13. Juli 2015

# Sensor Technologies & the Human Experience

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*Convening diverse thinkers for a unique conversation about sensor technologies, considered as emerging sociotechnological systems, with emphasis on actual and potential societal and individual impacts.*

As sensor technologies become increasingly powerful and pervasive, what effects might this have on embodied sensation and the human experience, on the individual and societal levels?

How can sensor networks and associated functionalities be innovatively and responsibly developed?

What are the key considersations for individual and societal decision makers with respect to ubiquitous artificial sensation?

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**Workshop Information**

Dates and Duration
21-22 July 2015

Location
TUM-Institute for Advanced Study (IAS)
Lichtenbergstraße 2 a
85748 Garching

Leaders
Klaus Mainzer (TUM)
&
Kathleen Eggleson
(U of Notre Dame)

## Workshop Agenda

## ~~~~~21 July~~~~~

A. Opening Session

9:00-9:45
*Trillion Sensor Roadmap: Innovative Chance and Societal Impact*
Klaus Mainzer

9:45-10:30
*Ethical and Evolutionary Perspectives on Externalized, Artificial Sensing*
Kathleen Eggleson

**10:30-11:00 Coffee Break**

B. Technical Basics (Chair: Lugli)

11:00-11:45
*Introduction to Sensor Technologies*
Wolfgang Porod

11:45-12:30
*Energy Requirements for Ubiquitous Sensors*
Steve Goodnick

**12:30-14:00 Lunch**

14:00-14:45
*Getting Our Brain to Sense a New Body*
Gordon Cheng

C. Applications (Chair: Porod)

14:45-15:30
*Printing Technologies for Low Cost Sensors*
Paolo Lugli

**15:30-16:00 Coffee Break**

16:00-16:45
*Wireless Sensor Network Enabled by Energy Harvesting Technology for the Digital Agriculture*
Luca Larcher

16:45-17:30
*Context is the New Content: Biologically-Inspired Robot Perception*
Laurel Riek

D. Societal Sectors (Chair: Eggleson)

17:30-18:15
*Big Data based Governance: Autonomy and Control in Sociotechnical Systems*
Sabine Thürmel

**18:30-21:00 Dinner**

## ~~~~~22 July~~~~~

9:00-9:45
*Legal Concepts in the Light of modern Human-Machine-Interaction*
Suzanne Beck

9:45-10:30
*On the way to Generation 'R' – Advanced Sensor Technologies as Enabler for the Future of Robotics*
Dominik Bösl

10:30-11:15
*Sensing Cities, Detecting Politics: Using Speculative Fiction to Explore Urban Life*
Jathan Sadowski

**11:15-11:45 Coffee Break**

E. Individual Human Implications (Chair: Mainzer)

11:45-12:30
*Sensors and Sensibility: Can We Collect, Store, and Share Ubiquitous Sensor Data and Still Protect Individual Privacy and Identity?*
Denise Baker

12:30-13:15
*Linking Social Cognitive Neuroscience with Robotics for Better Social Robots*
Agnieszka Wykowska

13:15-14:00
*Social Robots and Their Society: Some Sociological Reflections on a Sociotechnical System*
Sabine Maasen

F. Closing Remarks (Mainzer/Eggleson)

14:15-14:30
*Discussion*
All participants

**Time and Place, TBD**

G. Writing

Available participants will gather for further discussion and writing.

## Sponsors

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# Participants

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## DOMINIK BÖSL

Corporate Innovation Manager, KUKA AG (Germany's leading Robotics Company), Technology Owner: "Apps, Cloud & IoT" (M.S. Computer Science, M.A. Philosophy of Science, MBA (US): U. Pittsburgh/ U. Augsburg), Expertise: Innovation management, future of (cognitive) robotics, societal impact of robotics

