



IEEE – Joint CSS/R&A Societies Chapter, Queensland
ITEE Committee – Queensland, Engineers Australia

INTELLIGENT ROBOTIC SYSTEMS WORKSHOP

Topics and Speakers:

Interaction and Intelligence: A New Direction of Robotics Research

Professor Fumio Harashima, Tokyo Denki University, Japan

Recent Progress of Robotics and Mechatronic Technology

Professor Toshio Fukuda, Nagoya University, Japan

Cooperation and Interaction Among Road Vehicles

Associate Professor Ljubo Vlacic, Griffith University, Australia

Advances in Computer Vision for Road and Traffic Applications

Associate Professor Brian Lovell, The University of Queensland, Australia

Date : 01 December 2003 (Monday)

Time : 13:30 for 14:00 (Light refreshments will be provided from 13:30)

Venue : Hawken Auditorium Engineering House, Institution of Engineers Australia
447 Upper Edward Street, Brisbane

PROGRAM

14:00 – 14:45

INTERACTION AND INTELLIGENCE: A NEW DIRECTION OF ROBOTICS RESEARCH

Professor **Fumio Harashima**

Department of Electrical Engineering, Tokyo Denki University, Japan

Abstract:

In the modern society, human beings interact with mechanical systems through computer networks. This interaction is, unfortunately, asymmetrical at this point of time. Human beings easily understand the computer's way of thinking, because computers and mechanical systems are human-made. On the other hand, computers do not understand the human way of thinking, because computers do not have psychological model of human beings. The motivation of the project is to establish a symmetrical relationship between human beings and computers by introducing a psychological approach. Other related research topics are also included.

This talk will address our on-going research work aimed at developing so-called "artificial life", which maximally enhances human abilities for intelligent and/or physical actions. It is expected for both human and mechanical systems to grow more intelligent through mutual interactions, either physically or on an informational basis. The talk will also address some of the issues related to integration and fusion of sensing and decision, smart actuators, intelligent interfaces, intelligent robots, learning machines, intelligent micro-machines, virtual reality, intelligent mechatronics, and so on.

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14:45 – 15:30

RECENT PROGRESS OF ROBOTICS & MECHATRONICS TECHNOLOGY

Professor **Toshio Fukuda**

President, IEEE Nanotechnology Council

Department of Microsystem Engineering, Nagoya University, Japan

Abstract:

Since robotic and mechatronic technology came about 30-40 years ago, the application fields have been expanded from manufacturing to nonconventional areas and/or more daily life: the first generation robot was for the manufacturing sector, the second generation is for the service sector, and the third generation is for personal use. Robotics and mechatronic technology is making progress to much wider and broader applications. This presentation will show such system integration technology.

15:30 – 15:45: REFRESHMENT

15:45 – 16:05

COOPERATION AND INTERACTION AMONG ROAD VEHICLES

Associate Professor **Ljubo Vlacic**

Intelligent Control Systems Laboratory, Griffith University, Australia

Abstract:

The Cooperative Driverless Vehicle Technology developed by Griffith University's Intelligent Control Systems Laboratory enables vehicles to undertake everyday driving manoeuvres in cooperation with each other independent of humans.

This outstanding innovation marks the beginning of a new era in transport system concepts. It has the potential to substantially increase society's mobility and their safety while also reducing the adverse impacts of transport on the environment and health. The innovation was driven by the vision that in the vehicles of the not-too distant future, intelligent robotic drivers will share the driving with humans, and that driverless vehicles will be seen on the roads simultaneously with other vehicles driven by human drivers. It was also driven by the motivation to improve road safety and to make road transport accident free.

16:05 – 16:25

ADVANCES IN COMPUTER VISION FOR ROAD AND TRAFFIC APPLICATIONS

Associate Professor **Brian Lovell**

Intelligent Real-Time Imaging and Sensing Group, EMI, The University of Queensland, Australia

Abstract:

As we enter the 21st century, computer vision systems are coming of age. Their growth is spurred by the low-cost of computer platforms capable of handling real-time video and the development of ever more complicated and robust approaches to pattern recognition. In this talk we will look at applications of computer vision to road transport. Such applications are beginning to be seen as a credible approach to monitoring traffic and managing traffic systems.

