

# IEEE ICMA 2011 Conference

## Plenary Talk 1

**Full Research for Sustainable Industry (Tentative)**

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**Engineer**

**Director-General**

**Center for Research and Development Strategy (CDRS)  
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### **Abstract:**

Engineering for sustainability is to establish useful principles for people who work to realize sustainability on the earth. Sustainability consists of diversified elements to be described in terms of many disciplines: physical, social and humanities. There remain still many facts influencing sustainability that are not yet well understood scientifically. Therefore, the engineering discipline of sustainability is neither an application of existing sciences nor mix of existing engineering disciplines. It is a new engineering domain that is based on scientific knowledge not found easily in traditional scientific disciplines. It requires basic researchers to create new knowledge and sometime requests to establish new domains of science. Methodically, the engineering for sustainability must be synthetic

because the target of this domain is clearly and concretely given, unlike conventional engineering disciplines such as mechanical engineering. Then, how shall we establish the engineering for sustainability?

## **Short Biography for Dr. Hiroyuki Yoshikawa**

### **Education:**

Bachelor of Engineering (Precision Engineering), The University of Tokyo, 1956.  
Doctor of Engineering, The University of Tokyo, 1964.

### **Professional Career:**

Oct. 1956: Research Member, Institute of Physical & Chemical Research, Tokyo.  
Apr. 1966: Associate Professor of Engineering, The University of Tokyo.  
Apr. 1967: Senior Visiting Fellow, University of Birmingham, UK.  
Apr. 1977: Visiting Professor, Technical University of Norway.  
Jul. 1978: Professor of Engineering, The University of Tokyo.  
Apr. 1989: Dean, Faculty of Engineering, The University of Tokyo.  
Apr. 1990: Vice President, The University of Tokyo.  
Apr. 1992: President, The Japan Society for Precision Engineering.  
Apr. 1993: President, The University of Tokyo.  
Apr. 1997: Science Adviser to the Minister of Education, Science, Sports and Culture.  
Jun. 1997: Fellow, Churchill College, University of Cambridge  
Jul. 1997: President, Science Council of Japan (SCJ).  
Sep. 1997: President, Japan Society for the Promotion of Science (JSPS).  
Apr. 1998: President, The University of the Air.  
Sep. 1999: President, International Council for Science (ICSU).  
Apr. 2001: President, National Institute of Advanced Industrial Science and Technology (AIST)  
Apr. 2011: Director-General, Center for Research and Development Strategy (CDRS), JST

### **Honors:**

Apr. 1996: Honorary Doctor, University of Strathclyde, UK  
Nov. 1996: Honorary Doctor, University of Twente, NL  
Jul. 1999: Honorary Doctor, University of Birmingham, UK  
May 2001: Honorary Doctor, National University of Science and technology, Norway  
May 1991: IFIP Silver Core Medal  
Jun. 1995: Education Award, Society of Manufacturing Engineers (USA)  
Oct. 1995: Hasunuma Memorial Award, Japan Society for Precision Engineering  
Apr. 1997: 13rd Japan Prize  
Dec. 2000: L'Ordre National de la Legion d'Honneur (France)  
May 2003: Royal Honor of Merit (Norway)  
Aug. 2003: Honorary Fellow of the Design Society

# IEEE ICMA 2011 Conference

## Plenary Talk 2

**Robotics: From Manufacturing to Intelligent Machines**

**Tzyh Jong Tarn**

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Center for Robotics and Automation  
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### **Abstract:**

This presentation describes the evolution from tele-robotics to interactive robotics and to intelligent machines due to the silicon revolution. The impacts of this transformation to the manufacturing culture as well as the automated manufacturing research facility are outlined. Finally the current trends in robotics research and new applications are presented.

**Tzyh Jong Tarn** is currently a Professor in the Department of Electrical and Systems Engineering and the Director of the Center for Robotics and Automation at Washington University. He also is the director of the Center for Quantum Information Science and Technology at Tsinghua University.

An active member of the IEEE Robotics and Automation Society, Dr. Tarn served as the President of the IEEE Robotics and Automation Society, 1992-1993, the Director of the IEEE Division X (Systems and Control), 1995-1996, and a member of the IEEE Board of Directors, 1995-1996.

