Invited Speaker 1

Invited Speech Title: **Modular Playware and Personal Health Technology**

henrik.hautop.lund@gmail.com

Dr. Henrik Hautop Lund is Professor at Technical University of Denmark, is head of the Center for Playware, and has published more than 175 scientific papers and several patents. He has served in the Danish National Research Council. He is World Champion in RoboCup Humanoids Freestyle 2002, has developed shape-shifting modular robots, and has collaborated closely on robotics, ALife and AI with companies like LEGO, Kompan, BandaiNamco, etc. for the past two decades. His Center for Playware at the Technical University of Denmark has a long track record of developing modular robotic playware for playful contextualized IT training in Sub-Saharan Africa, for playful rehabilitation for sport, for music, for wearable, for play, and for education. These modular playware technology developments include I-Blocks (LEGO bricks with processing power) and modular interactive tiles (larger bricks for physical rehab). Further, with the development of East-Africa's first science and business park, local entrepreneurship has been fostered amongst students graduating from the university degree programs in contextualized IT. Combining such skills, it became possible to develop technical skill enhancing football games and global connectivity based on modular playware for townships in South Africa for the FIFA World Cup 2010. Lately, together with international pop star and World music promoter Peter Gabriel, he has developed the MusicTiles app as a music 2.0 experience to enhance music creativity amongst everybody, even people with no initial musical skills whatsoever, and made physical modules for Peter Gabriel's live stage performance. In all cases, professor Henrik Hautop Lund and his research center develop modular playware technology in a playful way to enhance learning and creativity amongst anybody, anywhere, anytime.

Invited Speaker 2

Invited Speech Title: **How the new technologies might lead to a paradigm shift in psychological and neuropsychological research**

Luigipagliarini@gmail.com

Dr. Luigi Pagliarini is Professor of The Academy of Fine Arts of Macerata, Italy, an artist, psychologist, multimedia and software designer, expert in robotics, AI and Artificial Life. He is currently Professor at the Academy of Fine Arts of Macerata (Italy) and Consultant Professor at DTU Center for Playware (Denmark). He has published in different international books, journals, congresses and conferences proceedings and has been rewarded with international prizes more than once. He has exhibited his work in different museums and institutions all over the world. Luigi Pagliarini has also worked for many different institutes and universities as professor or researcher and, as consultant, with many enterprises and multinational factories. His work has often been reported on many international newspapers, magazines and televisions.

Invited Speaker 3

Invited speech title: **Natural Computing Paradigm – A Concise Introduction**

Dr. Takashi Yokomori is a Professor of Mathematics Department, Faculty of Education and Integrated Arts and Sciences, Waseda University, Tokyo.

Research themes: Automata and Formal Language Theory, Computational Learning Theory (e.g., Grammatical Inference), Theory of Natural Computing (e.g., Molecular Computing Theory, Bio-informatics, Chemical Reaction Computing)

yokomori@waseda.jp

Educational and Professional Careers:

1998 -- (present) : Professor, Waseda University, Japan
1997 -- 98: Professor, University of Electro-Communications, Japan
1989 -- 97: Associate Professor, University of Electro-Communications, Japan
1983 -- 89: Researcher, IIAS-SIS, Fujitsu Limited, Japan
1982 -- 83: Postdoctoral Fellow at Pennsylvania University, USA
1981 -- 82: Postdoctoral Fellow at McMaster University, Canada
1979 -- 81: Research Associate, Sanno College, Japan
1979 : D.Sci., University of Tokyo,Japan
1976 : M.Sci., University of Tokyo, Japan
1974 : B.Sci., University of Tokyo, Japan

Academic Activities:

Please refer to: http://www.edu.waseda.ac.jp/~yokomori/activitye.html

Selected Publications: (since 2010)

・ F. Okubo and T. Yokomori : The computational power of capability of chemical reaction automata, *Natural computing*, Vol.15, pp.215-224, 2016.

