Coping with the “Robot Hype” – A Soft Materials Approach

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Robotics 2017 has a problem – a big problem (I’m not talking about industrial robotics – no problem there, I mean “social robotics” or “service robotics”): What has been delivered until now does not match by any standards people’s expectations (which are shaped by Hollywood movies like iRobot, Terminator, or even the early Metropolis by Fritz Lang). I will argue that there is a huge robotic hype and that there is a big danger that the bubble will burst if we – engineers, scientists, entrepreneurs – don’t manage to deliver on the promises. And we must deliver robots that do have useful sensory-motor functionality that goes beyond merely talking, smiling, and perhaps waving.

There are numerous companies producing so-called “social robots”, the champion being Softbank’s “Pepper” robot. Other examples of social robots are: Jibo, Papero, Unisrobo, Alpha-2, Zenbo, Tapia, Buddy, Robohon, Kirobo, Mi Bunny, to mention but a few. The can all talk (a little), perhaps put on a smile, recognize some facial expressions, perhaps wave a bit, but they have no useful sensory-motor functionality whatsoever. “Pepper”, for example, can inform customers in a Nescafe Café (e.g. in Harajuku) about the latest features of Nespresso machines, but it is not capable of making coffee. Investments into robotics are soaring world-wide, and many of these social robotic companies have received substantial investments. The reality is very disappointing – full-featured humanoid robots are nowhere near in sight.

We propose to cope with the robotic hype – i.e. to deliver this sensory-motor functionality – by employing the concepts of “Soft Robotics” and “Scaffolding.” The term "Soft Robotics" designates a new generation of robots capable of functioning in the real world by capitalizing on "soft" designs at various levels: surface (skin), movement mechanisms (muscles, tendons), and interaction with other agents (smooth, friendly interaction). Industrial robots, by contrast, operate in highly controlled environments with no or very little uncertainty. By "outsourcing" functionality to morphological and material characteristics - e.g. to the elasticity of the muscle-tendon system - the distinction between control and controlled, which is at the heart of manufacturing and control theory, breaks down and entirely new approaches will be required. The term “scaffolding” implies that we exploit constraints from morphology, materials, and environment, which often reduces the design complexity to a fraction of what it was originally. In this lecture I will be showing many examples and case studies from biology and engineering. I will also introduce the ROBOLOUNGE project – a café, bar or lounge where robots instead of humans take care of the well-being of the customers. It is a venue designed to enable customers to “experience the future” in very close interaction with robots in a real-world public environment.