Dr. Yuko Harayama

Executive Director RIKEN, Japan

Former Executive Member of Council for Science, Technology and Innovation

"Human in the loop or human-centered"

Abstract

The use of AI and digital technologies helps us to be connected each other, even under stay-at-home orders, and to be informed, almost in real-time, from multi-sources, of what is happening around the world, while bringing the question of how to ensure the quality, credibility and validity of information generated by these means. Also, an abundance of information does not necessarily mean better decision-making, it can also reinforce bias, and digital divide may occur.

"Human-in-the-loop" approach emerged in the context of machine learning could be perceived as an attempt to address these issues. Along this line of thought, I will invite the audience to revisit the role of "human" in the development and use of AI and digital technologies in my presentation.

CV

Dr. Yuko Harayama is an Executive Director principally charged with international affairs at RIKEN. Prior to joining RIKEN, she spent five years at the Cabinet Office of Japan as an Executive Member of the Council for Council for Science, Technology and Innovation, two years at the OECD as the Deputy Director of the Directorate for Science, Technology and Innovation, and ten years at the Graduate School of Engineering of Tohoku University as a Professor of Management Science and Technology. She is a Legion D'Honneur recipient (Chevalier) and was awarded honorary doctorate from the University of Neuchâtel. She holds a Ph.D. in education sciences and a Ph.D. in economics, both from the University of Geneva.

Dr. Fredrik Heintz

Associate Professor of Computer Science at Linköping University, Sweden

"Education for an AI-assisted Future - From Primary Education to Life-Long Learning"

Abstract

AI is influencing almost all aspects of life and society. To help people prosper in this new AI-assisted world, education is essential to provide the knowledge and skills needed. AI-related skills are no longer something only for developers and researchers, it is becoming necessary for all. We also need people that are both domain experts and proficient in AI and how to use it in their profession or domain.

At the same time, the amount of knowledge in the world doubles exponentially, which means that our education programs will cover less and less of the knowledge available and put more demands for on-demand and life-long learning. Further, as professions changes and become AI-assisted, people need to learn to solve problems together with computers. They need to develop their computational thinking.

To meet these challenges will require changes to all levels of education, from primary school to professional education. This talk will provide an overview of the challenges, present some partial solutions and make recommendations for how to proceed. Success is absolutely crucial. If we fail, millions of people risk being left behind. If we succeed, progress and quality of life could improve significantly!

CV

Dr. Fredrik Heintz is an Associate Professor of Computer Science at Linköping University, Sweden, where he leads the Reasoning and Learning group. His research focus is artificial intelligence especially Trustworthy AI and the intersection between machine reasoning and machine learning. He is the Director of the Graduate School for the Wallenberg AI, Autonomous Systems and Software Program (WASP) the largest research program in Sweden with more than 300 PhD students, coordinator of the TAILOR ICT-48 network developing the scientific foundations of Trustworthy AI, and the President of the Swedish AI Society. He is also very active in education activities both at the university level and in promoting AI, computer science and computational thinking in primary, secondary and professional education. Fellow of the Royal Swedish Academy of Engineering Sciences (IVA).

Dr. Satoshi Murayama

Professor Emeritus / Co-Convener of the International Consortium for Earth and Development Sciences, Kagawa University, Takamatsu, Japan

"Environmental humanities: a long-term local history approach to living spaces to be sustained"

Abstract

Japanese rice fields have a long tradition of more than thousands of years. They have been constructed based on a logic of local organic economies, which have also become a foundation of early modern Japanese economy, but not a market economy in a strict sense, because the rice fields had two different spheres: one of them is a taxation system, and the other is a subsistence economy, a self-sufficient or fulfillment economy for local inhabitants. The latter function could be realized in small scale land holdings less than 0.5 ha, and then, they could survive in Japan until recent days.

Organic economies in early modern times have found their position between self-sufficiency and market economies. More self-sufficiency in Japan, and more in market economies in Europe. Organic economies in early modern Japan have had a prolonged existence of more than 400 years everywhere in Japan. Such an ecological system has tended to disappear in recent years because of the de-population process and due to agricultural and environmental policies in Japan. However, a long-term local history approach can find some local efforts to sustain the organic economies. They show us a couple of evidence which could be a future possibility for a gradual departure from an "Anthropocene epoch" in the "short" twentieth century, which is dependent on "fossil fuel energies" in the world.

CV

Dr. Satoshi Murayama is Professor Emeritus at Kagawa University. His research field is environmental economic history with a particular interest in human, social and environmental capital management in medieval and early modern Europe and Japan. He comparatively investigates regional diversity, especially in the differences of all local Living Spaces. He acquired his Ph.D. degree from Justus Liebig University Gießen in 1990. He was a professor of socio-economic and environmental history at Kagawa University, Japan, served two years as President of the Association for East Asian Environmental History from 2013 to 2015, and organizes several research projects on Living Spaces.

