

## **The Evolution of Emotions and their Expression in Autonomous Agents and Robots**

Contact: Dr Lola Cañamero (L.Canamero@herts.ac.uk; <http://homepages.feis.herts.ac.uk/~comqlc>)

Emotions and their expression are key components of social interactions in humans and other animals, serving as mechanisms for communication, signaling, directing attention, motivating and controlling interactions, assessing situations, etc. As put forward by Darwin, they also play a number of survival-related functions: for example, anger energizes and prepares the body for action, fear enhances features that permit to escape from predators and other dangers, etc. Both aspects are relevant for autonomous and social robots that must inhabit and survive in dynamic environments presenting similar kinds of challenges, particularly the natural environments of humans.

From the perspective of evolution, emotions can be regarded as adaptive mechanisms that arose to better face significant survival-related events that recurred in evolutionary history. Artificial life and robotics can contribute to the understanding of how our emotions became what they currently are by simulating in computers and robots how they could have evolved under different environmental conditions and in response to various evolutionary pressures. Different projects could be developed within this general theme, depending on the background and interests of the candidate. The projects would investigate, in an artificial life environment and ideally also using physical robots, the evolution of a subset of emotion-related systems and (expressive) behaviors as a function of diverse evolutionary pressures, putting particular emphasis on social interaction and dynamics. Another aspect that would be of particular interest involves the interactions between the evolution (at the level of the specie) and the development (at the level of individuals) of emotional systems.

Applicants should have a very strong first degree or (preferably) a Master's degree in Computer Science, Biology, Cybernetics, Cognitive Science, or other relevant area, and are expected to have strong interdisciplinary interests (e.g. in robotics, biology, neuroscience, psychology) as well as substantial computer programming ability.