perception barrier**
A library with a collection of **ROS nodes** and the necessary **tools for training and deployment** will be developed that will enable **any ROS-based robotic architecture to easily integrate them for improving its technical capabilities.**	State-of-the-art **lightweight deep learning models** will be developed building upon the **strong expertise of the involved partners**. Models will provide **real-time inference** on **embedded systems**, while being able to process **high-resolution data.**	OpenDR aims to be the first project that will provide **a complete framework for simulating and developing robotics applications** that use **deep learning methodologies.** OpenDR will also provide **tools** for **enhanced robot navigation, action and manipulation capabilities.**

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OpenDR Deep Robotics

OpenDR expected impact

- Improve the technical capabilities in robotics by providing easily deployable, efficient and novel DL tools
- Enable a greater range of cognitive applications in agri-food, healthcare robotics and agile production (TRL 3+)
- Lower the technical barriers by providing a modular and open platform for developing DL models
- Strengthen the competitiveness of companies by lowering the cost to access robotics-oriented DL tools

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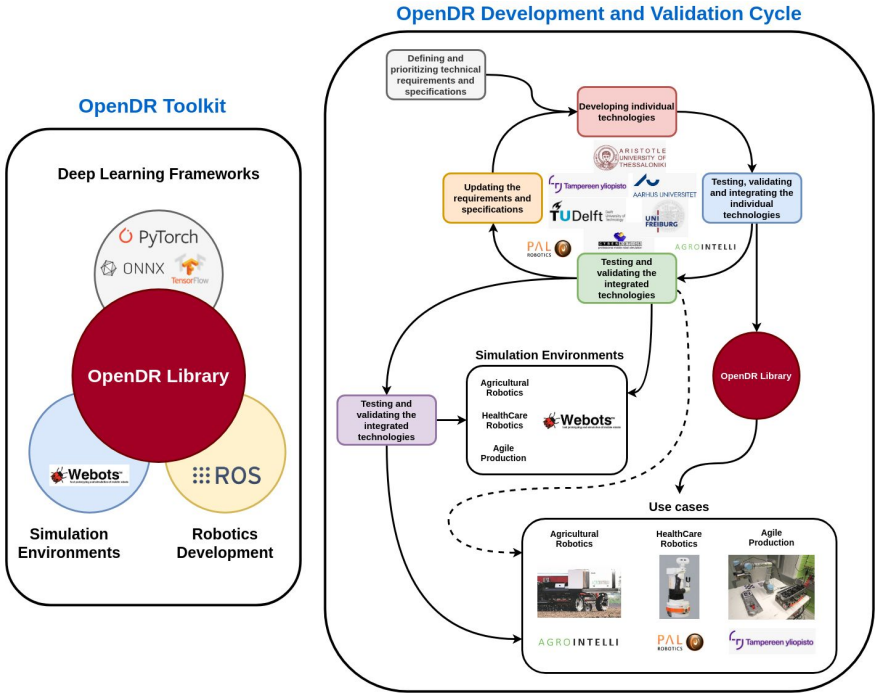
OpenDR Deep Robotics

OpenDR ecosystem & development cycles



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OpenDR Deep Robotics

OpenDR workplan

- **Divided into 10 work packages (WP)**
- **WP 1** is dealing with **project administration**
- **WP 9** will deal with **disseminating** the research results through various channels (publications, links with robotics DIHs, exhibitions, …)
- **WP 10** will ensure **compliance with ethics requirements**

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OpenDR Deep Robotics

OpenDR workplan

- **WP 2** will deal with the **requirements** and **specifications** of the **toolkit** and the **specific use cases**
- **WPs 3 to 5** will provide **lightweight active perception**-based deep learning methods for **human-centric and environment perception** and **cognition**, as well as **robot action and decision making**
- **WP 6** will provide a **simulation framework** aimed at training **OpenDR tools**
- **WP 7 and 8** will **integrate** and **evaluate** OpenDR toolkit in **simulation** and **real world environments** and **ensure its portability across various systems**