・ F. Okubo and T. Yokomori : Finite Automata with Multiset Memory: A New Characterization of Chomsky Hierarchy, *Fundamenta Informaticae*, Vol.138, pp.31-44, 2015.

・ F. Okubo and T. Yokomori: Recent developments on reaction automata theory: A survey, in "Recent Advances in Natural Computing" (Selected results from the IWNC 7 Symposium), Series: Mathematics for Industry, vol.9 (Y. Suzuki and M. Hagiya, eds.),pp.1-22, Springer, 2014.

・ G. Rozenberg et al.(Eds.): Handbook of Natural Computing, Chapter 34:"Molecular Computing Machinies--Computing Models and Wet Implementations (by M. Hagiya, S. Kobayashi, K. Komiya, F. Tanaka, T. Yokomori), Springer, 2012.

・ F. Okubo, S. Kobayashi and T. Yokomori : On the properties of language classes defined

by bounded reaction automata, *Theoretical Computer Science*, Vol.454, pp.206-221, 2012.
・ F. Okubo, S. Kobayashi and T. Yokomori : Reaction Automata, *Theoretical Computer Science*, Vol.429, pp.247-257, 2012.
・ F. Okubo and T. Yokomori : On the Hairpin Incompletion, *Fundamenta Informaticae*, Vol.110, pp.255-269, 2011.
・ M. Ionescu, G. Paun, M. Perez-Jimenez and T. Yokomori : Spiking Neural dP-systems, *Fundamenta Informaticae*, Vol.111, pp.423-436, 2011.
・ F. Okubo and T. Yokomori : Morphic Characterizations of Language Families in Terms of Insertion Sytems and Star Languages, *Intern. J. of Foundations of Computer Science*, Vol.22, No.1, pp.247-260, 2011.
・ F. Manea, V. Mitrana and T. Yokomori : Some Remarks on the Hairpin Completion, *Intern. J. of Foundations of Computer Science*, Vol.21, No.5, pp.859-872, 2010.
・ O. Ibarra, M. Perez-Jimenez and T. Yokomori : On Spiking Neural P-systems, *Natural Computing*, Vol.9, pp.475-491, 2010.
(For full details, please refer to:
http://www.edu.waseda.ac.jp/~yokomori/publiste.html)

[Contact]

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Abstract: Natural computing (NC) is an emerging research area that investigates computing techniques and models inspired by nature, and it also investigates phenomena taking place in nature in terms of computational methodologies. Thus, NC research congenitally bridges between computer science and a broad spectrum of fundamental research fields including biology, chemistry, physics, medical science, and so forth.

In this talk, we give a concise introduction to this new paradigm of NC. Specifically, we give an overview of selected topics of the fields in which the stress is primarily put on theoretical achievements in computing paradigms such as molecular computing and chemical computing.

Invited Speaker 4

Invited Speech Title: **Artificial Immune Ecosystems: challenges for a new generation of bio-inspired secure and resilient systems**

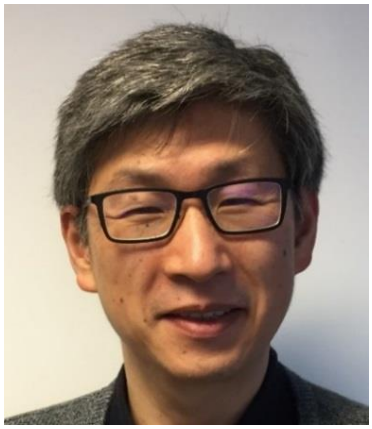
pierre.parrend@unistra.fr

Dr. Pierre Parrend is the head of the Computer Science and Mathematics departement at ECAM Strasbourg-Europe engineer school. He is a member of the research team 'Complex Systems and Translational Biology' at ICube Laboratory of the University of Strasbourg, and the head of the e-laboratory '4PFactory : the factory of the future' of the UNESCO Unitwin Complex System-Digital Campus. His research interests encompass artificial immune ecosystems, evolutionary strategies for optimisation and anomaly detection, as well as emergent properties of human organisations.

