IEEE Robotics & Automation Society Newsletter

ROBOTICS AND AUTOMATION

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THE INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC.
IEEE

1990 IEEE INTERNATIONAL CONFERENCE ON

ROBOTICS AND AUTOMATION

Sponsored by the IEEE Robotics and Automation Society

General Chairperson: **R. A. Volz,** Texas A&M University
Program Chairperson: **A.J. Koivo,** Purdue University
Treasurer and Coordinator: **Harry Hayman**
Local Arrangements: **E.L. Hall,** University of Cincinnati

May 13-18, 1990
The Hyatt Regency Cincinnati
Cincinnati, Ohio

ADVANCE ANNOUNCEMENT
and
CALL FOR PAPERS

The theme of this conference is "Intelligent Automation and Robotics" with emphasis on information technology for sensor-based systems. Original basic and applied papers in all areas of automation and robotics are solicited. Special topics include but are not limited to the following:

- Automation systems: design, planning, modeling, evaluation, and optimization. Structural and geometric representation and reasoning.
- Flexible manufacturing systems: planning, scheduling, simulation and design for assembly.
- Artificial intelligence, knowledge management and expert systems for intelligent automation and robotics.
- Intelligent robot systems and their applications.
- Robot sensing: vision, touch, range, force. Information technology for sensors. Integration of multisensory information.
- Teleoperated and autonomous robots. Coordinated multiple robotic systems.
- Mobile robots: design, planning, navigation and applications.
- Micro electro-mechanical devices and systems.
- Applications of automation and robotics to industry, space, underwater, construction, medicine, hostile environment.

Submission of non-commercial papers from representatives of industry, universities, research institutions, and governmer 's encouraged.

PAPER SUBMISSION: Four copies of papers should be sent by October 16, 1989 to:
A.J. Koivo, School of Electrical Engineering
Purdue University, West Lafayette, IN 47907

Reviews will be conducted by a program committee of established robotics researchers. Invited sessions will be entertained, but their papers will be reviewed by the normal process.
Authors will be notified of acceptance and furnished with an author's kit by January 15, 1990. Final papers received by the deadline will be included in the proceedings available at the conference.

The conference hosts workshops and tours on Sunday, May 13, and Friday, May 18, 1990, and tutorials on Monday, May 14. Conference sessions will be held on Tuesday, May 15 to Thursday, May 17, 1990. Prior to September 1, 1989 those with proposals for tutorials or workshops should contact: **Dr. J. Lin,** Department of Bioengineering, University of Illinois at Chicago, P.O. Box 4348, Chicago, IL 60680.

Announcing the Anton Philips Award for Best Student Paper

A $1000 prize will be awarded for the best paper offered by a graduate student. To be eligible, the student (1) must be first author and primary developer of the paper's ideas, (2) must have student status in June 1989 and (3) must be a member of the IEEE. Four copies of the paper, along with a nominating letter from the student's advisor and the student's IEEE membership number should be sent by October 16, 1989 to:

Anton Philips Award Committee
c/o A.J. Koivo, School of Electrical Engineering
Purdue University, West Lafayette, IN 47907

THE INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC.

IEEE

From the President

Arthur C. Sanderson
Rensselaer Polytechnic Institute

The IEEE Robotics & Automation Society has an important role in developing and stimulating research directions in this rapidly changing field of science and technology. Our annual conference, which was held in May in Scottsdale, Arizona, contributes to this process in two important ways. First, the conference provides an important forum for the formal presentation of new research results and developments. Second, the conference provides an opportunity for informal discussion and exchange of ideas over the wide range of research and applications topics which comprise our field. I felt that both of these goals were accomplished in the Scottsdale Conference. The quality of the formal papers was certainly very high. Copies of the published proceedings of the conference are available through the IEEE for those of you who were not able to attend the conference. In addition, the beautiful surroundings and the informal nature of the Scottsdale site encouraged the informal exchange of ideas and the development of new acquaintances. It is particularly gratifying to see the continuing development of a community feeling among the interdisciplinary researchers who attended this conference. In robotics and automation, we study the marriage of intelligent computing and the physical world, and as such, this research is at the forefront of an increasingly larger set of important developments which help to shape present and future technologies. Many of the fundamental issues which were discussed at the conference, in control, sensor interpretation, planning, architecture, and mechanisms, will shape the future development of technologies well beyond the immediate applications. The principles which we evolve in automation, teleoperation, and autonomous machines will form the basis for new generations of both intelligent systems and intelligently designed systems.

