Artificial intelligence: Disi welcomes ARI, a humanoid robot

A social robot, the product of AI research, has just arrived from Barcelona to the Department of Information Engineering and Computer Science - DISI in Povo, where it will be trained to work in healthcare and assistance. ARI is capable of moving around, moving arms, hands and eyes and can talk, but now it will be programmed by the research group of DISI to interact even better with people thanks to its ability to convey expression and its natural language skills. The goal of the European project SPRING is to establish how much it will be accepted by patients, the elderly and healthcare staff in hospitals and nursing homes.

Trento, 7 June 2021 – Its name is ARI, it is almost as tall as a person and was created for one purpose: to socialize. A bizarre challenge, given that ARI is a humanoid robot, the result of research in the field of artificial intelligence and social robotics, designed to perform tasks such as helping and informing people. ARI, produced by PAL Robotics in Barcelona, has recently arrived at the Department of Information Engineering and Computer Science (Disi) of the University of Trento, where it will be programmed mainly to assist the elderly as part of an international research project.

But how will it be received by people? Will it be accepted? A first answer may come from the results of the ongoing study on its ability to interact. The European project SPRING (Socially Pertinent Robots in Gerontological Healthcare), led by Professor Elisa Ricci of Disi for UniTrento, focuses precisely on “social robots” to be employed in healthcare and assistance. These robots, like ARI, are programmed to develop advanced dialogue and multimodal data analysis skills, to process audio and video data for example, and to be usable they must be able to interact as naturally as possible with more people simultaneously.

Now researchers are trying to understand if interaction and communication with people are socially accepted. The premises, however, are encouraging: ARI can combine the ability to convey expression with arms and hands, head movements, eye animations and LEDs, with speech synthesis and recognition functions. The integrated touchscreen in the chest allows viewing of multimedia content and gives users an intuitive interface. Its strengths are its technological equipment (sensors, RGB-D, stereo, fisheye and RGB cameras, IMU, microphones) and computing power (main computer with Intel i7 CPU and a secondary embedded computer with NVIDIA® Jetson™ TX2 GPU): ideal conditions for developing machine learning.

Social robots and the SPRING project – In recent years, social robots have been successfully introduced in public places such as museums, airports, malls, banks, but also in hospitals and retirement homes. In addition to the ability to navigate, grasp and manipulate objects, they must also be able to communicate with people in the most natural way and to move and interact in complex and unstructured populated spaces. International research...
projects such as SPRING aim precisely at creating a new generation of robots, much more sophisticated and flexible, that can adapt to the needs of users.

ARI is produced by PAL Robotics, a start-up based in Barcelona. The SPRING research project, coordinated by INRIA (National Institute for Research in Information Technology and Automation) in Grenoble, also involves, in addition to the University of Trento with Disi, the Czech Technical University of Prague, Heriot-Watt University of Edinburgh, and Bar-Ilan University of Tel Aviv. The business partners are ERM Automatismes Industriels Carpentras, PAL Robotics Barcelona and Hôpital Broca of Paris.

The project, launched in January last year, will continue for four years and has received 8.3 million euro funding from the European Union under Horizon 2020. At the University of Trento, it is coordinated by Professor Elisa Ricci: "Here at Disi we create artificial intelligence algorithms so that the robot, which is already equipped with good basic functions, can move in complex situations, where there are objects and many people, such as rehabilitation facilities and nursing homes. We also programme it so that it can have sophisticated language skills, as natural as possible, that allow it to interact better with patients and elderly people. It can move in space, turn around, talk, monitor the position of people and obstacles or view content, and it can be suitable, for example, for reception tasks or to support rehabilitation activities by interacting with medical and healthcare personnel. Our project aims to understand if patients will accept the robot: a challenge that requires interdisciplinary skills, involving psychology and cognitive sciences, which go beyond information and communication technologies".

More information on the project is available on the website: https://project.inria.fr/spring/

"Research on humanoid robots does not end here", commented the director of DISI Paolo Giorgini. "Another ARI is in fact arriving in the coming weeks and will complete the infrastructures available in the department's laboratories which, from September, will be available to students and researchers for the new academic year". The new laboratories were created thanks to funds allocated by the Ministry of University and Research to the Department of Excellence, and have made it possible to purchase infrastructure and equipment for different research areas, including distributed robotics.

The ARTEMIS (Assistive Robots wiTh EMotIonal Skills) project, funded by the VRT Foundation, will also play an important role, as it aims to develop algorithms to help social robots interpret the emotional state of people they interact with in order to improve their social skills. The robot will also have to take into account the personal information that determine the emotional state of people. To do this, researchers will develop new methodologies that integrate computer vision, audio signal processing and machine learning.