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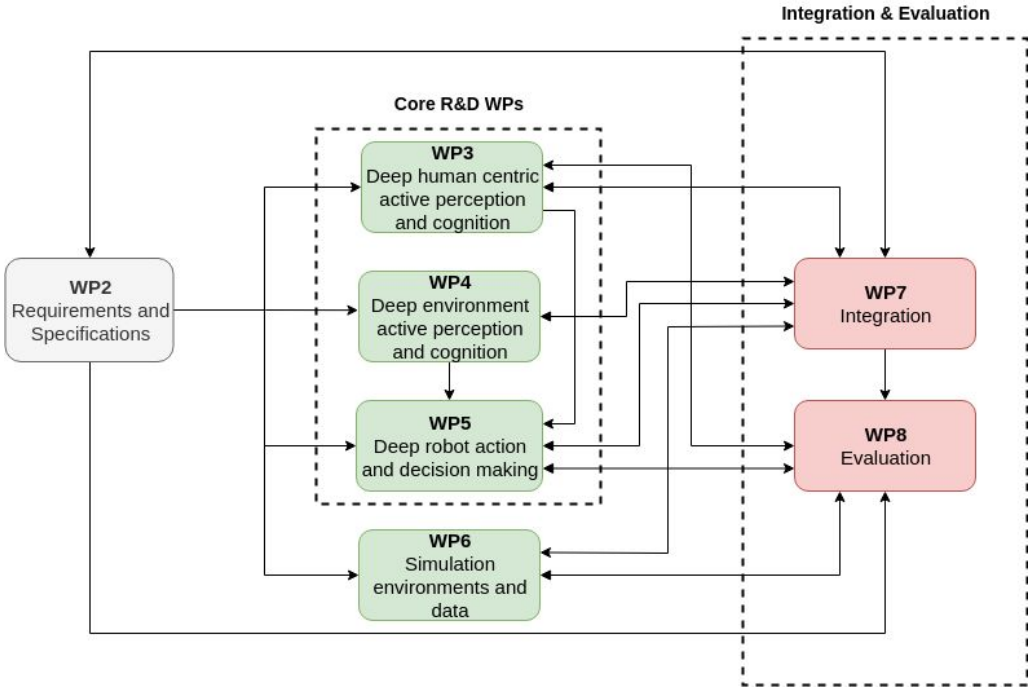
OpenDR Deep Robotics

OpenDR workplan



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OpenDR consortium

- **OpenDR** brings together **8 partners** from **7 European countries**
- A **multidisciplinary team** with complementary expertise uniting
  - **Academic institutions** with expertise on
    - *deep learning, computer vision, digital image/video processing and analysis, graphics,*
    - *robotics, control, planning, localization, navigation, as well as production engineering*
  - **Industrial partners** with expertise on developing
    - *robotics simulations*
    - robots for *healthcare* and *agriculture applications*
- Collaboration for the development of a modular, open and non-proprietary toolkit for core robotic functionalities to enhance robotics autonomy

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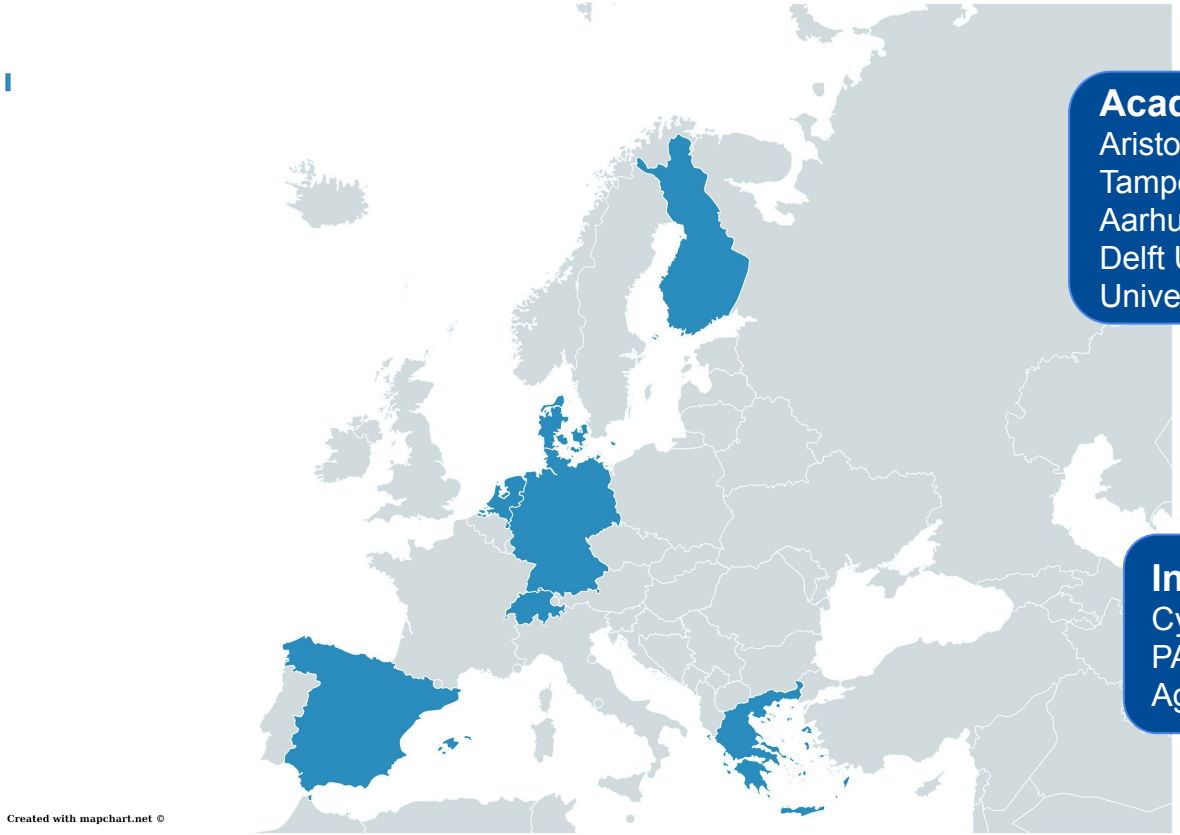
Deep Robotics



