

## **Why robotics developing teams need to be formed as interdisciplinary teams**

Gottfried Wilhelm Leibniz Universität Hannover/Germany

Project coordinator: Dr. Sebastian Fischer

Contact person: Richard Heise

heise@idd.uni-hannover.de



**Institut für  
Didaktik der Demokratie**

In collaboration with: 2EK Peraia (Greece), Emphasys Centre, Cyprus Computer Society (Cyprus), Civic (UK), CDIMM (Romania), WIDE (Luxembourg) and IES Maria Moliner (Spain)



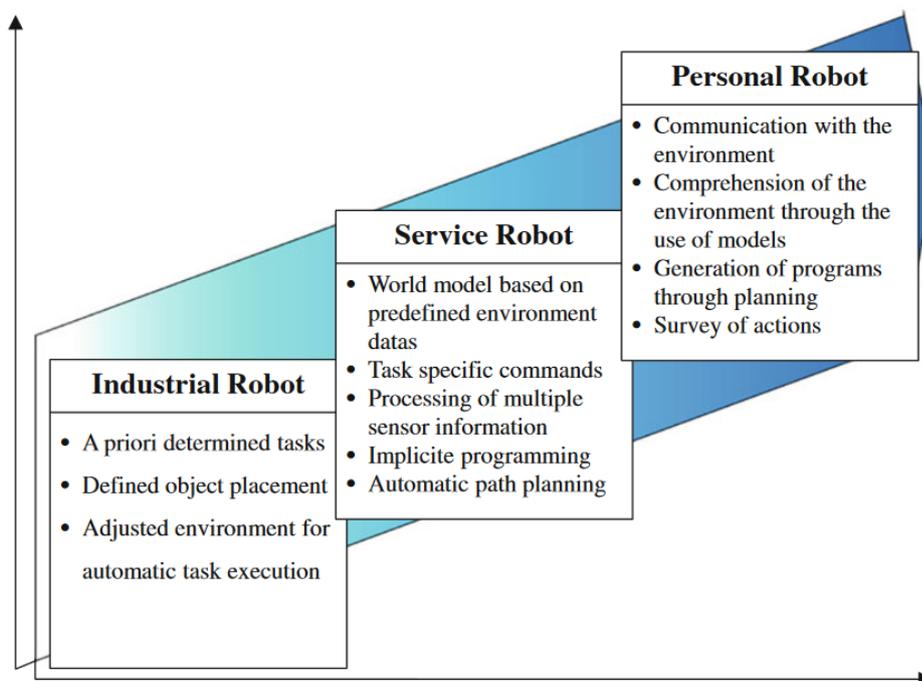
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## Why robotics developing teams need to be formed as interdisciplinary teams

### Background

The evolution of robots, beginning with the focus on predefined and repetitive tasks in the industrial sector, has led to robots that are able to replace humans in fulfilling exhausting or dangerous tasks more and more autonomously. More powerful computer technology brought the possibility to program robots with complex instructions and let them perform multiple service tasks in the field of logistics, aerospace, healthcare or security. The interaction with other robots or even humans is the latest step in the evolution of robots. These types of personal robots are able to react to a variety of inputs from the physical world around them and act or communicate accordingly.



Source: Schraft et al.1993<sup>1</sup>

The evolution of the way robots are developed and designed has also affected the demand for corresponding expertise in the field these robots are utilised.

<sup>1</sup> Schraft R, Hägele M, Wegener K (1993) Service robots: the appropriate level of automation and the role of users/operators in the task execution. In: Proceedings of international conference on systems engineering in the service of humans, 17–20 Oct 1993. Systems, Man and Cybernetics, vol 4, pp163–169

## **Interdisciplinary robotic developing teams**

The development of all basic features of robots is rooted in the domain of experts in electrical engineering, computer science and mechanics. As the importance of service robots grew, new field of studies like automation robotics or artificial intelligence were introduced, that already gathered interdisciplinary elements from the fields of hardware, software and particular expertise in the field these robots were used in, like production, logistics or agriculture.

The direct interaction with humans regarding personal robots extended the demand for interdisciplinary teams by the need for experts in law, politics, care or psychology. Since the programming of robots, including the emerging possibilities of artificial intelligence and machine learning, is dependend on a basic set of information and rules about the outside world, the provision of ethical guidelines and security aspects are crucial for a safe and successful collaboration of robots and humans.

## **Examples of interdisciplinary robotic developing teams**

- An Interdisciplinary, Team-Based Mobile Robots Design Course for Engineering Technology: A robotic course at the Georgia Southern University brings together students from the fields of mechanical engineering and electrical engineering to develop mobile robots in small teams.<sup>2</sup>
- A team of electrical and computer engineers together with a fine-arts student participated at the robotics football competition of the department of Aerospace and Mechanical Engineering at The University of Notre Dame by creating a „Robotic Football Dance team“.<sup>3</sup>
- The Roboethics Atelier, founded 2005 by the European Robotics Research Network works on the development of robots and corresponding guidelines for ethical questions as a parallel process, involving experts from the fields of natural science and humanities, like philosophical, cultural oder religious studies.<sup>4</sup>

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<sup>2</sup> Rios-Gutierrez, F.; Alba-Flores, R. (2011): An Interdisciplinary Team-based Mobile Robotsdesign course for Engineering. Available at <https://digitalcommons.georgiasouthern.edu/cgi/viewcontent.cgi?article=1002&context=electrical-eng-facpubs>, accessed on 24.03.2020

<sup>3</sup> Desmond, D.; Horton, M.; Morrison, A.; Khorbotly, S. (2016): Robotic football dance team: An engineering Fine-Arts interdisciplinary learning experience. 1-6. 10.1109/FIE.2016.7757485.

<sup>4</sup>Veruggio, G. (2007): The EURON roboethics roadmap. 612 - 617. 10.1109/ICHR.2006.321337.