Dominik Boesl has been responsible for Innovation and Technology Management at KUKA since he joined KUKA Laboratories in 2011 as Head of Corporate Strategy and Member of the Board. Since 2012, he works as Corporate Innovation Manager in the CTO Office at KUKA AG and has the responsibility for all innovation efforts for the whole KUKA group. As one of KUKA's Technology Owners (equivalent to other companies' Technical Fellows or Distinguished Engineers) he defines the group's strategy for "Apps & Cloud". Dominik Boesl started his career in 1999 at Siemens and helped to establish the foundations for today's mobile ecosystem by bringing the first UMTS broadcasting cell to market, before joining Microsoft Germany in 2005. At Microsoft, he held various leading positions with national responsibility in developer evangelism. Instead of moving to Seattle and joining Microsoft Corporation at a leading position in program management, he joined the KUKA group. Dominik Boesl graduated with a diploma in computer science from the University of Augsburg and a MBA degree from the University of Pittsburgh. Besides his career, he has constantly been working as a lecturer at different Universities, within Munich Technical University (TUM), and is author of technical and scientific publications. In his sparetime, he is publishing educational concepts around serious gaming and works as head of a charity organization that maintains AntMe!, one of the world's most successful serious games.

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## KATHLEEN EGGLESON

Biological scientist and practical ethicist at the University of Notre Dame, Center for Nano Science and Technology (ND*nano*), with an educational background in molecular microbiology and microbial pathogenesis (Ph.D. Washington University in Saint Louis). Leads the university's multidisciplinary Nano Impacts Intellectual Community; served as past Associate Director of the Reilly Center for Science, Technology, and Values; lead instructor of Technology and Ethics for entrepreneurial MS students in the Engineering, Science, & Technology Entrepreneurship Master's Program (ESTEEM) program; committee chair for 2010 Notre Dame conference *Toward Regulation of Nanomaterials: A Conversation Between Academia, Industry, Law, and Government;* member of the ANSI-Accredited U.S. Technical Advisory Group (TAG) to the International Organization for Standardization (ISO) Technical Committee (TC) 229 on Nanotechnologies. Current NSF projects include 'Ethics Education in Life Cycle Design, Engineering, and Management', designing nanomaterial case-based graduate level ethics education materials, and the societal and ethical implications component of 'Computer Architectures for 2020 and Beyond', with activities including this *Sensor Technologies & the Human Experience* workshop. Research interests in emerging nanotechnology ethics, particularly cases involving both biological and justice considerations. Recent first/only author articles in *Nano medicine: Nanotechnology, Biology, and Medicine (*2013), *NanoEthics* (2014), and *Journal of Responsible Innovation* (2015).

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## SABINE THÜRMEL

Independent researcher and lecturer at Carl von Linde Academy, TUM. Background both in computer science (Ph.D. in Computer Science from TUM in 1989) and philosophy (Ph.D. in Philosophy of Science and Technology from TUM in 2013, advisor Klaus Mainzer). Wide-ranging computer science experience including parallel and distributed systems as well as multi-agent systems and as technical strategy advisor at Siemens. Interdisciplinary work on the foundations and effects of culture changing information technologies since the 1990s. Book chapters in 2015: "The Participatory Turn – A Multidimensional Gradual Agency Concept for Human and Non-human Actors", "Exploring Social and Asocial Agency in Agent-based Systems" (both in press by Springer). Big Data focus in 2015: „Responsible Innovation in Big Data Systems" to be presented at Data Power, Sheffield, CLMPS 2015, Helsinki, and SPT 2015 in Shenyang, China. Current research interests include Big Data, autonomy and control in socio-technical systems, emergence and chance in agent-based simulations.

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## AGNIESZKA WYKOWSKA

Senior researcher and lecturer affiliated both with the Dept. of Psychology, Ludwig-Maximilians-Universität (LMU) Munich and Chair for Cognitive Systems, TUM. Scientific coordinator of a DFG-project with Singapore "Intercultural Social Robotics", lead by Prof. Gordon Cheng, TUM. Background in Philosophy and Logic (M.A. in Philosophy from the Jagiellonian University, Krakow, Poland) as well as in Cognitive Neuroscience (M.Sc. in Neuro-cognitive Psychology, LMU, Munich). PhD and Habilitation in Psychology (LMU Munich). Expertise: social cognitive neuroscience in the context of human-robot interaction and social robotics. Methods: EEG, eyetracking, psychophysics. Research interests: fundamental mechanisms of social cognition in human-robot interaction (joint attention, attunement, perceptual and motor resonance, perspective taking, theory of mind); prerequisites for adopting the intentional stance towards robots; incorporating robots into human social sphere for applied purposes (healthcare, elderly care); sensing abilities in social robots; cultural aspects in social robotics.

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