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The Future & Emerging Technologies (FET) program (http://www.cordis.lu/ist/fet) of the Information Society Technologies (IST) program of the Information Society Directorate General of the European Commission is to promote long-term research aiming at opening new possibilities for future research programs. Towards that target, for the seventh framework program, FET set proactive activities such as Beyond Robotics, Complex Systems Research and Disappearing Computer, etc.

"Beyond Robotics" (http://www.cordis.lu/ist/fetro.htm) was launched in 2003 in order to promote European research in the area. The initiative concentrated on three specific objectives:

- the development of cognitive robots whose "purpose in life" would be to serve humans as assistants or "companions"
- hybrid bionic systems that would augment human capabilities such as perception of the environment, motion, interaction with other humans, etc.
- the development of autonomous microrobot groups ("robot ecologies"), consisting of many heterogeneous members exhibiting collective behaviour and intelligence.

Towards the first objective, project COGNIRON ("The Cognitive Robot Companion,"http://www.cogniron.org) was awarded to ten partners from seven countries. With a duration of four years the project budget is approximately EUR€8 million. The COGNIRON objective is to study the perceptual, representational, reasoning and learning capabilities of embodied robots in human-centered environments. The project aims to develop methods and technologies for the construction of cognitive robots that will be able to evolve and grow their capacities in close interaction with humans, which will be able to serve humans as companions in their daily life. The design of the cognitive functions of this artificial creature and the study and development of the continuous learning, training and education process in the course of which it will mature to a true companion, are the central research themes of the project. Expected results are basic methods, algorithms and architectures and their integration and long-term experimentation and scientific evaluation on embodied robotic systems in different settings and situations.

NEUROBOTICS ("The fusion of Neuroscience and Robotics for augmenting human capabilities," http://www.neurobotics.info) was awarded towards the second objective. Sixteen partners from seven European countries in addition to one from the United States and one from Japan will cooperate for four years with a budget of EUR€6.7 million. The main objective is to pursue a strategic alliance between neuroscience and robotics by exploring the area of hybrid bionic systems (HBSs) to deeply investigate the theme of human augmentation. Starting from the most advanced state of the art in neuroscience, the project will aim at developing new integrated robotic artifacts, as much biomorphic as required to be effectively interfaced with human body and brain. Three robotic platforms featuring different levels of hybridness (i.e., mechanical coupling with the human body) and of connectivity (to the human nervous system) will be developed to be used in experiments on human augmentation: biomimetic scalable artifacts to be remotely controlled by a human operator (beyond tele-operation); intelligent wearable artifacts loosely physically coupled with the human body (beyond prostheses); arm-hand sub-systems tightly physically coupled with the human body (beyond prosthetic or orthotic devices).

The third objective is the theme of "Intelligent Small World Autonomous Robots for Micro-manipulation" (I-SWARM, http://www.i-swarm.org) awarded to ten research teams from eight countries for four years and a budget of approximately EUR€5 million. Technological problems in miniaturizing systems have to date been huge obstacles towards building artificial "ant robots" which closely cooperate as a swarm. The I-SWARM project wants to be a stepping stone towards an artificial ant (yet, building such an ant robot having all capabilities of natural ants, is still years from now) and aims to take a leap forward in robotics research by combining experts in microrobotics, in distributed and adaptive systems as well as in self-organizing biological swarm systems. The project will produce technological advances to facilitate the mass-production of microrobots, which can then be employed as a "real" swarm consisting of up to 1,000 robot clients. These clients will all be equipped with limited, on-board intelligence. The swarm will consist of a huge number of different robot types, with various sensors, manipulators and computational power. Such a robot swarm can perform a variety of applications, including micro assembly, biological, medical, or cleaning tasks.

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