



From Biological Systems to Intelligent Robots

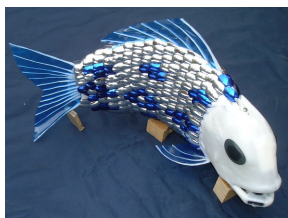
Dr Housheng Hu
Professor of Robotics

School of Computer Science and Electronic Engineering
University of Essex, UK



RoboCup (Singapore)
Association
www.RobocupSingapore.org

After recent advancement of computing and robotics technologies, intelligent robots are soon ready to serve us in our home, hospital, office and everywhere. They are mobile, autonomous and interactive, inspired from behaviour demonstration of biological systems. A number of new application areas have currently received significant interests in the robotics community, including service robots, medical robots, education robots and entertainment robots, etc. However, these robots face a number of challenges. Firstly, they have to deal with uncertainty within the systems, such as sensor noise, actuator inaccuracy, and components failure. Secondly, they have to handle a huge uncertainty in the real world, which is dynamically changing over time. Thirdly, inspiration from biological systems is an important issue to be addressed in the design of intelligent robots since it could provide some guidance to solve the problem. Finally, human-robot interaction is a key for success, including communicating with and navigation around humans. In this workshop, Prof Hu will overview the current state of art robotics technologies, and present his current research work toward the development of advanced theory and technologies, based on inspiration from biological systems. More specifically, bio-mimetic system modelling, robotic fish, and swarm robotics are discussed respectively, and some preliminary results are demonstrated via video.



About the Speaker:



Housheng Hu is a Professor in the School of Computer Science & Electronic Engineering at the University of Essex, leading the Human-Centred Robotics Group. He received the MSc degree in industrial automation from the Central South University in China and the PhD degree in robotics from the University of Oxford in the U.K. His research interests include behaviour-based robotics, human-robot interaction, service robots, embedded systems, data fusion, learning algorithms, mechatronics, and pervasive computing. He has published around 300 papers in journals, books and conferences in these areas, and received a number of

best paper awards. Prof. Hu is a Fellow of IET, a senior member of IEEE and ACM, a founding member of IEEE Robotics & Automation Society Technical committee on Networked Robots. He has been a Program Chair or a member of Advisory/Organising Committee for many international conferences such as IEEE IROS, ICRA, ICMA, ROBIO, RoboCup Symposia, and IASTED RA and CA conferences. He currently serves as Editor-in-Chief for International Journal of Automation and Computing. He is a member of UK EPSRC Peer Review College, and a reviewer for a large number of international journals such as IEEE Transactions on Robotics, Automatic Control, Biomedical Engineering, Industrial Electronics, SMC, Neural Networks and International Journal of Robotics Research.

RoboCup

RoboCup is a world-class international research and education initiative in robotics and artificial intelligence. There will be more than 3,000 researchers, scientists, engineers and students from more than 40 countries all over the world coming to Singapore for competition, conference and exhibition in 2010. The RoboCup competition has four major domains, i.e. Soccer, Rescue, @Home, and RoboCup Junior.

RoboCupSoccer is an important opportunity for researchers to exchange technical information. RoboCupRescue is to promote research and development by involving multi-agent team work coordination, physical robotic agents for search and rescue. RoboCup@Home focuses on real-world applications and human-machine interaction with autonomous robots. Finally, RoboCupJunior focus on education of new generations about robotics.

ROBOCUP – SG

RoboCup (Singapore) Association, ROBOCUP-SG (ROS Ref. No: 2117/2008) is to promote robotic science and technology in Singapore and the neighboring region.

RoboCup (Singapore) Association has been authorised by RoboCup Federation to organise all the RoboCup related events and activities in Singapore.