Abstract: The rapid evolution of IT ecosystems significantly challenges the security models our infrastructures rely on. Beyond the old dichotomy between open and closed systems, it is now necessary to securely handle the interaction between heterogeneous devices bulding dynamic ecosystems. To this regard, bio-inspired approaches provide a rich set of conceptual tools, but have failed to lay the basis for robust and efficient solutions. Our research effort intends to revisit the contribution of artificial immune system research to bring immune properties: security, resilience, distribution, memory, into IT infrastructures. We introduce the concept of artificial immune ecosystems, which encompass a comprehensive immune protocol, libraries for detection and investigation of anomalies, and an underlying middleware layer, for bringing immunity to IT infrastructures, the Cloud, and IoT environement.

Invited Speaker 5

Invited Speech Title：**Harnessing over a Million CPU Cores to Solve a Single Hard Mixed Integer Programming Problem on a Supercomputer**



Dr. Yuji Shinano is Researcher, Zuse Institute Berlin, Germany

CV:

1997 PhD Engineering, Tokyo University of Science, Japan
1994 MS Engineering, Tokyo University of Science, Japan
1992 BS Engineering, Tokyo University of Science, Japan

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Appointments

2010/04 – present Researcher, Zuse Institute Berlin, Germany
2010/10– present Guest Associate Professor, The Institute of Statistical Mathematics, Japan
2009/03 – 2009/12 Visiting Zuse Institute Berlin for Sabbatical leave
2004 – 2010/03 Associate Professor, Tokyo University of Agriculture and Technology, Japan
1999 – 2004 Assistant Professor, Tokyo University of Agriculture and Technology, Japan
1997 – 1999 Research Assistant, Tokyo University of Science, Japan
1994 – 1997 Research Fellow of the Japan Society for the Promotion of Science, Japan

Recent Publications

1. Y. Shinano, T. Achterberg, T. Berthold, S. Heinz, T. Koch. ParaSCIP: a parallel extension of SCIP. Competence in High Performance Computing 2010, Christian Bischof, Heinz-Gerd Hegering, Wolfgang Nagel, Gabriel Wittum (Eds.), pp. 135–148, 2012.
2. T. Koch, T. Ralphs, Y. Shinano. Could we use a million cores to solve an integer program? Mathematical Methods of Operations Research, 76(1):67–93, 2012.
3. Y. Shinano, T. Achterberg, T. Berthold, S. Heinz, T. Koch, M.Winkler. Solving hard MIPLIB2003 problems with ParaSCIP on supercomputers: An update. in Proceedings of the 2014 IEEE International Parallel & Distributed Processing Symposium Workshops, IPDPSW'14, (Washington, DC, USA), pp. 1552–1561, IEEE Computer Society, 2014.
4. G. Gamrath, T. Koch, S. J. Maher, D. Rehfeldt, Y. Shinano. SCIP-Jack - A solver for STP and variants with parallelization extensions. Math. Prog. Comp. pp.1 – 66, 2016.

5. Y. Shinano, T. Achterberg, T. Berthold, S. Heinz, T. Koch, M. Winkler: Solving open MIP instances with ParaSCIP on supercomputers using up to 80,000 cores. In: 2016 IEEE International Parallel and Distributed Processing Symposium (IPDPS), pp. 770–779. IEEE Computer Society, Los Alamitos, CA, USA, 2016.
6. Y. Shinano, S. Heinz, S.Vigerske, M.Winkler. FiberSCIP - A shared memory parallelization of SCIP. accepted for publication in INFORMS Journal on Computing, 2017.

Research Interests and Expertise

My research expertise is in the field of mathematical optimization programming problems and parallel computing. I am interested in the application of parallel computing to solve very hard discrete optimization problem instances in the real-world.

Currently I am involved in the development of the SCIP Optimization Suite at the Zuse Institute Berlin. I am the developer of UG which is a software framework to parallelize state-of-the-art MIP solvers and is a package in the SCIP Optimization suite.

