

Invited talker:

IT1 Modular Robotic System as Multisensory Room in Children's Hospital



**Professor
Henrik Hautop Lund**

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When developing modular robotics for user interaction, there are a number of design issues to consider. In this paper, we highlight some of these design issues. These design issues include the selection of connection mechanism, energy use, sensing and actuation system, and centralized versus distributed processing. There are issues related to construction strong or loose connections. Also, in a modular robotic system there is a number of design choices related to designing centralized or distributed systems (for energy, processing, and communication). In a number of cases, these choices are based upon the use context of the modular robotic system, and the choices will often differ from those taken for modular robotic systems that are not designed with the user interaction in mind. We will exemplify the development with the design of playful modular robotic systems for children's therapy in hospitals, for physiotherapy of cardiac patients in hospitals, and for private home care.

Education:

- M.Sc. degree in Computer Science from University of Aarhus, Denmark
- Ph.D. degree in Computer Systems Engineering from University of Southern Denmark

Professional Training and Employment:

- 1992-1993 and 1994-1995, Research Assistant, the National Research Council, Rome, Italy
- 1996-1997, Research Associate (Post Doctor), Department of Artificial Intelligence, University of Edinburgh, UK
- 1997-2000, Head of LEGO Lab
- 1998-2000, Research Associate, Department of Computer Science, University of Aarhus, Denmark
- 2000-2008, Full Professor, the Maersk Mc-Kinney Moeller Institute, University of Southern Denmark
- 2003-2007, Member of the Danish Research Council
- 2008-present, Full Professor, the Center for Playware, Technical University of Denmark

IT2 Modular Robotic Wearable



**Professor
Luigi Pagliarini**

Luigi Pagliarini, Henrik Hautop Lund

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In this paper we trace the contours and define a new approach to robotic systems, composed of interactive robotic modules which are somehow worn on the body. We label such a field as *Modular Robotic Wearable* (MRW). We describe how, by using modular robotics for creating wearable, it is possible to obtain a flexible wearable processing system, where freely interchangeable input/output modules can be positioned on the body suit in accordance with the task at hand. In this respect, we describe the first rough prototypes and show an artistic application, as well as some drawing of future works and projects. Finally, by focusing on the intersection of the combination modular robotic systems, wearability, and body-mind we attempt to explore all the theoretical characteristics of such approach and exploit all the possible application fields.

Education:

- Master Degree in Experimental Neuropsychology

Professional Training and Employment:

An Artist, Art Curator, Psychologist, Multimedia and Software Designer, and a worldwide known as a theoretician and expert in (mainly Artistic) Robotics, A.I. and Artificial Life.

- Professor, Theories of Perception and Psychology of Shape and of Computer Art, the Academy of Fine Arts of Bari, Italy
- Associate Professor, Center for Playware, Technical University of Denmark
- Founder and Director, the Pescara Electronic Artists Meeting
- President, the Cultural Association Artificialia
- Art Director, Ecoteca
- Founder of RoboCup Junior and Member of its International Committee

IT3 Optimal monitoring for distributed intrusion detection system



**Professor
Adam Grzech**

Adam Grzech

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The paper is devoted to present some concept and model of multi-layered architecture of intelligent distributed intrusion detection system as well as to investigate qualitative interdependencies between parameters describing architecture of data collection system and the quality of intrusion detection system. Presented hierarchical architecture of intrusion detection system divided functionality that improves the scalability of the system and simplifies the design of such a system comparing to the architecture of centralized systems. In addition, such architecture fulfills several important features - it imposes the minimum overhead on the distributed system in order to avoid interference with its ordinary functionality and is easy to deploy. Therefore the quality of intrusion detection system is dependent on the quality of monitoring system quality which is built by lower layer of proposed distributed detection system. In this paper the monitoring system quality is assessed twofold: by the delay in receiving data for analysis from monitored elements by the monitoring elements and by the amount of data intended for an analysis by monitoring elements.

