The Internet of Bio-Nano Things – Smart Computing in the Human Body

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I. Description

The Internet of Bio-Nano Things (IoBNT) is an innovative field of research located at the intersection of nanotechnology, biotechnology and information and communication technologies. It aims to enable the seamless integration of biological and nanoscale systems into the Internet in order to develop advanced biomedical applications, environmental monitoring sensors and energy-efficient networks. At the core of IoBNT are biocompatible nanodevices that can function in living organisms to monitor or modify specific biological processes in real time. These devices communicate with each other and with the Internet to collect, process and transmit data, opening up entirely new possibilities for health monitoring, disease control, environmental protection and many other areas. By merging biology and nanotechnology, IoBNT promises to push the boundaries of what is technically possible while improving the efficiency and sustainability of technological solutions.

This tutorial first introduces the basics of IoBNT. It explains the basic requirements and existing technologies and looks at a number of example applications, primarily medical applications. In the main part, DNA-based nanonetworks are presented as a promising implementation technology. Before providing an outlook, further concepts are addressed, which focus in particular on gateways between communication inside and outside the body.

The motivation behind a tutorial on the IoBNT can be divided into several core objectives:

- To teach the basics: the tutorial provides a solid introduction to the fundamental concepts, technologies and applications of IoBNT. It lays the foundation for understanding how biological systems and nanotechnology can merge to develop novel solutions for current and future challenges.
- Promoting research and development: By presenting current research results and developments in the field of IoBNT, the tutorial aims to inspire and motivate researchers and developers. It serves to stimulate innovative ideas and collaborations between conference participants to further push the boundaries of what is possible in this field.
- Emphasize practical applications: By discussing real-world application examples and case studies, the tutorial aims to highlight the practical relevance of IoBNT. It aims to raise awareness of the potential of this technology especially in the areas of healthcare.
- Discuss technical challenges and solutions: An important aspect of the tutorial is to address the technical challenges that can arise when implementing IoBNT systems. By discussing solutions and best practices, participants will gain a deeper understanding of the complexity and steps required to overcome these challenges.
- Networking and community building: Finally, the tutorial also serves to build a network of researchers, developers and interested parties in the field of IoBNT. It provides a platform for the exchange of knowledge, experiences and contacts that can be useful for future collaborations and projects.

By combining these goals, the tutorial aims not only to enrich participants with knowledge, but also to motivate active participation and further research in this fascinating and forward-looking field.

II. Speaker

Stefan Fischer is a full professor in Computer Science at the University of Lübeck, Germany, and the director of the Institute for Telematics. He got his diploma degree in Information Systems and his doctoral degree in Computer Science from the University of Mannheim, Germany, in 1992 and 1996, respectively. After a postdoctoral year at the University of Montreal, Canada, he held positions at the International University in Germany as an assistant professor and at the Technical University of Braunschweig as an associate professor, until he joined Lübeck University in 2004. His research interest is currently focused on network and distributed system structures such as ad-hoc and sensor networks, Internet of Things, Smart Cities and nano communications in these fields. He has (co-)authored more than 200 scientific books and articles.

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