The range of applications which were discussed and presented at the conference continues to grow. While manufacturing continues to be the largest and economically most important of these applications, service, defense, hazardous environments, space, undersea, mining, and construction are examples of other areas of increasing importance. In many cases these applications are generators of the fundamental issues as well as targets for demonstration. Robotics is in many ways fundamentally experimental, and as Steve Jacobson suggested in his plenary talk at the conference, it's important to find out how bad reality really is.

I think the Society provides a forum to integrate ideas of applications, experiments, and theory, to share experiences, and to help find key directions which make these technologies increasingly important and useful for the future. It provides a linkage among both users and developers of these technologies and helps to shape both the intellectual directions and the practical relevance of our work.

AdCom Highlights

Transactions Allotted More Pages

At the May meeting in Scottsdale, members of the IEEE Robotics and Automation Society Advisory Committee (AdCom) voted to increase the number of pages allocated for the *Transactions on Robotics & Automation* to 824, from the 1988 allocation of 696.

The AdCom voted to keep dues at the current level through 1990, using some of the current budget surplus to finance the page increase.

According to *Transactions* editor Dr. Russ Taylor, the increase in the "page budget" will enable the editors to reduce the backlog of accepted papers.

R&A Dues Unchanged for 1990

The AdCom voted to keep the current dues structure through 1990. The Society currently has a substantial surplus, some of which will be used to finance the increase in publication costs associated with increasing the size of the *Transactions.*

Richard Klafter, Vice-President for Finance, emphasized the need for the R&A Society, as a new society, to practice conservative fiscal management, especially during the first few years when membership may be volatile.

Upcoming R&A Conferences

The 1990 Conference will be May 13-18, 1990 in Cincinnati, Ohio. R.A. Volz is General Chairman, A.J. Koivo is program chairman, and E.L. Hall is Local Arrangements Chairman.

The 1991 Conference will be April 7-12, 1991 in Sacramento, California. T.J. Tarn is program chairman, and Steve Hsia is local arrangements chairman.

The AdCom will discuss proposals for the 1992 conference site at its December meeting. Site proposals and other suggestions should be sent to Roger Brockett, Meetings Chairman. A conference site should be easily accessible from U.S. and European airports and should provide convenient meeting space and accommodations for at least 600 participants.

Membership

The IEEE reports that the R&A Society currently has 5382 members. As an IEEE society, members may establish local R&A chapters which can sponsor seminars, workshops and other activities. Contact Harry Stephanou, vice president for membership, about forming local chapters.

$$ Why Page Charges? $$

Lord Chesterfield, the eighteenth century British essayist, once wrote a correspondent, "I wish to apologize for the length of this letter. I did not have time to write a shorter one."

It is a truism that the easier a paper is to read, the harder it is to write. By the same token, a 35-page paper is much more difficult and time-consuming to prepare than a 50-page paper covering the same material.

This is why the *IEEE Transactions on Robotics & Automation*, like most other scholarly journals, imposes mandatory excess page charges on those authors who are unable to to keep their articles within the suggested length of eight printed pages (about 35 manuscript pages).

According to Dr. Russ Taylor, editor of the *Transactions* the excess page charges are imposed as incentives to keep papers at a reasonable length and allow more people to publish. He emphasized that payment of the charges is in no way a consideration in the review and acceptance process.

While the excess page charges and the voluntary page charges which many research sponsors pay do help to underwrite expenses, publication of the *Transactions* is financed by the IEEE Robotics & Automation Society, primarily through society membership dues and the profits from society-sponsored conferences and workshops.

