



SHAREWORK TRAINING COURSE

#1 MANUFACTURING ENVIRONMENT PERCEPTION FOR AN EFFECTIVE HUMAN-ROBOT COLLABORATION

INTRODUCTION

Autonomous and hybrid plants require a high level of automation and understanding of the processes within where collaborative robots have a high potential. The development of collaborative robotics as a research area is based on the study of computer vision, machine learning and artificial intelligence to provide robots with high vision skills and knowledge to interact safely and effectively in the workplace and assist humans in arduous or repetitive tasks.

In this training course, several perception techniques to increase collaborative robots' knowledge and skills to perceive, comprehend and reason about the surrounding environment are presented. The concepts presented include several technologies and methodologies to enhance the robot ability for the detection of the objects and humans in the environment, identify humans' posture and activities and understand the human behaviour or model desired motions for our robots.

The course comprises basic concepts and techniques used to perform an environmental analysis and provide robots with the necessary intelligence to recognise their surroundings and act accordingly. The concepts presented are exemplified with comprehensive case studies developed under the framework of the Sharework project.

TOPICS

- Basic concepts of machine learning to transport knowledge from artificial data to real-world applications.
- Human tracking concepts and revision of the state of the art with comprehensive examples.
- Density estimation models for robot motion prediction, gesture classification or motion generation.
- Basic knowledge of human-task recognition to develop a robust system predicting the action the worker is performing using multiple real-time video streams.
- How to design a robotic system knowledge base representing the general properties and featuring collaborative robotics application scenarios.

Please register on the platform in order to access the training course.

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TARGETED TO

- Undergraduate, graduate, or master students willing to learn about the application of computer vision, learning primitives and machine learning to enhance collaborative robotics environmental perception ability.
- Researchers in Human-Robot Collaboration, cognition robotics and Human-Robot Interaction, computer vision from universities and research centres.
- Professionals from companies in the field of robotics, computer vision or Industry 4.0.

SPEAKERS

NILS MANDISCHER, SCIENTIFIC EMPLOYEE, RWTH AACHEN UNIVERSITY

Nils Mandischer M.Sc. is a scientific employee of four years at the Institute of Mechanism Theory, Machine Dynamics and Robotics (IGMR) of RWTH Aachen University. His main fields of research are computer vision, sensor data analysis and human-robot-collaboration in firefighting, resulting in the team lead of human-robot-teaming special research group at IGMR. His main contribution in Sharework is in the field of autonomous item detection and localization and safety for industrial manipulators.

ANDREA ORLANDINI, RESEARCHER, ISTC-CNR

Researcher working at the Institute of Cognitive Sciences and Technologies (ISTC-CNR), in Rome. He got a degree in Computer Science Engineering and he received his PhD in 2006 defending the thesis “Logical Based Approaches to Artificial Intelligence Planning and Robot Control” at the Roma Tre University in Rome (Italy). He is currently working within the Planning and Scheduling Team at ISTC-CNR, studying temporal plan validation and execution problem in research projects. His research interests span over automated planning, temporal logic, dependable plan execution and model-based robot control.

MAGÍ DALMAU, RESEARCHER, ROBOTICS & AUTOMATION UNIT, EURECAT

Magí Dalmau received the Industrial Engineering degree from the Polytecnic University of Catalonia (UPC), in 2019; and a MSc in Intelligent Interactive Systems from Pompeu Fabra University (UPF), in 2022. He joined Eurecat in 2019, where he is Robotics Researcher within the Collaborative Manipulation research group and has actively participated in the research and developments of public (European and national) and private projects. His current research interests are focused on AI task and motion planning, RL-based robot behaviours generation, and human-robot interaction.

JULEN URAIN, PHD CANDIDATE, TECHNICAL UNIVERSITY DARMSTADT

Julen Urain M.Sc. is a fourth year PhD candidate in the Intelligent Autonomous Systems group in Technical Universität Darmstadt (TUDa). His main fields of research are the imitation learning and density estimation for robot motion generation. His main contribution in Sharework is in the field of building gesture and motion models to represent and predict human motion.