

Preface

For about the last ten years, the scientific world of robotics has been influenced by worldwide innovative stimuli from research inspired by biological processes. Instead of rigid structures, the trend is now towards the use of soft, pliable organic structures, materials, and surfaces. In doing so, scientists obtain their inspiration from diverse biological organisms such as humans, vertebrates, caterpillars, snakes, octopuses, starfish and plant roots. They try to understand natural mechanisms and use this information to develop a new generation of robots – “soft robots”. This new class of robot may be utilized in unsafe, dynamic task environments, to grip and manipulate unknown objects, move around in rough terrain, interact with humans in top security situations and even be capable of the visionary research topic of self-repair.

In numerous initiatives, especially in the USA, Japan, Italy and Switzerland, but also in Germany, some of these technologies have already been transferred to initial applications. In view of this already advanced pioneering work, in the spring of 2014 we came to the conclusion that there is an urgent need to gain an overview of the state of research in selected European institutions. To do this, we organized a symposium that was held at Fraunhofer IPA in Stuttgart in Germany on 23rd and 24th June 2014. There, over the course of three plenary sessions and four forums, 30 scientists gave their assessment of the situation and reported on their first successes in the promising research field of »soft robotics«.

We took the opportunity, offered by such a positive response to the event, to ask speakers to contribute towards this book by submitting details of their projects. Among other things, the geographic locations of the authors also showed that quite a few universities are taking different approaches as they explore this new field of research.

We were always aware of the fact that this has only given us a glimpse of the situation and highlighted merely a handful of representative research concepts. The 22 contributions to the book are intended not only to intensify people’s individual research efforts but also to encourage more interdisciplinarity. That’s because we’re only just beginning to develop the in-depth cooperations that are needed between engineers, biologists, material scientists, medical doctors, chemists and mathematicians to turn promising new ideas into radical innovations.

As well as the 77 authors, a few scientists were also particularly involved in completing the book. The editors would like to take this opportunity to thank them for their commitment. We would also like to express our thanks to the German Academic Society for Assembly, Handling and Industrial Robotics (MHI) and its president Bernd Kühlenkötter as well as the directors Jörg Franke and Thorsten Schüppstuhl for their kind support in realizing the symposium and in planning this book.



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Transferring Theory to Application

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