The *Transactions'* budget is measured not in dollars, but in pages. Even if cost were no object, the page budget would still be limited. Among other reasons, there is a limit to the amount of time and storage space subscribers are willing to allocate to a single journal! Therefore, overlong papers reduce the number of deserving papers which can be published in each issue. This increases the delay between acceptance and publication. If the turnaround time between submission and publi cation becomes unreasonably long, people will begin to send their work to other, perhaps less appropriate journals.

While the decision by the Adcom to increase the page budget will help reduce the *Transactions'* backlog, contributing authors are urged to adhere to the length regulations. If this is impossible, try to pay the excess charges graciously, if not cheerfully.

It's Not Too Late!!

If you missed the conference, proceedings of the 1989 IEEE International Conference on Robotics and Automation will be available in July from the IEEE. Send orders to:

Sales Department
IEEE Service Center
445 Hoes Lane
Piscataway NJ. 08854 201-562-3878
Catalog No: : 89CH2750-8
IEEE member: $99
Nonmember $198. Checks must be payable in US currency.

The IEEE has copies of conferences as far back as 1976 available on microfiche. Printed copies are available as supply lasts. A few (76 at last count) printed copies of the 1988 R&A conference are remaining.

Intelligent Automation and Robotics: The 1990 IEEE International Conference on Robotics and Automation

A.J. Koivo, General Chairman and R.A. Volz, Program Chairman

We have selected the theme *Intelligent Automation and Robotics* for the 1990 conference. We hope that authors will respond by submitting many significant papers in these areas. Naturally, the submission of technical papers on other areas of automation and robotics is encouraged as well. We interpret the theme very broadly. It is widely accepted that "robotics" refers to the engineering and science dealing with robots. On the other hand, "automation" can be amenable to various interpretations, although it is usually explained in the framework of manufacturing. From this perspective, one may say that automation refers to a system or a method in which many or all of the processes of production, movement (transportation), and inspection of parts and materials are performed and controlled by self-operating machines and/or devices. The concept of automation, in our opinion, should have a broader interpretation than that provided by manufacturing.

It is more difficult to specify the adjective "intelligent."Would it be more appropriate to say "not stupid?" We are inclined to think that the basic qualifications for intelligent behavior of a system are that it is capable of detecting changes and unexpected circumstances, diagnosing them, adapting(itself) to the changes, and still achieving its functional objectives. An example is a flexible manufacturing system producing many different customized products. The intelligence is achieved principally by means of software (reprogrammability, knowledge-base, etc.) and sound engineering.

Thus, the emphasis is shifted from factory floor to computer room with emphasis on engineering. Another example is a machine that can detect errors such as malfunctioning, diagnose them, and perform adjustments to recover and continue its function. The intelligence of the system is built in the software, and it relies strongly on sensory information.

We would like to see papers on automation related to *planning, modeling, evaluation and design.*

In particular, papers on what qualifies the system to be intelligent would be interesting. We encourage submission of papers in these oft neglected areas.

An intelligent (automation and/or robotics) system relies heavily on sensory information. Sensory technology involves not only the development of sensors but also the processing of the measured information and expressing it in a suitable form.

When measurements are gathered by many sensors, the information needs to be fused and integrated. An intelligent system should also help in this activity.

We look forward to many papers on *intelligent sensory systems*, which is a fast changing area with many miniature-size devices being developed.

Automatic guided vehicles and mobile robots are typical representatives of intelligent machines. They usually also possess a high degree of autonomy. Their design and control represent an interesting challenge to engineers and scientists. Although we are still far away from being able to design completely autonomous intelligent machines such as Luke Skywalker's 3'CPO, the reports on work on these areas will provide a fruitful ground for exchange of ideas, which will pave the road to further progress. We also hope to see many submissions on *various types of intelligent machines*, including papers on *intelligent hands and micro electromechanical devices*, another fast-growing technology.