Education:

- In 1977, M.S. degree in Automatic Control from the Wroclaw University of Technology, Poland
- In 1979, Ph.D. degree and D.Sc. degree in Computer Science from the Wroclaw University of Technology, Poland
- In 2003, Professor title from President of the Republic of Poland

Professional Training and Employment:

- 2003-present, Professor, Institute of Computer Science, the Wroclaw University of Technology, Poland

IT4 Making Decision in Two-Stage Identification System with Knowledge Updating



**Professor
Jerzy Swiatek**

Jerzy Swiatek, Krzysztof Brzostowski

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In the paper an algorithm for knowledge updating in adaptive system to select scenario as a decision making system has been proposed. Taking into account specific character of the process, two-stage identification approach is used. The first stage is built for diagnostic purpose i.e. estimated parameters of the first-stage's relationship is utilized to make a decision at the second stage. Proposed algorithms to select scenario, at the second stage, rests on extracted knowledge from human expert and effects on diagnosis. In real problems it is not possible to collect exact and certain knowledge from expert. One of the possible techniques is to update knowledge stored in knowledge base. Biomedical application of planning physical exercises for spastic people is considered. In general, this problem can be described as a task in which the aim is to bring internal state of the human neuromuscular system to desired values by selecting optimal sequence of control scenarios.

Education:

- In 1977, M.Sc. degree in Electronic Engineering from the Wroclaw University of Technology, Poland
- In 1979, Ph.D. degree in Automatics and Robotics from the Institute of Technical Cybernetics, Poland
- In 1987, D.Sc. degree in Automatics and Robotics from University of Mining and Metallurgy, Poland

Professional Training and Employment:

- 1993-1999, Dean of Computer Science and Management Faculty, the Wroclaw University of Technology
- 1999-2005, Vice-President for Education, the Wroclaw University of Technology
- 2005-present, Dean of Computer Science and Management Faculty, the Wroclaw University of Technology
- Present, Professor, the Institute of Information Science and Engineering, the Wroclaw University of Technology
- Present, President of Accreditation Commission of Polish Technical Universities

IT5 On the Observability and Estimability Analysis of the Global Positioning System (GPS) and Inertial Navigation System (INS)



**Professor
Man Hyung Lee**

Man Hyung Lee

School of Mechanical Engineering, Pusan National University, Busan, Korea

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Advanced Ship Engineering Research Center, Pusan National University, Busan, Korea

In this paper a brief review on the observability and estimability analysis of GPS/INS is presented. There have been various analysis results on the observability of INS errors. However different INS error dynamics models and reference frames of INS mechanization have been used in the observability analysis. Moreover, the analysis framework was not unique. In this paper, known observability analysis results are summarized first. Then relatively general analysis tools to handle system model perturbation on the observability and estimability is given.

Education:

- In 1969, B.S. degree in Electrical Engineering from Pusan National University, Korea
- In 1971, M.S. degree in Electrical Engineering from Pusan National University, Korea
- In 1983, Ph. D degree in Electrical and Computer Engineering from Oregon State University, U.S.A

Professional Training and Employment:

- 1971-1974, Instructor, Department of Electronics Engineering, Korea Military Academy
- 1974-1978, Associate Professor, School of Mechanical Engineering, Pusan National University
- 1978-1983, Teaching Assistant, Research Assistant & Postdoctoral Fellow, Oregon State University, U.S.A
- 1997-2003, POSCO, Chair Professor, Pusan National University, Korea
- 2002-2004, Dean of the College of Engineering, Pusan National University
- 1983-present, Professor, School of Mechanical Engineering, Pusan National University

IT6 A Design of Brain Sensory monitoring Thinking Activity inside the Knowledge System



**Assistant Professor
Jeongyon Shim**

Jeongyon Shim

Division of General Studies, Computer Science, Kangnam University, Korea

For several recent years many studies adopting the brain functions have been studied for making efficient system in the dynamic complex environment. As one of brain based research, in this paper the new concept of brain sensory was defined as 6th sensory organ and brain sensory monitoring thinking activity is designed which has various functions including selective sensory input signals, recalling the related knowledge and retrieving thinking chains. Especially DTAM (Dynamic Thinking Association Map) was designed for conditioned learning process and switching concept for activating the matched knowledge from the large well structured memory with the control signal was proposed. The functions of DTAM and switching make dynamic & selective thinking chain retrieval possible. They also make the system maintained efficiently with well structured memory. This system was applied to the virtual memory and tested with sample data.

Education:

- BS degree in Computer Science from Korea University, Korea
- MS degree in Computer Science from Korea University, Korea
- PhD degree in Computer Science from Korea University, Korea
- Post Doctor in the Chinese University of Hong Kong, China

Professional Training and Employment:

- Assistant Professor, YongIn SongDam College, Korea
- Assistant Professor, Division of General Studies, Computer Science, Kangnam University, Korea