Video presentations of real-time numberplate and traffic sign identification systems developed within the Intelligent Real-Time Imaging and Sensing Group at UQ will be presented as well as related work from European collaborators on monitoring traffic congestion and autonomous smart-vehicles.

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S P E A K E R S

Professor **Fumio Harashima**

Department of Electrical Engineering, Tokyo Denki University, Japan

Fumio Harashima was born in Tokyo in 1940. He received B.S., and M.S. and Ph.D. degrees all in Electrical Engineering from University of Tokyo in 1962, 1964 and 1967, respectively. He was employed as Associate Professor at Institute of Industrial Science, University of Tokyo in 1967, and had been Professor from 1980 through 1998. He was Director of the Institute from 1992 to 1995. He was President of Tokyo Metropolitan Institute of Technology from April 1, 1998 through March 31, 2002. He is currently Professor at Tokyo Denki University. He was with KAIST, Korea, from September through December, 2002, as Visiting Professor. Dr. Fumio Harashima is Professor Emeritus of University of Tokyo.

His research interests are in power electronics, mechatronics and robotics. He is a co-author of four books and has published over 1,000 technical papers in these areas. He has been active in various academic societies such as Institute of Electrical Engineers of Japan, Instrument and Control Engineers of Japan (SICE), Robotics Society of Japan and IEEE. He served as President of IEEE Industrial Electronics Society in 1986-1987 and 1990 IEEE Secretary. He was a member of IEEE Executive Committee and Board of Directors in 1990. In 1995 he served as Founding Editor-in-Chief of IEEE/ASME Transactions on Mechatronics. He is also Editor-in-Chief of IEEE Transactions on Industrial Electronics since January 1, 2001. Dr. Harashima served as President of IEE of Japan from 2001-2002. Dr. Harashima has received a number of awards including 1978 SICE Best Paper Award, 1983 IEE of Japan Best Paper Award, 1984 IEEE/IES Anthony J. Hornfeck Award, 1988 IEEE/IES Eugene Mittelmann Award and IEEE Millennium Medal in 2000. He is a Fellow of IEEE and a Fellow of SICE.

Professor **Toshio Fukuda**

President, IEEE Nanotechnology Council

Department of Microsystem Engineering, Nagoya University, Japan

Toshio Fukuda (M'83-SM'93-F'95) graduated from Waseda University, Tokyo, Japan in 1971 and received the Master of Engineering degree and the Doctor of Engineering degree both from the University of Tokyo, in 1973 and 1977, respectively. Meanwhile, he studied at the graduate school of Yale University from 1973 to 1975. In 1977, he joined the National Mechanical Engineering Laboratory in Japan. From 1979 to 1980, he was a Visiting Research Fellow at the University of Stuttgart, West Germany. He joined the Science University of Tokyo in 1981, and then joined Department of Mechanical Engineering, Nagoya University, Japan in 1989.

At present, he is Professor, Department of Microengineering Systems, Nagoya University, Japan. He is mainly engaging in the research fields of intelligent robotic system, self-organizing system, micro-nano robotics, robotic system under hostile environment, bio-robotic system, neuromorphic intelligent control, fuzzy control, control of mechanical systems and technical diagnosis.

He was the Vice President of IEEE Industrial Electronics Society (1990-). He is the member of the administrative committees in IEEE Robotics and Automation Society and IEEE Industrial Electronics Society. He was the Publication chairman (1991-1992) and the Secretary of IEEE Neural Network Council (1992-1993). He was chairman of Division of Robotics and Mechatronics of Japan Society of Mechanical Engineering (JSME), chairman of Committee of Technical Committee of Robotics in Society of Instrument and Control Engineer (SICE) and chairman of many other technical committees. He was the President of IEEE Robotics and Automation Society (1998-1999). He is elected as Director of the IEEE Division X, Systems and Control. He was the Founding General Chairman of IEEE International Workshop on Intelligent Robots and Systems (IROS) held in Tokyo (1988) and Program Chairman of IJCNN '91-Singapore (Nov., 1991). He was the Steering Chairman of the International Joint Conference on Neural Networks (IJCNN'93-NAGOYA, 1993).