We would like to encourage the submission of application papers on automation and robotics in such areas as the *space, underwater, medicine, manufacturing, process and construction industries and in hazardous (e.g., nuclear) environments.* In many of these applications, teleoperation is essential, at least at present. A proper framework is provided by the telepresence to guide a human in the decision making.

Robots to Pitch for the Cincinnati Reds?

The 1990 Conference will be held at the Hyatt Regency in Cincinnati, Ohio, May 13-18, 1990. The city has excellent samples of automation and robotic industry. In spite of this, we may want to introduce our in-

R&A e-mail Addresses

In response to requests from several members we are establishing a Robotics & Automation e-mail/fax directory. If you want to be included in the directory send your 'handles", along with your request to *wes@ecelet.ncsu.edu.*

The first installment follows, and we will publish additional entries as they come in.

Name	Institution	e-mail	fax
George Bekey	Univ. So. Calif.	bekey@pollux.usc.edu	
Roger Brockett	Harvard Univ.	brockett@gramian.harvard.edu	
Mark Cutkosky	Stanford Univ.	cutkosky@cdrsun.stanford.edu	
Toshio Fukuda	Nagoya Univ.		(052) 781-9243
Eddie Grant	Turing Institute	eddie@uk.ac.turing	
Y.C. Ho	Harvard Univ	ho@paone.harvard.edu	
Robert B. Kelley	Rensselaer Poly. Inst.	kelley@ral.rpi.edu	
C.S. George Lee	Purdue Univ.	csglee@ee.ecn.purdue.edu	
Vladimir J. Lumelsky	Yale Univ	lumelsky@cs.yale.edu	
Giuseppe Menga	Univ. of Torino	menga@itopoli.bitnet	(011) 556-6329
Arthur C. Sanderson	Rensselaer Poly. Inst.	acs@mts.rpi.edu	
George Saridis	Rensselaer Poly. Inst.	saridis@ral.rpi.edu	
Arun Sood	George Mason Univ.	asood@gmuvax.gmu.edu	
Wesley E. Snyder	North Carolina St. Univ	wes@ecelet.ncsu.edu	
Janos Sztipanovits	Vanderbilt Univ.	sztipaj@vuse.vanderbilt.edu	
Russell H. Taylor	IBM TJ Watson Center	csnet: rht@ibm.com	
Dr. Walter Trybula	GE, Charlottesville, VA		(804) 978-6073
Roger Tsai	IBM T.J. Watson Ctr.	rtsai@ibm.com.bitnet & csnet	

ligent robots to the Cincinnati Reds (baseball team) to perform pitching, and our intelligent automation designs for adaptive process planning to the Bengals (football team) for play selection. Although we do not have at present accurate information about the intelligent systems used in riverboats, we should have the opportunity to gather first-hand information about this in Cincinnati.

Schedule

The actual conference sessions will be held on Tuesday, May 15 to Thursday, May 17, 1990. The tutorials and workshops will be held the days before and after the conference. In addition, tours will be arranged to local industry and cultural centers.

Deadlines

The deadline for submission of the technical papers is October 16, 1989. The authors will be notified of acceptance by January 15, 1990. Papers for the invited sessions will also be due October 16, 1989 and will be reviewed by the normal process.

Officers of the IEEE Robotics & Automation Society

President: **Arthur C. Sanderson, RPI**
Past President: **Yu-Chi (Larry) Ho, Harvard Univ.**
Founding President: **George N. Saridis, RPI**
V.-Pres., Finances: **Richard D. Klafter, Temple Univ.**
V.-Pres., Member Activities: **Harry E. Stephanou, George Mason Univ.**
V.-Pres., Technical Affairs: **T.J. Tarn, Washington Univ.**
Secretary: **C.S. George Lee, Purdue Univ.**
IEEE Div. X Director: **Anthony Ephremides, Univ. Maryland**
Editor of Transactions: **Russell H. Taylor, IBM**
Chairman, Publications Com.: **Robert B. Kelley, RPI**