Abstract:

Mixed integer programming (MIP) is a general form to model combinatorial optimization problems and has many industrial applications. The performance of MIP solvers, software packages to solve MIPs, has improved tremendously in the last two decades and these solvers have been used to solve many real-word problems. However, against the backdrop of modern computer technology, parallelization is of pivotal importance. In this way, ParaSCIP is the most successful parallel MIP solver in terms of solving previously unsolvable instances from the well-known benchmark instance set MIPLIB by using supercomputers. It solved two instances from MIPLIB2003 and 12 from MIPLIB2010 for the first time to optimality by using up to 80,000 cores of supercomputers. Additionally, a specialized version of ParaSCIP for solving Steiner tree problems called SCIP-Jack solved three open instances from the Steiner tree test benchmark set PUC. ParaSCIP has been developed by using the Ubiquity Generator (UG) framework, which is a general software package to parallelize any state-of-the-art branch-and-bound based solvers. The UG framework is currently being used to develop ParaXpress, a distributed memory parallelization of the commercial MIP solver Xpress. Moreover, it is being used to parallelize PIPS-SBB, a solver for stochastic MIPs. Since Xpress is a multi-threaded solver and ParaSCIP can run at least 80,000 processes in parallel for solving a single MIP, ParaXpress could handle over a million CPU cores. Furthermore, the parallelization of PIPS-SBB by the UG framework has the potential to also handle over a million CPU cores. In this talk, a ground design of the UG framework and its latest extensions to harness over a million CPU cores will be presented and preliminary computational results will be provided.

Invited Speaker 6

Invited Speech Title: **Predicting Trust of Humanoid Robots in Service Scenarios; Implications for Human-Robot-Human Interaction**

Dr. Halimahtun M. Khalid is President of Damai Sciences, Malaysia. She obtained her PhD in cognitive ergonomics from University College London, UK. She has 35 years of knowledge and experience in HCI, human factors and ergonomics. She was Professor of Cognitive Ergonomics at Universiti Malaysia Sarawak, Malaysia, where she established the Institute of Design & Ergonomics Application, the Centre for Applied Learning & Multimedia, and the first Virtual Reality Centre. She has delivered several keynotes at international conferences, and has more than 100 publications in refereed journals and proceedings. She received research grants from the European Commission and US Air Force for projects related to mass customization, cultural cognition, disaster attitudes, and human-robotic trust. Dr. Khalid is the Founder and Past President of the Human Factors and Ergonomics Society Malaysia, and Past President of the Southeast Asian Network of Ergonomics Societies. She is Past Chair of the Science Technology & Practice Committee of the International Ergonomics Association (IEA), and Past Chair of the Affective Design Technical Committee of the IEA. She is a Certified Human Factors Professional with BCPE USA, and a Fellow of the International Ergonomics Association.

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Abstract:

Trust is a key element in the development of effective human-robot-human relationships. In particular, trust affects system effectiveness as it relates to safety, performance, and usability. With the development and integration of humanoid robots in human teams, the issue of predicting trust has become a focal concern. Setting the scene, we will trace a decade of research into human-robotic trust starting from 2006. One of the research gaps is the lack of a reliable measure of human-robotic trust. Past studies have emphasized on subjective measurements only. In this plenary, we will present a method where subjective (general trust, psychological) and objective (physiological) measures were mapped to predict human trust of humanoid robots in performing social tasks in a multi-actor, multi-dialog, and bilingual contexts. We will present the findings from two studies, involving different humanoid robots and diverse types of interactive dialogs in business, disaster and healthcare application domains. Extraction of objective measures includes facial expressions, voiced speech, camera-based heart rate, and gestural posture. Subjective trust comprised fifteen items that measured ability, benevolence and integrity. A neuro-fuzzy algorithm extracted rules that predicted low, medium and high trust levels. The implications of the findings on future human-robotic trust relationships and limitations of the method will be discussed.