Dr. Lucas Paletta

Head of Human Factors Lab and Research Team "Cognitive Sensing and Interaction" at the applied research center JOANNEUM RESEARCH Forschungsgesellschaft mbH in Graz, Austria

"Cognitive Sensing for the Future of Smart Health and Care"

Abstract

The healthcare industry is transforming at a rapid velocity that is offering new research and innovation opportunities based on AI-enabled sensing. With ever-increasing health data from personal fitness trackers, connected medical devices, and other sensors that collect real-time information, healthcare platforms are among the earliest adopters of cognitive computing—systems that can understand, reason and learn while interacting with humans. In the care of neurodegenerative diseases, digital phenotypes were analyzed for prevention and intervention purposes. The keynote talk highlights the work on ICT assistance technologies for dementia with a focus on recent projects of the Human Factors Lab at JOANNEUM RESEARCH DIGITAL. This round trip starts with the household-based application of social robot Pepper that was particularly targeted to activate persons with dementia and to motivate them to adhere to multidomain gamified training. Furthermore, cognitive sensing is presented in terms of non-obtrusive eye tracking technology in VR and AR devices for the screening of cognitive decline during mindfulness and gamified executive function training. Finally, research trajectories for gaze interfaces in serious games for cognitive assessment and training are discussed from the view of monitoring neuropsychological profiles and with an outlook on future emerging technologies.

CV

Dipl.-Ing. Dr.techn. Lucas Paletta is Head of the Human Factors Lab and its Research Team "Cognitive Sensing and Interaction" at the applied research center JOANNEUM RESEARCH Forschungsgesellschaft mbH in Graz, Austria. He was visiting researcher at Fraunhofer IAIS (Germany) 1998-2000 and received his PhD. in Computer Science from Graz University of Technology 2000 on Machine Learning for Active Vision. Since 2000 he worked as principal investigator and coordinator of inter-/national application oriented research projects, such as, in the EU projects MOBVIS, MACS, euCognition, MARFT, MASELTOV, PLAYTIME, SIXTHSENSE and MARA on assistive technologies with AI-enabled sensing of psychological constructs. His

research on smart care applications for persons with cognitive decline, such as, with Alzheimer's disease, focused on intuitive interfaces for the measurement of executive functions, using mobile, serious games, AR-, VR- and social robot-based technologies. He founded/chaired the international and interdisciplinary workshop series, ISACS (International Symposia on Attention in Cognitive Systems), IDGEI (Intelligent Digital Games for Empowerment and Inclusion) and, recently, AIDEM (Artificial Intelligence for Prevention and Intervention in Dementia Care). He has (co-)authored more than 200 peer reviewed scientific publications, acted in service for the European Commission on future and emerging technologies, and has been Member of the Board of the Austrian Association for Pattern Recognition (AAPR) for many years.

Dr. Hiroshi Tsuji

Executive Director, University Public Corporation Osaka, Japan
Former President of Osaka Prefecture University

"From 45 years' experience on R&D and education on systems sciences"

Abstract

This talk presents personal view of systems sciences from the carrier in industry and academic society. At first, it reviews Cybernetics proposed by N. Winer and an empirical science of "artificial phenomena" argued by H. Simon. They pointed out that artificial things are synthetic and characterized in terms of functions, goals and adaptation based on observation. Then, touching the subtleties among data, information and knowledge, it illustrates how the computer systems (data processing, information processing and knowledge processing) have evolved to Society 5.0 and are evolving. To make Society 5.0 sustainable, we should make balance for multiple goals such as economic advancement with resolution of social problems. According to the social change, two education programs are also introduced in the context of higher education reform: undergraduate program "Sustainable Systems Sciences" and leading graduate program "System-inspired Leaders in Multidisciplinary Sciences". Finally, challenge for making co-creative research teams is also presented with cases.

CV

Dr. Hiroshi Tsuji is currently an executive director of Public University Corporation Osaka which operates two universities (Osaka Prefecture University and Osaka City University) and one college of technology. Receiving BS and MS degrees from Kyoto University, he worked with Hitachi, Ltd. in 1978-2022 where he was engaged in R&D for Management Information Systems including expert systems and decision support systems. While he was in Hitachi, he was also a visiting researcher of Carnegie-Mellon University (1987-88) and a visiting scholar of Stanford Japanese Center (1995-2001). He joined in Osaka Prefecture University as a professor at Department of Industrial Engineering in 2002. As a dean, he started multi-disciplinary education in College of Sustainable Systems Sciences in 2012. As a vice president, he started leading graduate program called "System-inspired Leaders in Multidisciplinary Science" in 2013. He was the president of Osaka Prefecture University in 2015-2019.

Dr. René Reiners

Head of Human-Centered Engineering & Design bei Fraunhofer-Institut für Angewandte Informationstechnik FIT, Germany

"Human-Centered System Design for Successful Digital Transformation"

Abstract

Japanese rice fields have a long tradition of more than thousands of years. They have been constructed

Digitalization and the need for innovation pushes at all parts of businesses, organizations and institutions. Be it in production, the energy sector, healthcare, work and home office support or even private, everyday life: We must life the change and adapt to upcoming technologies…

However, is that really a satisfying scenario? Information and communication technology (ICT) offers a plethora of innovations and benefits. The challenge we all face nowadays lies in the handling of and interaction with systems whose complexity is increasing continuously.

