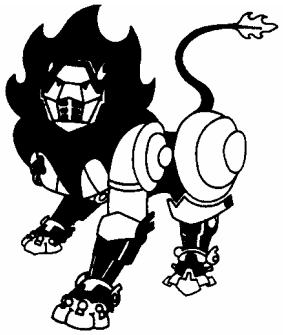

ONE DAY ROBOTIC WORKSHOP/TUTORIAL

ON

Nanorobotics

By

Ari Requicha

Laboratory for Molecular Robotics, University of Southern California

Friday, 19 Jan 2007

8.30 AM TO 5.30 PM

Rose Room I, Upper Lobby Level

York Hotel Singapore

21 Mount Elizabeth, Singapore 228516

The Robotic Workshop is held in cooperation with

IEEE Robotics and Automation Society Singapore Chapter

and is jointly organised by

Robotic Games Society (Singapore), Institute of Technical Education, Nanyang Polytechnic, Nanyang Technological University, National University of Singapore, Ngee Ann Polytechnic, Republic Polytechnic, Singapore Polytechnic, Singapore Science Centre & Temasek Polytechnic.

REGISTRATIOM FORM

Nanorobotics

COMPANY DATA

COMPANY: _____

ADDRESS: _____

_____

_____

POSTAL CODE: _____

TEL: _____ **FAX:** _____ **E-mail:** _____

CONTACT PERSON: _____

PARTICIPANTS FOR THE WORKSHOP

1. NAME: Mr. /Mrs. / Dr. _____

DESIGNATION: _____ **E-mail:** _____

2. NAME: Mr. /Mrs. / Dr. _____

DESIGNATION: _____ **E-mail:** _____

3. NAME: Mr. /Mrs. / Dr. _____

DESIGNATION: _____ **E-mail:** _____

** Cancel where applicable*

Number of Complimentary Car Park Pass(es) required (entry via Mt. Elizabeth) :

Fee enclosed: S$_____. Cheque should be crossed and made payable to **Robotic Games Society (Singapore).** Completed forms and cheques should be sent to:

Ms. Chia Meow Leng
Graduate Programme Office
Mechanical Engineering. Department
National University of Singapore
9 Engineering Drive 1, Singapore 117576

Tel: 6516-5122 Fax: 6872-3229 E-mail: mchsec@nus.edu.sg

Nanorobotics

by **Ari Requicha**
Gordon Marshall Professor of Computer Science and Electrical Engineering
Director, Laboratory for Molecular Robotics
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941 Bloom Walk
Los Angeles, CA 90089-0781
USA

Nanorobotics encompasses: (i) design and fabrication of nanorobots with overal dimensions at or below the micrometer range and made of nanoscopic components; (ii) programming and coordination of large numbers of nanorobots; and (iii) programmable assembly of nanoscale components, either by manipulation with micro or macro devices, or by directed self-assembly.

The tutorial begins by discussing nanorobot construction. The emphasis is on nanomachines and sensors, areas which have seen a spate of rapid progress over the last few years. Nanorobots are quintessential NEMS (nanoelectromechanical systems) and raise all the important issues that must be addressed in NEMS design: sensing, actuation, control, communications, power, and interfacing across spatial scales and between the organic/inorganic and biotic/abiotic realms. Nanorobots are expected to have revolutionary applications in such areas as environmental monitoring and health care.

The tutorial's focus then changes to nanoassembly by manipulation with SPMs (Scanning Probe Microscopes), which is a relatively well established process for prototyping nanosystems. Experimental results are presented which show that interactive SPM manipulation can be used to accurately and reliably position molecular-sized components. These can then be linked by chemical or physical means to form subassemblies, which in turn can be further manipulated. Applications in building wires, single-electron transistors and nanowaveguides are presented. Finally, we discuss an emerging paradigm in self-assembly, in which active elements (nanorobots) are used to build nanostructures.

PROGRAMME		DETAILS
8.30 am	Registration	Date: **Friday, 19 Jan 2007**
9.00 am	Welcome Address	Time: **8.30 am to 5.30 pm**
9.10 am	Commencement of Workshop: Session 1	Fee: **S$350** per participant.
10.30 am	Tea Break	**10% discount** for early registration, received with payment before **12th Jan 2007**.
11.00 am	Session 2	Students: **S$60** for full time students.
12.30 pm	Lunch	Photocopies of student matriculation card must be submitted with registration.
2.00 pm	Session 3	Venue: Rose Room I, Upper Lobby Level
3.30 pm	Tea Break	York Hotel Singapore
4.00 pm	Session 4	21 Mount Elizabeth, Singapore 228516
5.00 pm	Question & Answer	Web site: http://www.yorkhotel.com.sg
5.30 pm	**End of Workshop**	Tel: **6737-0511**
		Who Should attend:
		Engineers, professional, scientists, and students involved or interested in creative design using new technologies, robotics, and automation.

Aristides A. G. Requicha was born in Monte Estoril, Portugal, in 1939. He received the Engenheiro Electrotécnico degree from the Instituto Superior Técnico, Lisbon, Portugal, in 1962, and the Ph.D. in electrical engineering from the University of Rochester, Rochester, NY in 1970. He was a college and high school Valedictorian.

He currently holds the Gordon Marshall Chair in Engineering and is a Professor of Computer Science and Electrical Engineering at the University of Southern California, where he also directs the Laboratory for Molecular Robotics. He has authored some 170 scientific papers and has served in numerous conference program committees and journal editorial boards. His past research focused on geometric modeling of 3–D solid objects and spatial reasoning for intelligent engineering systems. Currently he is working on robotic manipulation of nanometer-scale objects using scanning probe microscopes; nanorobot components and nanorobotic system integration; fabrication of nanostructures by robotic self-assembly; sensor/actuator networks; and applications in NEMS (nanoelectromechanical systems) and nanobiotechnology. The long-term goals are to build, program, and deploy nanorobots and networks of nanoscale sensors/actuators for applications to the environment and health care.

Dr. Requicha currently is the Editor-in-Chief of the IEEE Transactions on Nanotechnology, and co-chairs the Micro/Nano Robotics and Automation Technical Committee of the IEEE Robotics and Automation Society. He is a Fellow of the IEEE and the AANM, and is also a member of the AAAI, AAAS, ACM, AVS and SME. Personal web page: http://www-lmr.usc.edu/~requicha.