R&A Technical Committees

T.J. Tarn, Washington University
Vice-President for Technical Activities

Currently I am organizing the technical committees for our Society. Possible activities for TCs are unlimited and can include workshops or special sessions at the Robotics and Automation Conference. Society members may join one or more Technical Committees. The following committees are being proposed, pending the approval of the AdCom:

Computer-Aided Production Management

Chairman: Professor Peter Luh
Department of Electrical and Systems Engineering
University of Connecticut
Box U-157
Storrs, CT 06268
(203) 486-4821

Future Directions

Chairmen: Professor M. Vidyasagar
Department of Electrical Engineering
University of Waterloo
Waterloo, Ontario
Canada N2L 3G1
(519) 888-4075

Professor John Baillieul
Aerospace/Mechanical Engineering
Boston University
College of Engineering
110 Cummington Street
Boston, MA 02215
(617) 353-9848

Intelligent Instrumentation and Measurement Systems in Robotics and Automation

Chairman: Professor Janos Sztipanovits
Department of Electrical Engineering
P.O. Box 1824, Sta. B
Vanderbilt University
Nashville, TN 37235
Phone: (615) 352-7950
Fax: (615) 343-6702
E-mail: sztipaj@vuse.vanderbilt.edu

Robot Motion Planning

Chairman: Professor Vladimir J. Lumelsky
Department of Electrical Engineering
Yale University
New Haven, CT 06520
Phone: (203) 432-4249
E-mail: lumelsky@cs.yale.edu

Robot Dynamics and Control

Chairman: Dr. Oussama Khatib
Artificial Intelligence Laboratory
Computer Science Department
Stanford University
Stanford, CA 94305

Computer Vision

Chairman: Dr. Roger Tsai
IBM T.J. Watson Research Center
Room 5-151
Yorktown Heights, NY 10598
Phone: (914) 945-1437
E-mail: rtsai@ibm.com.bitnet & csnet

Manufacturing Automation

Chairmen: Dr. Walter Trybula
Electronics Manufacturing Applications Center
General Electric Company
P.O. Box 8106
Charlottesville, VA 22906
Phone: (804) 978-6456
Fax: (804) 978-6073

Dr. Stanley B. Gershwin
35-331
Massachusetts Institute of Technology
Cambridge, MA 02139
(617) 253-2149

International

Chairmen: Professor Toshio Fukuda
Department of Mechanical Engineering
Nagoya University
Furo-cho, Chikusa-ku

Nagoya 464-01, Japan
Phone: (052) 781-5111 (Ext. 4478, 3301)
Fax: (052) 781-9243

Professor Giuseppe Menga
Department of Automatica & Informatica
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Corso Duca degli Abruzzi 24
10129 Torino
Italy
Phone: (011) 556-7012
E-mail: menga@itopoli.bitnet Fax: (011) 556-6329

Another committee on "Micro Robots" is under consideration.

Robot Motion and Planning Technical Committee Report:

Vladimir J. Lumelsky
Committee Chairman

Two highlights dominated the Committee's activity during the last year:

- Preparation of the Special Issue of the IEEE Transactions on Robotics and Automation (Guest Editors – Vladimir Lumelsky, Yale University, and Rodney Brooks, MIT). The topic is Sensor-Based Planning and Control in Robotics. Most of the papers deal, in some form or another, with robot motion planning. As of today, the reviewing process is complete and the Issue is approved for publication. The expected publication date for the Issue is December 1989.
- Preparation of the IEEE International Workshop on Intelligent Robots and Systems (IROS'89), to be held in Tsukuba, Japan, Sept. 4-6, 1989 (Program Chairmen – T. Arai, Univ. of Tokyo, and V. Lumelsky, Yale Univ.). The theme of this year's Workshop is "Autonomous Mobile Robots", and many papers relate to motion planning. In particular, we organized two special sessions:
  - Implementation Issues in Sensor-Equipped Robotic Systems (Chairman - F. Pin, Oak Ridge National Laboratory, USA).
  - Position Estimation for Autonomous Vehicles (Chairman - I. Cox, Bell Laboratories, USA).

