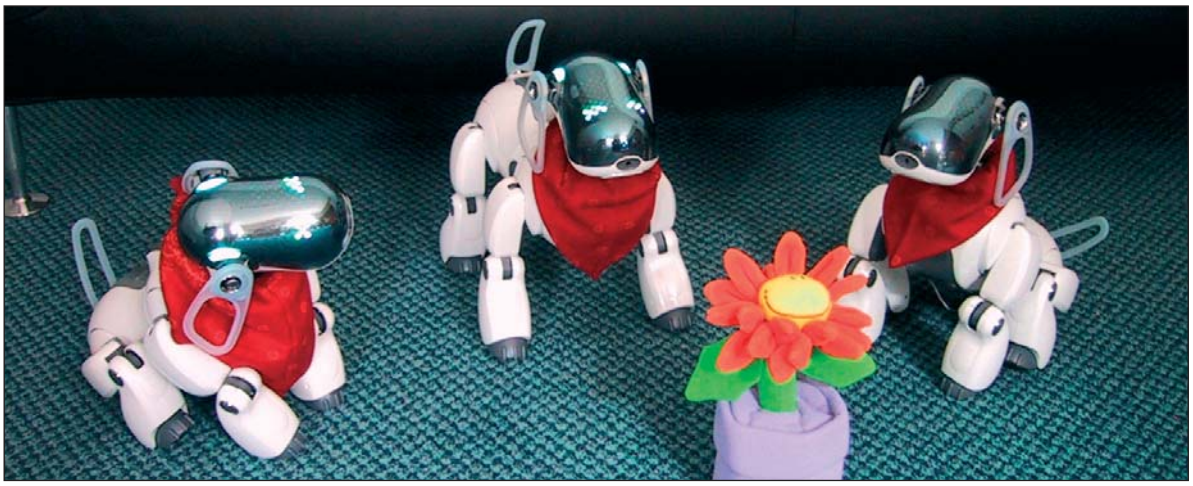
ECAGENTS - EMBODIED AND COMMUNICATING AGENTS



SONY AIBOs interacting with a flower pot

Artificial Intelligence (AI) researchers have been criticised for putting in too much a priori knowledge - pre-programmed rules - by hand. The same is to some extent true with language. If we put in the rules of English, we do not explain how one could learn, invent or agree on language rules. Language is a continuously evolving system. New sounds, new meanings, and new grammatical constructions appear all the time, and a language user creatively innovates. This is the process that the new FP6 project ECAGENTS tries to elucidate. If we let a robot community develop its own ways of viewing the world and ways of communicating about it, the artificial communication and representation systems the robots develop might have language-like features, although they obviously will never be equal to existing human languages. What is interesting for the purpose of AI is that the robot community developed these communication systems themselves.

In a recent experiment, "Talking Heads", Luc Steels at Sony Laboratories in Paris studied the evolution of a shared lexicon in a population of embodied software agents. The agents developed their vocabulary by observing a scene through digital cameras and communicating about what they have seen together. To add an extra level of complexity to their task, agents were able to move freely between different computer installations located in different parts of the world.

ECAGENTS will develop a new generation of embodied agents that are able to interact directly (i.e. without human intervention) with the physical world and to communicate between themselves and with other agents (including humans). This will be achieved through the development of new design principles, algorithms, and mechanisms that can extend the functionality of existing technological artefacts (mobile phones, WI-FI devices, robots and robot-like artefacts, etc.) and can lead to the development of new artefacts.

The project will develop concepts, tools and models for analysing collections of both natural and artificial agents, and algorithms, definitions of dynamical systems, and performance analysis tools for designing artefacts that consist of evolving populations of interacting and communicating embodied agents.

The project will investigate basic properties of different communication systems, from simple communication systems in animals to human language and technology-supported human communication, to clarify the nature of existing communications systems and to provide ideas for designing new technologies based on collections of embodied and communicating devices.

The main focus of the project is on the development of scientific foundations by using methods, insights and techniques from complex systems research. An evolving communication system and its underlying adaptive ontology will be viewed as a complex adaptive system. Evolutionary theory, information theory, game theory, network theory, and dynamical systems theory will all significantly contribute to its study. The results of the project might trigger significant breakthroughs in many future and emergent technologies, from self-developing robots to the semantic Web and ubiquitous wireless devices.

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