

ROSSANA, CRS4's first anthropomorphic robot

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ROSSANA, the first anthropomorphic robot from CRS4 - the Research Centre operating within the Science and Technology Park of Sardinia, has been developed **in collaboration with Athlos**, a Sardinian company specialised in artificial intelligence and human-machine interaction, and has been presented to the media today in Cagliari, Sardinia - Italy.

The robot is the final result of a project named 'Robotika', which was financially supported with about 300,000 euros by the Regional agency Sardegna Ricerche. The project was aimed to develop a **prototype of a physical conversational robot**, in this case a **library assistant robot**, capable of interacting with visitors by indicating the presence of books they require and accompanying them to the shelves where books are placed. The experimental activity, which successfully took place during the second lockdown caused by the pandemic, was carried out in the **CRS4 laboratories**, set up ad hoc as if it were a real library.

Giacomo Cao, CRS4's sole administrator, explains: "CRS4 created the robot using Sardegna Ricerche's Rapid Prototyping laboratories to print its components. Rossana is currently able to understand the questions she is asked and give answers with the help of artificial intelligence developed by Athlos. In addition, she is able to **move autonomously**, at the moment, to accompany visitors to the shelves where the requested book is placed, while above all, she is able to **perceive the surrounding environment**, thus avoiding potential obstacles, thanks to the software developed and patented by our technologists". Cao continues: "CRS4 has consequently registered the **ROSSANA trademark** to identify the hardware, physical components and movement software of the robot, and we will be developing a **proprietary artificial intelligence system in the next future**".

Alessandro Frulio, technical-scientific manager of **Athlos** points out: "In this project, the company has implemented an **advanced conversational system** entirely designed for the robot, which provides it with a 'brain' capable of understanding, speaking, remembering and learning. In addition, thanks to an experiential memory based on visual recognition, it can manage **personalised conversations**. Frulio continues: "Thanks to the experimentation and training we conducted in an environment simulating a library, we specialised the robot as a library assistant providing information on the books and authors present, and more generally on other authors and volumes". Frulio concludes: "The prototype created will be the subject of further experimentation and has great potential for developing conversation and interaction with the external environment. We do hope that this project will be the first step to start the development of robotics in Sardinia to meet the future challenges of the personal robot market for use at home and other public and private contexts (e.g. personal assistance, surveillance, etc.)".

Massimo Deriu, CRS4's technologist and author, together with young colleagues Federico Bachis and Marco Massa, of the patent application for the **indoor navigation system** that allows the robot to move within a **circumscribed physical space**, points out: "Why the name **Rossana**? The trademark refers to what has been developed by CRS4 for the 'physical robot', which consists of **software and hardware**, partly opensource such as the operating system ROS (Robot Operating System from which the name ROSSana derives) and InMoov through which the physical parts and a portion of the hardware can be obtained".



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Deriu continues: “We developed and **patented the control software** for the robot that manages all the **movements** of arms, head and wheels, while the **head**, which is the focal point of HRI - Human Robot Interaction, was designed not only taking advantage of structural and aesthetic concepts, but we also devised the **interaction** system such as the interface and usability that allows Rossana to **recognise people’s faces** and **express her emotional states** by changing the colour of her face”.

Maria Assunta Serra, managing director of Sardegna Ricerche: “The project of the first humanoid robot developed in Sardinia confirms the island’s expertise in advanced technologies, such as those of CRS4 in the IT field, and the innovative potential of start-ups and enterprises, which Sardegna Ricerche assists in all stages, from the business idea, as in the case of Athlos, to product development, from market entry to internationalisation, and as here by making available the Technology Park’s prototyping facility”. Continues Serra: “This project is one of many that we have supported through the ‘Aid to Research and Development’ programme, financed by the Sardinian Region with funds from the POR-FERS Sardegna (2014-2020). In the two previous calls, we received 169 applications, 94 of which were financed with a total expenditure of over 20 million euros. These positive results prompt us to reintroduce the scheme in the next regional programme, taking into account the suggestions of the companies and research centres involved in order to make the necessary adjustments”.

Cao concludes: “All the know-how used to develop the Rossana robot represents the **basis of new robotics projects**, ranging from those serving humans to cobots used to facilitate production processes in collaboration with humans. This subject can be of great interest to the Region of Sardinia, as it allows it to foreseen a cutting-edge future”.

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