

EURON SIG on Cooperative Robotics

<http://aass.oru.se/Agora/EuronCoop/>

Description of Work 2007

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Chapter 1

Aims and Structure of the SIG

1.1 Aims

The purpose of the SIG is to meet the tremendously increased interest in cooperative robots of different types for many emerging applications, and to foster Europe's position as leader in the field. The SIG intends to act as a catalyst in amalgamating the increasing number of European research groups in this field. It will provide an infrastructure for scientific exchange and high-level education in this area, and a point of contact between academia and industry.

COOPROB will organize educational and scientific events. It will also maintain links with other related entities in Europe and worldwide, including: the European Robotic Association EUnited-Robotics, the European Robotic Platform EUROP, the Robocup International Federation, and the IEEE RAS Technical Committee on Networked Robots.

The key **technology areas** addressed by COOPROB include: task allocation, cooperative planning and execution, cooperative perception, multirobot mapping and localization, formal models of multirobot plans, multirobot learning, self-configuration, middleware for multirobot systems, truly heterogeneous cooperating robots, networked robotics, robot ecologies, the inclusion of humans in multirobot teams. An important horizontal issue is benchmarking of cooperative robotic systems, including the definition of suitable benchmark scenarios and performance measures.

The key **application domains** include: collaborative manipulation, space and underwater exploration, domestic robotics, entertainment, surveillance, search and rescue.

COOPROB is a continuation of the EURON-1 SIG on Cooperative Robotics, which has been active during the period 2001-2005. This continuation is most needed given the rapidly increase in the level of interest in cooperative robotics in Europe and worldwide, and the continuous emergence of new research issues.

1.2 Organizational structure

COOPROB has a very simple structure, consisting of three types of entities: the SIG coordinators, the SIG board, and the members.

The two **SIG coordinators** provide the overall, day-to-day management of COOPROB. The coordinators are Alessandro Saffiotti (University of Örebro, Sweden) and Pedro U. Lima (Instituto Superior Técnico, Lisbon, Portugal).¹

All decisions regarding the management of SIG activities are taken jointly by the coordinators, after consultation with the **SIG Board**. In addition to this overall consulting role, some members of the Board have specific roles and responsibilities. The members of the SIG Board are listed in the table below. Any member can be added and removed by the SIG board by unanimous decision of the remaining members.

<i>Name</i>	<i>Affiliation</i>	<i>Specific roles</i>
Andrea Bonarini	Politecnico di Milano, Italy	
Frans C.A. Groen	University of Amsterdam, The Netherlands	
Gerhard Kraetzschmar	Fraunhofer IAIS, Germany	Maintenance of the SIG wiki Liason with Roberta-EU project
Daniele Nardi	University of Rome "La Sapienza", Italy	Liason with Robocup Federation
Enrico Pagello	University of Padua, Italy	Liason with IAS Society
Irene Pagello	IT+Robotics SRL, Italy	Industrial liason
Erol Sahin	Middle East Technical University, Turkey	
Alberto Sanfeliu	Technical University of Catalonia, Spain	Liason with the IEEE RAS TC on Networked Robotics
Oskar von Stryk	Technische Universitat Darmstadt, Germany	Organization of the 2008 Summer School
Nikos Vlassis	Technical University of Crete, Greece	Organization of the AAMAS-08 workshop

Membership to COOPROB is open to all the interested EURON members which are active in the field of cooperative robotics. Members outside EURON will also be allowed, but financial support cannot be granted to them. This strategy is intended to maximize the visibility and impact of the SIG activities, while encouraging new people to join EURON.

1.3 Duration

COOPROB has been approved for EURON sponsoring for one year. The workplan below concerns this sponsored period, with starting day October 1, 2007. However, the activities of the SIG are intended to continue after this period. In particular, the Internet infrastructure will be maintained, on a voluntary basis, as long as possible. Further funds may be sought in future to sponsor other activities.

¹Full contact details of all the key persons are listed in Appendix A.

Chapter 2

Work Plan

2.1 Activities

The technology areas and application domains of interest to COOPROB, mentioned in Section 1.1 above, are many and very varied. While the SIG will host events and discussions on all of these areas and domains, each year, COOPROB will define a set of explicit themes, which will constitute the priority focus of the SIG activities for that year. The themes will be decided depending on what's "hot" in the field, and on what are the strategic research priorities in Europe.

The themes for the first year are *networked robotics* and *formal models for cooperation*.

The main activities of COOPROB are listed below.

Community portal

The existing **website** (www.aass.oru.se/Agora/EuronCoop/) will be extended, re-organized, and regularly maintained, with the ambition to become the main reference point for European researchers in cooperative robotics.

A **wiki space** will be added to the "external" website, that allows contributions by all members. Expected contributions include: a student space to exchange ideas, references, and comments; and a catalog of relevant papers and software.

The existing SIG **mailing list** (currently containing 78 entries) will continue to be maintained.

Scientific events

We will organize several **workshops and special sessions** on cooperative robotics in general, and/or on specific topics within cooperative robotics. These events will help to create and maintain a network of European researchers in this area, and to give them international visibility. This will continue a tradition already started in this SIG under Euron-1.

Whenever possible, workshops will be co-located with major international conferences hosted in Europe, in

order to increase visibility and reduce costs. The first such event will be at AAMAS-2008 (Portugal, May 2008), and will have a special focus on “formal methods for modeling, analysis and design of multi-robot systems”. Submission of student papers will be strongly encouraged. This event will be co-chaired by Pedro Lima and Nikos Vlassis.