Academic partners:
Aristotle University Thessaloniki (GR)
Tampere University (FN)
Aarhus University (DK)
Delft University of Technology (NL)
University of Freiburg (DE)

Industrial partners:
Cyberbotics (CH)
PAL Robotics (ES)
AgroIntelli (DK)

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OpenDR Consortium - Infrastructure

Tampere Robolab

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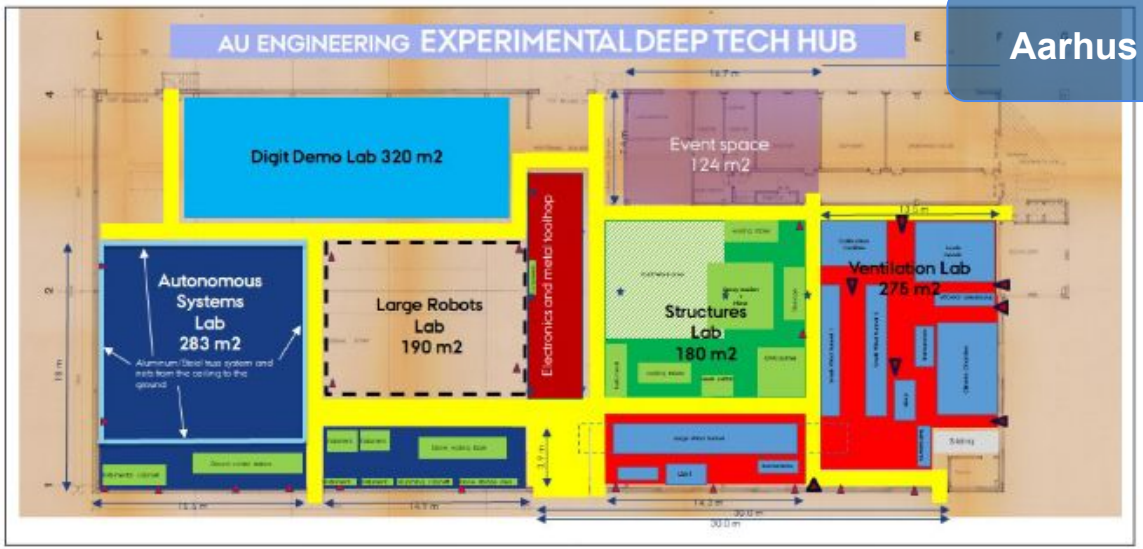
OpenDeep Robotics

OpenDR Consortium - Infrastructure



Aarhus Tech Hub

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OpenDR Deep Robotics

OpenDR Consortium - Infrastructure

TUDelft Robohouse

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OpenDeep Robotics

OpenDR Consortium - Infrastructure

PAL Robotics

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OpenDR Deep Robotics

OpenDR Consortium - Infrastructure

Agrointelli

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OpenDR Deep Robotics

Use-case: Agile Production

Human-robot collaborative Diesel engine assembly

Tampere University

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OpenDeep Robotics

Use-case: Healthcare robotics

Robots supporting elderly people

PAL Robotics

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Use-case: Agri-food

Intelligent Mechanical Weeding

Agrointelli

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Deep Robotics

Collaboration with Robotics DIH

- OpenDR will co-organize one workshop per year with DIH Trinity
- Establish links to other DIHs networks
- Special focus on the prioritized areas: agri-food, healthcare robotics, agile production, infrastructure inspection
- OpenDR will contribute use-cases to other DIHs

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OpenDR Deep Robotics

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