RoboCup 2010

Singapore will host the RoboCup 2010. This event is jointly organised by Singapore Polytechnic (SP), Science Centre Singapore (SCS), and Singapore Economic Development Board (EDB). For details, please visit www.Robocup2010.org



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Course Information

Date: 11 Sept 2009 (Friday)

Time: 8.30 am to 5.30 pm

Venue: Singapore Polytechnic Graduates' Guild

Registration is on a 1st come 1st serve basis. Register early to avoid disappointment.

Course Outline

- ❖ From Biological Systems to Intelligent Robots
- ❖ Industrial Robots in Structured Environments
- ❖ Biologically Inspired Robots in Unstructured Environments
- ❖ Service Robots Co-existing with Humans

Course Benefit

You will learn about,

- ❖ The state-of-the-art research in biological inspired robotics.
- ❖ The Robotic Fish fits application for Environmental Technology.
- ❖ To implement and apply biological inspired techniques for water quality monitoring.
- ❖ The impact of Service robots in our society.

Who Should Attend

This workshop is intended for those who wishes to gain a thorough overview of biological inspired robotics and service robots; and their applications, including Engineers, Scientists, Students, Technicians.

Course Fee

- [] \$500
- [] \$450 (10% off for early bird)
(Registration is confirmed by 4 Sep '09)
- [] \$400 (20% off for students)
- [] \$350
(Students who registered by 4 Sep '09)

Important Notices:

- ❖ Payments are required with registration prior to confirm reservation of seats.
- ❖ Registration fee includes refreshments, lunch, and full training documentation.
- ❖ Payment terms: Fee must be paid before the event.

Program

- 8.30 am Registration
- 9.00 am Welcome Address
- 9.10 am Session 1
- 10.30 am Tea break
- 11.00 am Session 2
- 12.30 am Lunch
- 2.00 pm Session 3
- 3.30 pm Tea Break
- 4.00 pm Session 4
- 5.00 pm Discussion and Question & Answer
- 5.30 pm End

Registration

- 🌐 Online <http://robocupsingapore.org/registration.php>
- ✉ Fax: 6870-8044
- @ E-mail: seminar@RoboCupSingapore.org
RoboCup (Singapore) Association
c/o Advanced Robotics and Intelligent Control Centre (ARICC)
Singapore Polytechnic
500 Dover Road
Singapore 139651
- 📧 Mail: Singapore Polytechnic
500 Dover Road
Singapore 139651
- 📞 Enquiry: 6772-1772 (Ms Tian Rong)

Cancellations and Transfers

All cancellations must be made in writing by fax, email or post.

- ❖ A substitute delegate is welcomed at no additional charge, if you are unable to attend.
- ❖ You will receive a full refund less 15% administration charge if cancellation is received in writing before 7 September 2009.
- ❖ Robocup (Singapore) Association reserves the rights to cancel the workshop before 9 September 2009. Paid participants will be refunded.

Registration Method

Please make payment in Singapore dollars using crossed cheque in favour of **RoboCup (Singapore) Association**.



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Registration Form

Organisation

Organisation: _____

Address: _____ Post Code: _____

Tel: _____ Fax: _____ E-mail: _____

Contact Person: _____

Participants

<p>1 Name (Dr/Mr/Ms): _____</p> <p>Designation: _____</p> <p>Contact No: _____</p> <p>Email: _____</p>	<p>3 Name (Dr/Mr/Ms): _____</p> <p>Designation: _____</p> <p>Contact No: _____</p> <p>Email: _____</p>
<p>2 Name (Dr/Mr/Ms): _____</p> <p>Designation: _____</p> <p>Contact No: _____</p> <p>Email: _____</p>	<p>4 Name (Dr/Mr/Ms): _____</p> <p>Designation: _____</p> <p>Contact No: _____</p> <p>Email: _____</p>

Singapore Polytechnic Graduates' Guild



Legend

- Bus stop
- MRT train track
- Overhead bridge

Bus Stop A:
SBS 33, 196

Bus Stop B:
SBS 96, 151, 151A,
196, 196A, 183,
183A, 151E

Address : 1010 Dover Road (At Gate 4 of Singapore Polytechnic)