



PRESS RELEASE

PLANTOID: the technological future of Europe has robotic roots

Funded within the FET projects of the European Commission, the PLANTOID project, coordinated by the Istituto Italiano di Tecnologia, will design new generation robots inspired by plants

Genoa, 7 June 2012 – Official start of the three-year European project “PLANTOID”, coordinated by the **Center for Micro-BioRobotics (CMBR) of the Istituto Italiano di Tecnologia**, on 7th and 8th June, at the Faculty of Agriculture of the University of Florence. The project ***Innovative Robotic Artefacts Inspired by Plant Roots for Soil Monitoring (PLANTOID)***, which is funded within the European Commission’s prestigious **Future and Emerging Technologies Open (FET-Open)** scheme, aims to design and develop robots inspired by plants – called “Plantoids” – which, combining a new generation of hardware and software technologies, will be able to imitate the behaviour of plant roots.

The project involves, besides the **CMBR of the Istituto Italiano di Tecnologia in Pisa, the University of Florence, the Institute of Bioengineering of Catalonia (IBEC) in Barcelona and the Ecole Polytechnique Fédérale de Lausanne (EPFL)**, and will be carried out by a wide interdisciplinary scientific consortium comprising engineers, plant biologists and computer scientists.

“Robotics inspired by plants is a totally innovative field,” states **Barbara Mazzolai, Scientific leader of the project and Coordinator of the CMBR of the IIT in Pisa**. “The project PLANTOID aims, on the one hand, to carry out advanced studies on the behaviour of the root apices, and subsequently on their chemical-physical and mechanical characteristics – and, on the other hand, to provide models and first prototypes of robotic roots imitating them, with a specific focus on their penetrative, explorative and adaptive capacities.”

In particular, researchers at the **CMBR of the IIT** will engage in the development of the hardware system of the robotic root, the physical sensors to be integrated into the root apices, and the actuators allowing the penetration and orientation of the roots. Furthermore, they will study in more depth the phenomenon of tropism; that is, the response of the roots to external stimuli such as nourishment and gravity. The group of the **University of Florence** will carry out studies on the chemical-physical communication among the roots of the plant itself, which is crucial for its coordinated growth; the group at **IBEC** will focus on the chemical sensors that root apices need to recognize different substances in the soil; and the group at the **EPFL** will develop the software architecture necessary to control the robotic structure and its sensors.

Every Plantoid will be made up of a root apex – comprising sensors, actuators and control units – and a robotic trunk, which are mechanically connected via a long structure. The ultimate aim of the project is to develop a network of sensorized robotic roots able to reproduce the capabilities of exploration, environmental



adaptation and coordination typical of the plant kingdom, and to provide a model of artificial plant comparable to those found in the natural world, also in terms of energy efficiency and sustainability.

The Istituto Italiano di Tecnologia (IIT) is a private law Foundation jointly established by the Ministry of Education, University and Research and the Ministry of Economy and Finance, with the aim of promoting excellence in both basic and applied research and to facilitate the development of the national economy. IIT's total staff is comprised of 1041 individuals. The scientific area is represented by about 86% of total staff, of which 37% are foreigners: 22% are researchers coming from 38 countries worldwide and around 15% are "returning Italian brains".

IIT has produced more than 2000 publications and 121 patents, of which 67 Italians and 54 international. The departments that collaborate in the main office based in Genoa include Robotics ("Robotics, Brain and Cognitive Sciences" and "Advanced Robotics"), departments oriented to life sciences ("Neuroscience and Brain Technologies" and "Drug Discovery and Development") and the "Nanochemistry", "Nanophysics", "Nanostructures", "Pattern Analysis & Computer Vision" and "iCub" facilities. Since 2009 the scientific activity has been further supported by 10 research centers located throughout Italy (Turin, Milan, Trento, Parma, Rome, Pisa, Naples, Lecce) that are developing the new platforms of the 2012-2014 scientific plan.

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