

Models and algorithms for motion autonomy and robust navigation in robotics

by

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INRIA Rhône-Alpes, France

The purpose of this tutorial is to study two key problems in robotics: how to provide a robot with *advanced motion autonomy capabilities*, and how to provide it with *decisional functions for robust and safe navigation* in open environments (i.e. environments which are partly known, structured or not, and which may contain moving or changing components).

The tutorial is composed of two main parts dealing respectively with (1) the *geometric and algorithmic tools* which are required for implementing motion autonomy capabilities when sufficient geometric and topological models are available (or can be reconstructed from perception), and (2) the *probabilistic methods* which are required for developing robust decision making capabilities exploiting incomplete world models and some knowledge on the related sensing and action uncertainties. The first part of the tutorial will focus on motion planning methods and on reactive control architectures for mobile robots; both holonomic robots and car-like robots will be considered. The second part of the tutorial will present the "Bayesian Programming" paradigm and its application in robotics (for both robust sensing and autonomous safe navigation). Several practical examples using real mobile robots and

autonomous vehicles will be presented for illustrating the proposed models and algorithms.

PROGRAMME

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

DETAILS

Date: Friday, 21 May 2004

Time: 8.30 am to 5.30 pm

Fee: **S\$350** per participant.

10% discount for early registration, received with payment before **7 May 2004**.

Students: **S\$50** for full time students.

Photocopies of student matriculation card must be submitted with registration. There will be **no early registration discount**.

Venue: Marie Room I,

York Hotel S'pore

21 Mount Elizabeth, Singapore 228516

Tel: 6737-0511

Who Should attend:

Engineers, professional, scientists, and students involved or interested in creative design using new technologies, robotics, and automation.

REGISTRATION

Participants should submit their registration forms together with their payment, in the form of a crossed cheque made payable to **Robotic Games Society (Singapore)**, to:

Ms. Chia Meow Leng

Graduate Programme Office

Mechanical Engrg. Department

National University of Singapore

10 Kent Ridge Crescent

Singapore 119260

Tel: 6874-5122 Fax: 6872-3229

Registrations received before 7th May 2004 are entitled to a 10% discount on the workshop fee. A letter of confirmation and official receipt shall be sent to you to confirm your participation in the workshop.

Please note that there will be no refund for cancellation of participation. Replacement of participation may be accepted without any additional cost.

For further information, please contact Dr. Marcelo H Ang Jr through e-mail:

mpeangh@nus.edu.sg

Biography of Dr. Christian Laugier

Dr. Christian Laugier is Research Director at INRIA (French National Institute for Research on Computer Science and Control), and leader of the eMotion (formerly known as Sharp) research project-team in Robotics since 1984. He is also in charge of the international relation office at INRIA Rhône-Alpes, and member of the INRIA evaluation board. He received the Ph.D. and "State Doctor" degrees in Computer Science from Grenoble University (France) in 1976, and 1987 respectively. His current research interests mainly lies in the areas of *Motion Autonomy*, *Intelligent Vehicles*, *Decisional Processes*, and *Virtual Reality*. In 1997, he was awarded the *Nakamura Prize* for his contribution to the advancement of the technology on Intelligent Robots and Systems. Dr. Christian Laugier is a member of several scientific national and international committees (several French ministerial committees, Adcom of IROS, Adcom of the EURON European Network, etc.), and he is regularly involved in the organizing committees (as PC member, or program chair, or general chair) of the major international conferences in Robotics (IEEE ICRA and IEEE/RSJ IROS). In addition to his research and teaching activities, he participated in the start-up of four industrial companies in the fields of Robotics, Computer Vision, and Computer Graphics.

Biography of Dr. Olivier Aycard

Dr. Olivier Aycard is an associate professor at the University of Grenoble and member of the eMotion group of GRAVIR laboratory since 2000. He passed his PhD in Computer Science in June 1998 in the University of Nancy. From June to September 1999, he was visiting researcher in Nasa Ames Research Center. His research fields are focused on interpretation and fusion of complex data. He lead two French/European projects on advanced driver assistance systems (ADAS). In addition he is in charge of lectures in Artificial Intelligence and Autonomous Robotics in the University of Grenoble.

REGISTRATION FORM

Models and algorithms for motion autonomy and robust navigation in robotics

COMPANY DATA

COMPANY: _____

ADDRESS: _____

POSTAL CODE: _____

TEL: _____ FAX: _____

CONTACT PERSON: _____

PARTICIPANTS FOR THE WORKSHOP

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

DESIGNATION: _____

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

DESIGNATION: _____

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

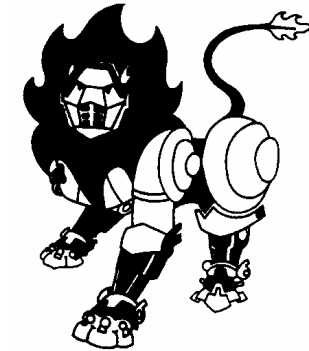
DESIGNATION: _____

* Cancel where applicable

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
10 Kent Ridge Crescent, Singapore 119260

Tel: 6874-5122 Fax: 6872-3229



ONE DAY ROBOTIC WORKSHOP

ON

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Friday, 21 May 2004

8.30 AM TO 5.30 PM

MARIE ROOM 1

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 and Temasek
Polytechnic.**