In order to face that challenge, technology must evolve but the whole technical steps necessary to operate the systems must step in the background. Mark Weiser already formulated this demand in the early 90s as "ubiquitous computing", the disappearance of technology from our focus. The aim is that users can follow their tasks that they want to perform, assisted by technology – not being distracted.

During the talk, we will have a look at the methodology of user-centered design here engineering of solutions happens in close collaboration with stakeholders. This approach is very promising in coming up with solutions that widely satisfy the users' needs and requirements. In addition, the user experience should be high enough, to accept the system and regard it as beneficial for the tasks that need to be fulfilled.

The talk will present examples from practice where this approach was followed and thus provide insights into working environments and the way system and interaction designers work.

CV

Dr. René REINERS leads the department Human-Centered Engineering & Design at Fraunhofer FIT where more than 30 researchers work on user and data-driven innovation on top of IoT technologies. Applications deal with the digital transformation in Industry 4.0 environments, Smart Food Ecosystems and Smart Cities.

Currently, he coordinates the project GRANITE within the research marketing campaign "The Future of Work" funded by the German Ministry of Education and Research in which he teamed up with Sabine GANTER-RICHTER and Marco INVERNIZZI from Lyogroup International to strengthen common activities regarding collaboration between German and Japanese industry and academia.

René REINERS obtained his diploma in computer-science from RWTH Aachen University, Germany. After his studies, he gained experience in industrial software development within the REWE Group Germany. 2007 he joined Fraunhofer FIT. During his work, he obtained his doctoral degree in natural sciences at RWTH Aachen University in 2013. Within research and industry projects, he is responsible for project management and coordinating research efforts in the field of system and application design, user-centered design, human-computer-interaction and knowledge management with the aid of design patterns.

He is certified PMI Project Management Professional (PMP), IREB certified Professional for Requirements Engineering, OMG certified UML Professional and Fraunhofer-Certified Usability Engineer.

Mr. Colin de Kwant

Vice President of Sweden Modular Management AB, Former Second Cycle University Lecturer of product modularization at Royal Institute of Technology, KTH, Stockholm, Sweden

"Sustainable Mobility Scenario Modeling: Evaluating Future Resilience of Modular Concepts for Electrified Trucks"

Abstract

Facing a myriad of megatrends such as sustainability, servitization, digitalization, electrification, automation and urbanization one of the greatest concerns for companies is how well their business will fit their future markets. Failing to timely prepare products for future markets may cause substantial losses. Consequently, many companies have drawn their interest to flexible product development strategies to cope with the complexity of changing and diffuse requirements. Research has highlighted Modularization as one such strategy. But how does one modularize against the uncertain future? Mobility solutions like trains, trucks and busses are designed to sustain long lifecycles as do the modular product and infrastructure platforms from and for which they are designed. While serving economic goals and keeping material resources in use, long life products, platforms and infrastructure may lock manufacturers and societies into paths limiting the transformation to more sustainable solutions. Mentioned megatrends, as well as sustainable socio-economic goals for safer, affordable and sustainable mobility stress the need to ensure future resilience and flexibility in such product platform development and innovation processes.

This talk proposes to integrate futures studies into the modularization process and model a evaluate the effectiveness of modular products against future scenarios. The case example used concern battery and hybrid fuel-cell electric trucks for long-haul goods transport mission.

The case study builds upon profound scenario frameworks from earlier research, developed with participation of more than 50 experts from 30 different organizations within the transportation industry. The scenarios do not intend to frame the most likely future. Instead, the scenarios provide a set of possible but distinctive different futures. The scenarios provide context for evaluation and modelling of performance and robustness of modules and product configurations around three key customer values: Total Cost of Ownership, Transport Effectiveness and Sustainability. The modular product configurations simulated in the model consist of the most significant but yet largely independent high-level modules. Results enabled, for instance, to reflect on most and least robust modular design and configurations choices across multiple futures to guide the scope for platform development.

The pathways and application scenarios for the continuation of this study are multiple. One is to

evaluate both near term (more certain but also constrained) versus long term (more uncertain, but unlocked) futures to support assessment of evolving, transient or new product platform design strategy, and configurations enabled or disabled in each. Another would be to include decision making pro's and con's such as the possible financial impact of design strategy alternatives to guide product platform planning and R&D investments.

We welcome you to join the conversation with industry-, research and public sector, as we are all stakeholders to a sustainable future. We believe scenario frameworks and models such as these can provide an effective common language and shared configurable future contexts to connect people and organizations, evaluate ideas and accelerate projects, as modules in societies' present and futures.

CV

Mr. Colin de Kwant is a Vice President and partner at Modular Management AB. He currently leads in Modularization Programs, Product Development Management-, and Supply Chain Development. He was the second cycle university lecturer of product modularization at Royal Institute of Technology, KTH, Stockholm, Sweden from 2011 to 2018 and is currently a centre coordination group member as researcher and industry partner at Royal Institute of Technology, ECO2 Vehicle Design. His consulting experiences include modularization at Ericsson (Sweden), Danfoss Drives (Denmark, US) Körber Mediseal (Germany), Alstom Hydro (France, India), Whirlpool Corporation (Italy) and so on.