He is the first recipient of the Nakamura Prize (in recognition and appreciation of his contribution to the advancement of the technology on intelligent robots and systems over a decade) at the 10th Anniversary of IROS in Grenoble, France, 1997, the recipient of the prestigious Joseph F. Engelberger Award of the Robotic Industries Association in 1999 for contributing to the advancement of the science of robotics, the Auto Soft Lifetime Achievement Award in 2000 in recognition of his pioneering and outstanding contributions to the fields of Robotics and Automation, the Pioneer in Robotics and Automation Award in 2003 from the IEEE Robotics and Automation Society for his technical contribution in developing and implementing nonlinear feedback control concepts for robotics and automation, and the George Saridis Leadership Award from the IEEE Robotics and Automation Society in 2009. In 2010 he received the Einstein Chair Professorship Award from the Chinese Academy of Sciences and the John R. Ragazzini Award from the American Automatic Control Council. He was featured in the Special Report on Engineering of the 1998 Best Graduate School issue of US News and World Report and his research accomplishments were reported in the "Washington Times", Washington D.C., the "Financial Times", London, "Le Monde", Paris, and the "Chicago Sun-Times", Chicago, etc. Dr. Tarn is a Fellow of IEEE and an IFAC Fellow.

# IEEE ICMA 2011 Conference

## Plenary Talk 3

**CSEM: Vertical integration of R&D in Micro and Nanosystems  
for optimal application in industrial applications**

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Doctor

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### **Abstract:**

Micro and Nanotechnologies have evolved as the heritage of the Swiss Watch industry and its traditional competencies. This activity has been verticalized over the years from design to manufacturing, characterization and integration for specific applications. This vertical integration has been extremely

useful for the industry. Design concerns two types of activities, which are (1) design of the microsystem and (2) design of specific surface properties, as for instance Zero Order Diffraction gratings, diamond self-assembled structures, where our nanotechnology capabilities are required. In terms of design structuring of Silicon, Polymer or more exotic materials as ceramics and even metals. Microelectronic techniques as DRIE are heavily used. One of the most complete X-Ray characterization labs brings the necessary quality, required by industrial applications. Over the some last years a number of successful applications have been served, including mechanical pieces for watch industry, MEMS for medical applications (actuating mechanisms and sensors), innovative MOEMS for tunable lasers and spectrometers, or chemical sensors for environmental monitoring.

**George Kotrotsios** holds a Ph.D. Degree in Optoelectronics, Institut National Polytechnique de Grenoble (Fr), an Executive MBA in Management of Technology, HEC, Université de Lausanne (CH) and an Electrical Engineering Degree from the Aristotle University of Thessaloniki (Gr). He conducted several years applied R&D in the field of optical fiber communications and sensors as well on fiber manufacturing technology, fiber lasers, surface engineering, nanotechnologies (having developed the first commercial European Atomic Force Microscope - AFM), since 1985. His activities gradually and steadily moved from pure R&D to R&D management and towards the process of creating economic value out of technology. Between 1996 and 1999, M3D SA, a contract research organisation, a joint venture of Mitsubishi Co and Battelle. He developed a new start-up on fiber optic sensors. Thereafter he created two other start-ups in optical communications. He joined again CSEM at the end of 1999 focusing the commercialisation of micro-nanotechnologies and ICT of the company in a large spectrum of markets. He is in charge of the Marketing and Business Development of the company since April 2005. From January 1<sup>st</sup>, 2010 he is in member of the Executive Committee of CSEM, in charge of Business Development, Technology Commercialisation and Strategic Relations, including European Commission and European Space Agency.

Presently, G. Kotrotsios is President Board of Directors of Sensecore (active in wearable for elite athletes). He is also on the Executive Board of Earto, the European Association of Research and Technology Organisations, and member of the Experts Committee of Micronarc, the Microsystem and Association in Western Switzerland.

He has published numerous articles in peer reviewed journals as well as in conferences. He is one of the co-authors of the Genessys, the European White paper on Nanotechnology. In addition, he is member of the Scientific Committee of numerous conferences Member of the International Advisory Board of the EuroNanoForum 2011, in Prague, Czech Republic. He is acting as a reviewer in major scientific reviews (Optics Letters, Applied Optics) as well as expert for national and international projects.