Some events may be organized outside Europe, when logistic considerations make this convenient. The SIG will participate in the organization of a workshop on “Network Robot Systems” (NRS) at IROS-2007 (San Diego, California, October 29 2007). Another NRS workshop proposal has been submitted to ICRA-2008. Alberto Sanfeliu will co-chair both events.

Educational events

We plan to organize a **summer school** on cooperative robotics in Darmstadt, Germany, during 2008. Funding for the school will be sought from EURON, as well as other bodies. Oskar von Stryk is the Board member in charge of the organization of this school.

We will also supervise the organization of activities targeting **high-school students**, especially female students, in concert with the Roberta-EU project (www.roberta-home.eu). Gerhard Kraetzschmar is the Board member in charge of this liaison.

SIG meetings

At least two **SIG meetings** per year will be organized, co-located with SIG or EURON events. Minutes of the meetings will be posted on the SIG portal, and reported in the Final SIG Report. During the first year, the following SIG meetings will be organized at the EURON annual meeting (Prague, March 2008) and at the COOPROB Summer School (Darmstadt, Summer 2008).

In addition, **informal SIG gathering** will be organized at the relevant workshops and conferences. The first gatherings will be: at Robocomm-2007 (Athens, Greece, Oct 15–17, 2007), and at IROS-2007 (San Diego, California, Oct 29 to Nov 2, 2007).

Publications

We will evaluate the possibility to produce journal special issues and/or edited volumes reporting the results of the SIG workshops and summer schools, depending on the quality of the submitted material.

A **white paper** will be produced every year, reporting the research status in Europe concerning each yearly theme. These white papers will be published on the COOPROB website. The SIG coordinators will act as editors, coordinating the contributions by all interested SIG members. For the first year, the white paper will focus on networked robotics and on formal models for cooperation.

2.2 Evaluation

We will evaluate the success of COOPROB by looking at a number of quantitative indicators, including:

- number of people subscribed to the mailing list;
- number of attendants at the scientific events;
- number of attendants at the educational events.

In addition, we plan to monitor the active participation in the SIG Wiki, and to make use of questionnaires to help steering the SIG in the right direction. The involvement of the SIG and SIG members in benchmark scenarios (e.g., RoboCup Soccer, RoboCup Rescue, RoboCup@Space, IEEE Space Robotics competition, or others to be discussed within the SIG) will also be examined.

The results of the evaluation, including the quantitative indicators, will be reported in the SIG Report for this year.

2.3 Deliverables

The following deliverables will be produced during the sponsored year of activity (October 1, 2007 – September 30, 2008).

<i>Number</i>	<i>Contents</i>	<i>Dissemination</i>	<i>Due date</i>
D1	Community portal online	Public	Nov 1, 2007
D2	Proceedings of workshop at IROS-07 (focus: network robot systems).	Public	Nov 30, 2007
D3	Proceedings of workshop at AAMAS-08 (focus: formal methods for modeling, analysis and design of MRS).	Public	May 31, 2008
D4	Report: the COOPROB Summer School	Restricted	Sep 30, 2008
D5	White paper: European research on networked robotics and on formal models for cooperation	Public	Sep 30, 2008
D6	First Year SIG Report	Public	Sep 30, 2008

Depending on the quality of the presented papers, we will consider editing a journal special issue from the outcomes of the COOPROB workshops.

Chapter 3

Budget

The allocated budget for the first year is 15,000 Euro. Since the SIG is intended to have an open-ended duration, we plan to enter new applications for funding in the next years, if possible.

The budget will be used for partial coverage of the cost of some of the SIG activities listed below. In particular:¹

<i>Activity</i>	<i>Allocated budget</i>
Travel grants to students participating in the COOPROB scientific events	4,500
Invitation of renowned speakers to the COOPROB scientific events	3,500
Travel reimbursements to COOPROB Board members attending the SIG meetings	3,000
Costs associated to the preparation of the Summer School	1,000
Overhead (20%)	3,000
Total budget	15,000

Student travel grants are intended to help students to participate in SIG-sponsored events. These grants are reserved to students affiliated with a EURON member which is also a member of COOPROB. The grants are expected to be 300 euro each, so that up to 15 student trips can be sponsored with the allocated budget. The precise amount of the grants, as well as the assignment criteria, will be decided by the SIG Board on a event-by-event basis.

The SIG partners will provide their own research and educational expertise at the SIG events, but it will of course be valuable to also *invite renowned speaker* from outside the SIG. The budget allocated for this will cover approximately the cost of one travel from North America or Far East, plus one from Europe.

Travel reimbursements for board members will be given according to EURON standard practices: a flat reimbursement of 300 euro per trip will be allowed, which amounts to 10 trips within the allocated budget. Standard provisions to reduce costs will be used: low cost flights and locations will be recommended,

¹All amounts are in Euro.

meetings will be co-located with other major events when possible, and use of internet meetings will be made.

The costs for the preparation of the Summer School mainly account for the travel expenses to allow the SIG coordinators and school organizers to meet. As for the costs of actually running the Summer School, specific applications for funding will be filed in due time.

Overall financial management for COOPROB will be provided by Örebro University, under the responsibility of Alessandro Saffiotti. The indirect and administration costs (overhead) are accounted for at a flat rate corresponding to 20% of the direct costs.

The remaining activities (e.g., maintenance of the portal, organization of the events, production of white papers, etc) will be performed on a voluntary basis by the SIG members.

Appendix A

Contact Details

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