

# Brain for Robots

Invited talk at AIC 2014

November 26-27 University of Turin, Italy

<http://aic2014.di.unito.it>

Giulio Sandini

IIT, Italian Institute of Technology,  
Università degli Studi di Genova, Italy

**Abstract.** Simulating and getting inspiration from biology is not a new endeavor in robotics [1]. However, the use of humanoid robots as tools to study human cognitive skills it is a relatively new area of the research which fully acknowledges the importance of embodiment and interaction (with the environment and with others) for the emergence of motor and perceptual skills, sensorimotor coordination, cognitive and social abilities [2]. Within this stream of research “developmental robotics” is a relatively new area of investigation where the guiding philosophy – and main motivation – is that cognition cannot be hand-coded but it has to be the result of a developmental process through which the system becomes progressively more skilled and acquires the ability to understand events, contexts, and actions, initially dealing with immediate situations and increasingly acquiring a predictive capability [3]. The aim of this talk is to present the guiding philosophy – and main motivation – and to argue that, within this approach, robotics engineering and neuroscience research are mutually supportive by providing their own individual complementary investigation tools and methods: neuroscience from an “analytic” perspective and robotics from a “synthetic” one.

## References

1. Atkeson, C.G., Hale, J.G., Pollick, F.E., Riley, M., Kotosaka, S., Schaul, S., Shibata, T., Tevatia, G., Ude, A., Vijayakumar, S., et al.: Using humanoid robots to study human behavior. *IEEE Intelligent Systems and their applications* 15(4), 46–56 (2000)
2. Sandini, G., Metta, G., Konczak, J.: Human sensori-motor development and artificial systems. In: *Proc. of the Int. Symp. on Artificial Intelligence, Robotics, and Intellectual Human Activity Support for Applications*. pp. 303–314 (1997)
3. Vernon, D., Metta, G., Sandini, G.: A survey of artificial cognitive systems: Implications for the autonomous development of mental capabilities in computational agents. *Evolutionary Computation, IEEE Transactions on* 11(2), 151–180 (2007)