He was the General Chairman of the IEEE Int'l Conference on Robotics and Automation (May, 1995), the Program Co-chairman of the Fuzz-IEEE Conference (Mar., 1995) and the General Chairman of the IEEE Int'l Conference on Evolutionary Computation (ICEC'96, May, 1996) and the steering member of many other international conferences. He was the General Chairman of Second Conference of Virtual Reality Society of Japan, September 1997. He was

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the General Chairman of Int'l Conference on Industrial Electronics, Control and Instrumentation-2000 (IECON-2000, October 2000). Currently, he is the Editor-in-Chief of the IEEE/ASME Transactions on Mechatronics (2000-2002), Journal of Micromechatronics (2000-), Journal of Advanced Computational Intelligence (JACI) and IEEE Nanotechnology Council President (2002-2003). He is also President of Japan Society for Fuzzy Theory and Intelligent Informatics (2003-)

He has received many awards such as Contribution Award from the Robotics and Mechatronics Division of JSME (1995), Best Paper Award of ICEC'96 and Best Paper Award of IECON'96, City of Grenoble Medal (1997), IEEE Eugene Mittelmann Achievement Award (1997), Banki Donat Medal from Polytechnic University of Budapest, Hungary (1997), and Medal from City of Sartillo, Mexico (1998), IEEE Third Millennium Medal (2000). IEEE Fellow (1995). SICE Fellow (1995).

Associate Professor **Ljubo Vlacic**

Intelligent Control Systems Laboratory, Griffith University, Australia

Dr Ljubo Vlacic is an Associate Professor and Director of the Intelligent Control Systems Laboratory, School of Microelectronic Engineering, Griffith University, Brisbane, Australia.

His career includes a number of positions with both industry and academia. This experience includes the design, development, field-testing, and deployment of a variety of sophisticated electronic devices for industrial control applications as well as senior management positions such as, the Institute Technical Director, Project Director, Program Director, and Head of School. At Griffith University, he has been the Intelligent Control Systems Laboratory Director since 1991 and was Head of School and the Industrial Affiliates Program Director from July 1999 to July 2001.

He serves/has served on the editorial boards (Associate Editor) of numerous scholarly journals, including the Journal of Robotics and Mechatronics (since 1998), Journal on Micromechatronics (since 1998), the International Journal of Korean Society of Precision Engineering (since 2003), Information & Management (1994–1999), The Asian Journal of Control (1999–2001) and the Conference Editorial Board (CEB) of the IEEE—Control Systems Society (since 2001).

He is also Chairman of the International Federation of Automatic Control's Technical Committee on Control Education, Chairman of the Harold Chestnut Control Engineering Textbook Prize Committee, Chairman of the National Committee on Automation, Control and Instrumentation of the Institution of Engineers Australia, and Co-Chairman of the Education Committee of the IEEE's Control Systems Society.

Associate Professor **Brian Lovell**

Intelligent Real-Time Imaging and Sensing Group, EMI, The University of Queensland, Australia

Associate Professor Brian Lovell is the Program Director of Electrical Engineering in The School of Information Technology and Electrical Engineering (ITEE) at the University of Queensland. He is also Director of the Intelligent Real-Time Imaging and Sensing Group within the EMI Research division of the School of ITEE.

He is a Senior Member of the IEEE Signal Processing, Communications, and Computer Societies; Voting Member for Australia on the Governing Board of the International Association for Pattern Recognition since 1998; Chair of the Conferences and Meetings Committee of the IAPR from 1998 to 2002; Member of the IAPR Nominating Committee of the IAPR since 2002; President of the Australian Pattern Recognition Society (APRS) with about 150 members nationally since 1995. Brian was also Organising and Publications Chair of ICPR98 (The 14th International Conference on Pattern Recognition) at the Brisbane Convention Centre in August, 1998, General Chair of WDIC2003 (Workshop on Digital Image Computing) 2003, Current Technical Chair of ANZIIS2003 (Australian and New Zealand intelligent Systems) and Technical Co-Chair of ICPR2006 in Hong Kong (Computer Vision and Image Analysis).

He reviews for numerous international journals and conferences in the fields of Signal and Image Processing and Pattern Recognition.