

Press Release

Date: 26 January 2023

EU Project IntelliMan – How robots will learn in the future: Developing an AI-controlled manipulation system for advanced robot services

Munich/Bologna (Italy) - The potential of intelligent, AI-controlled robots that "give a helping hand" to people in hospitals, care facilities for the elderly and children, factories, restaurants, the service industry and households is enormous. However, an intelligent and interactive robot can only be effective if it can react flexibly to different environments and situations. It therefore needs to be able to learn – and this presents an attainable challenge for researchers and developers. The EU-funded research and innovation project IntelliMan aims to develop such intelligent and learning robots. Thirteen partners from six countries are working together on the project, coordinated by the Università di Bologna (Italy). The EU is supporting the project with EUR 4.5 million under the European framework programme for research and innovation, "Horizon Europe".

In recent decades, research into intelligent, interactive and learning robotics has picked up speed tremendously. Robotic arms and robot grippers for machines that can interact directly and autonomously with their environment are increasingly becoming both available and affordable. However, how these autonomous systems are able to learn new skills will be a key question in the future, as the real world has too many variations for a robot to create an accurate model in advance of all human wishes and behaviours, its environment, the objects within it or the skills needed to handle them.

The next generation of robotic manipulation systems should be able to autonomously perform tasks with limited human supervision and interact with objects regardless of their material, size and shape through artificial intelligence. By interacting with people and the environment, these systems should simultaneously acquire new knowledge that enables their use for unforeseen tasks that have not been pre-programmed. This use ranges from industrial production to logistics, as well as service robotics and portable devices such as exoskeletons and prostheses. This means that these robot systems must learn and comply with certain safety requirements – i.e. they must recognise when they cannot complete a task under the applicable safety requirements in order to create a "level of trust" between humans and robots.

"The IntelliMan project focuses on how a robot can learn efficiently to perform tasks in a targeted, high-performance and safe manner," says Prof. Gianluca Palli, coordinator of the IntelliMan project at the Department of Electrical Engineering, Electronics and Information Technology "Guglielmo Marconi" at the Università di Bologna (Italy). "The robot should learn skills to interact with people, objects and their environment and develop abstract interaction scenarios based on these skills. The robot should also be able to derive properties and functionalities of the objects via targeted interaction. Perception and acceptance by users should be taken into account at all times."

In complex and various application scenarios, IntelliMan scientists want to investigate problems of gripping and placing flexible objects: in upper arm prosthetics, in everyday kitchen activities, in the flexible production of cable sets for automotive cable harnesses and in the handling of fresh food for supermarket logistics applications. This heterogeneous set of usage scenarios with a wide variety of challenges should enable the development of different solutions for the interaction problem.

About the EU project IntelliMan

The IntelliMan consortium consists of 13 internationally recognised scientific and industrial partners from six countries (Germany, Italy, Spain, Switzerland, Slovenia and the United Kingdom). They come from the fields of AI, robotics, information and communication technologies (ICT), as well as social sciences, humanities and economics, and work together in an interdisciplinary manner in the project coordinated by the Università di Bologna (Italy). The EU is supporting the project with EUR 4.5 million under the European framework programme for research and innovation, "Horizon Europe". For more information: www.intelliman-project.eu.

About Università degli Studi della Campania

Università degli Studi della Campania – Luigi Vanvitelli (UCLV) participates to IntelliMan with the Automatic Control group of the Engineering Department. In IntelliMan, UCLV will use its previous experience to optimize and integrate tactile and proximity sensors in suitably designed multi-sensorized fingers for commercial grippers (T5.1); develop sensor-based control strategies for grasping and manipulation of deformable objects (T5.4); develop sensing data interpretation algorithms for reconstructing features (e.g. interaction forces, shapes, stiffness) for object grasping and manipulation, (T5.1); develop slipping detection and avoidance algorithms (T5.4); investigate hand-over algorithms (T4.2).

IntelliMan profile

Project name: IntelliMan (grant agreement no. 101070136) – AI-Powered Manipulation System for Advanced Robotic Service, Manufacturing and Prosthetics

Duration: 09/22-03/26

Coordination: [Università di Bologna](http://www.unibo.it), Italy (University of Bologna, Italy)

Project partners:

[German Aerospace Center \(DLR\)](http://www.dlr.de), Germany

[Friedrich Alexander University Erlangen-Nuremberg](http://www.fhn.uni-erlangen.de), Germany

[Universitat Politècnica de Catalunya](http://www.upc.edu), Spain

[Università degli Studi di Genova](http://www.unige.it), Italy

[Università degli Studi della Campania "Luigi Vanvitelli"](http://www.univcampania.it), Italy

[Eurecat Centre Tecnològic](http://www.eurecat.com), Spain

[Istituto nazionale per l'assicurazione contro gli infortuni sul lavoro \(INAIL\)](http://www.inail.it), Italy

[ELVEZ](http://www.elvez.si), Slovenia

[OCADO Group](http://www.ocado.com), United Kingdom

[Bavarian Research Alliance \(BayFOR\)](http://www.bayfor.de), Germany

[IDIAP](http://www.idiap.ch), Switzerland

[University of Zurich](http://www.unizh.ch), Switzerland

Project coordinator: Prof. Gianluca Palli, Università di Bologna, Italy

Programme: Horizon Europe

Total project amount: EUR 6 million

Funding: European Union

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