Chapter 5
Research on Human Cognition for Biologically Inspired Developments:
Human–Robot Interaction by Biomimetic AI

Marko Wehle
Technische Universität Berlin, Germany

Alexandra Weidemann
Technische Universität Berlin, Germany

Ivo Wilhelm Boblan
Technische Universität Berlin, Germany

ABSTRACT

Robotic developments are seen as a next level in technology with intelligent machines, which automate tedious tasks and serve our needs without complaints. But nevertheless, they have to be fair and smart enough to be intuitively of use and safe to handle. But how to implement this kind of intelligence, does it need feelings and emotions, should robots perceive the world as we do as a human role model, how far should the implementation of synthetic consciousness lead and actually, what is needed for consciousness in that context? Additionally in Human-Robot-Interaction research, science mainly makes use of the tool phenomenography, which is exclusively subjective, so how to make it qualify for Artificial Intelligence? These are the heading aspects of this chapter for conducting research in the field of social robotics and suggesting a conscious and cognitive model for smart and intuitive interacting robots, guided by biomimetics.

INTRODUCTION

Humans adapted in the former eras of technological progress often to the use of technology, in spite developed by humans, one had to learn how to handle technology via many steps and realise them with caution. Because of technology's pioneering complexity it was not always satisfying the users needs and the premise of safe handling, special training and expert knowledge was often required to a large extend. In the new era control and feedback control systems, also called Cybernetics, take over for handling technology with ease and comfort. The focus on the practical usage of technology shifted in an evolutionary process towards human centred interfaces, e.g. from first computers with command line via mouse input towards touch-screens. For instance, considering people, and even kids, on using touch-screens one can recognise an intuitive usage, familiar and intuitive movements for interactions are easier to accomplish. In addition, sophisticated countries and states have to face the challenge of a demographic transition in their societies, which conditions the vision of service robotics to develop machines to be adaptive in their social behaviour. Meaning, reflecting the environment and being available to different users or user groups and their pleomorphism. A carer or patient interacting with the same device will have perhaps miscellaneous requirements and emphasis for it. Therefore, the research on biological cognitive abilities and confident behaviour, as well machine learning with information seeking aspects, should be considered for developing artificial intelligence (AI) systems. Thus far, it is not a new idea and the subject of mind, consciousness and models of thinking and self-awareness are discussed already since the 16th century, but often in rather philosophical or mathematical semantic ways, because the inside perspective is hard to grasp. Notably the beginning in understanding of mind led to impressive sociological impact, for example by the "Age of Enlightenment". Hence resulting in innovative thinking, which still influences current research and this research is a remaining challenge to science and engineering with impressive progress about the last six decades. Despite the different nature of former scientific contributions, all of the work has one major aspect in common: to achieve the goal of an implementation of artificial thought, mind and consciousness – only an interdisciplinary perspective can provide the necessities and insights from biological role models towards intuitive artificial intelligent systems. With the aim to provide input to the development of intuitive user interfaces and artificial perception, leading to artificial cognition, only joint competence from fields like biology (physiology, cognition), physics/mathematics (cognition, information processing and artificial intelligence), engineering (cybernetics, biomimetics, robotics), sociology (cooperation, synergy of human and technology, as well sociological impact and consequences, ethics), design (materials, aesthetics, appearance), philosophy and arts can identify and display what humans are capable

Related Content

Wave Propagation in Filamental Cellular Automata

Alan Gibbonsand Martyn Amos (2010). *International Journal of Natural Computing Research (pp. 56-69).*

www.irma-international.org/article/wave-propagation-filamental-cellular-automata/41944

Genetic Programming for Spatiotemporal Forecasting of Housing Prices

M. Kaboudan (2007). *Handbook of Research on Nature-Inspired Computing for Economics and Management (pp. 851-868).*

www.irma-international.org/chapter/genetic-programming-spatiotemporal-forecasting-housing/21170

Optimization Techniques for Influenza Prediction in Biological Expert Systems

U. Vigneshand Rahul Ratnakumar (2024). *Bio-Inspired Optimization Techniques in Blockchain Systems (pp. 192-206).*

www.irma-international.org/chapter/optimization-techniques-for-influenza-prediction-in-biological-expert-systems/338091

Quantum Automata with Open Time Evolution

Mika Hirvensalo (2012). *Nature-Inspired Computing Design, Development, and Applications (pp. 74-89).*

www.irma-international.org/chapter/quantum-automata-open-time-evolution1/66771

Modeling Qualitative Development

A. Pyka (2007). *Handbook of Research on Nature-Inspired Computing for Economics and Management (pp. 211-224).*

www.irma-international.org/chapter/modeling-qualitative-development/21131