Partnership

IIT(I)
- *Coordinator* -
Istituto Italiano di Tecnologia
Barbara Mazzolai

UNIFI (I)
Università degli Studi di Firenze
Stefano Mancuso

IBEC (E)
Institute for Bioengineering of Catalonia
Josep Samitier

EPFL (CH)
Ecole Polytechnique Fédérale de Lausanne
Dario Floreano

www.plantoidproject.eu

Project Information

Project Co-ordinator
Dr. Barbara Mazzolai

Center for Micro-BioRobotics
Istituto Italiano di Technologia – IIT
Via R. Piaggio, 34 – Pontedera (Italy)
Tel: +39-050883400
Fax: +39-050883402
Email: barbara.mazzolai@iit.it

Project Duration: ***36 months***

Project Cost: ***2,091,887 €***

EC contribution: ***1,619,924 €***

4 partners from 3 countries

www.plantoidproject.eu

PLANTOID

Innovative Robotic Artefacts Inspired by Plant Roots for Soil Monitoring

Future & Emerging Technologies

www.plantoidproject.eu

Objectives

The **STREP PLANTOID** Project will aim at designing, prototyping, and validating a new generation of ICT hardware and software technologies inspired from plant roots, called PLANTOIDS, endowed with distributed sensing, actuation, and intelligence for tasks of environmental exploration and monitoring. PLANTOIDS take inspiration from, and aim at imitating, the amazing penetration, exploration, and adaptation capabilities of plant roots.

PLANTOID has two major goals:

1) to abstract and synthesize with robotic artefacts the principles that enable plant roots to effectively and efficiently explore and adapt to underground environments;

2) to formulate scientifically testable hypotheses and models of some unknown aspects of plant roots, such as the role of local communication among root apices during adaptive growth and the combination of rich sensory information to produce collective decisions.

www.plantoidproject.eu

Plant Root Bioinspiration

Plants have evolved very robust growth behaviours to respond to changes in their environment and a network of branching roots to efficiently explore the soil volume, mining minerals and up-taking water.

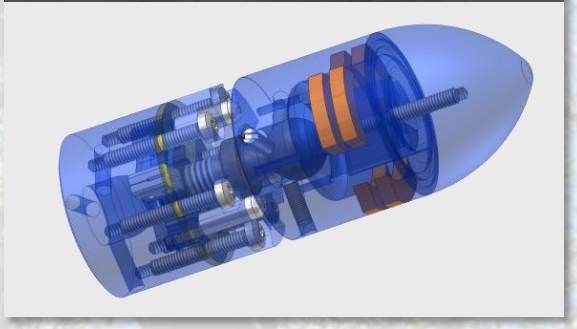
In this vision plant roots can represent an unexplored model for Collective Adaptive Behaviour as well as a source of inspiration for Soft Robotics. In particular:

- The plant root system morphologically adapts to the environment to and explores it with a number of rich sensorized probes.
- Plants represent an excellent paradigm in terms of energy efficiency, low speed, strong actuation, and low power consumption.
- Plants show adaptively variable growth and development during their lifetime.

www.plantoidproject.eu

The Plantoid

The PLANTOID artefact will be composed of a network of sensorized and actuated roots, displaying rich sensing and coordination capabilities as well as energy-efficient actuation and high sustainability, typical of the Plant Kingdom. Each PLANTOID root will consist of an apex that comprises sensors, actuators, control units, and by an elongation zone that mechanically connects the apex and the trunk of the robot. The new technologies expected to result from PLANTOID concern energy-efficient actuation systems, chemical and physical micro-sensors, sensor fusion techniques, kinematics models, and distributed, adaptive control in networked structures with local information and communication capabilities.



www.plantoidproject.eu