We are also planning to have special sessions on sensor-based robot motion planning at the 28th CDC Conference in Tampa, Florida, December 1989, and at next the IFAC Congress, Tallinn, USSR, July 1990.

Akella Wins Philips Award

Mr. Prasad Akella is the recipient of the second annual **Anton Philips Award** for the best student paper submitted to the IEEE Conference on Robotics & Automation. Mr. Roy Featherstone of Philips Laboratories presented the award during the conference banquet.

The North American Philips Corporation has agreed to sponsor the $1000 award for the next 10 years. To be eligible for the Philips Award, the student (a) must be the first author and primary developer of the paper's ideas, (b) must have student status in June of the year when the paper is submitted, and (c) must be a member of the IEEE.

The winning paper, "Manipulating with soft fingers: Modeling contacts and dynamics was one of 34 student-authored papers submitted for consideration.

Prasad is currently a student in the Ph.D. program at Stanford University. His co-author was his advisor, Dr. Mark Cutkosky at Stanford's Center for Design Research. Over the next year or two Prasad plans to extend his models and embark on extensive experimentation with a specially designed planar manipulator.

Prasad obtained his M.S. degree from the Mechanical Engineering Dept. at Stanford where he was admitted with a Department Fellowship. During the summer after he completed his Master's degree Prasad worked on a robotic welding project at the ALCOA Technical Center in Pittsburgh.

Abstract of the 1989 Philips Award Paper

Soft fingertips generally perform better than the kinematic idealizations proposed in recent research would indicate, allowing smaller gripping forces, providing stabler grasps, and dissipating energy from the system. These soft fingertips are created by filling robot fingers with powders or plastic fluids. We have developed models, adapted from plasticity theory, to represent such fingertips more realistically. Sensitivity studies have been

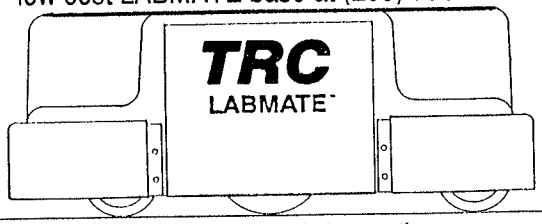
developed to help in the choice of an appropriate model. The visco-plastic nature of the fingertip affects the dynamics of manipulation by dissipating energy. This dissipation of energy has an effect similar to that of adding damping or velocity feedback to the finger joints. We are interested in this effect in the context of simulating the dynamics of manipulation. Initial simulations indicate that the dissipation of energy from the system, due to soft fingertips, is of the same order of magnitude as that due to damping in the finger joints.

In order to validate and better understand these models, we have designed and built a Planar Manipulator (PM). The PM is a direct drive, 5 bar mechanism, that s been designed such that the drive train dynamics are well defined. Thus it is possible for us to concentrate on the contact dynamics of the grasp itself.

Future work is directed towards improving on our initial attempts at modeling these soft fingers, towards studying models for fingertip with powers in them and towards verifying these models using the PM.

Get your project rolling.

Put your payload
on top of a LABMATE
Autonomous Mobile Robot
from TRC. LABMATE comes
ready to roll with an on-board
microprocessor, servo controllers,
tactile bumpers, a 200 lb. capacity,
and an RS232 interface--all standard!
An ultrasonic/infrared proximity system
is also available. Find out more about the
low cost LABMATE base at (203) 798-8988.



Transitions Research Corporation
15 Great Pasture Rd. Danbury, CT 06810 (203) 798-8988

Faculty Positions in Robotics
Robotics Ph.D. Program
Carnegie Mellon University

Applications are invited for tenure-track faculty positions in the Robotics Ph.D. Program at Carnegie Mellon University. The program is interdisciplinary with participation from the Robotics Institute, School of Computer Science, Carnegie Institute of Technology (the engineering college), and Graduate School of Industrial Administration. Appointees are expected to play major roles in education and research in the program. The appointments may be made at either assistant, associate, or full professor levels, and in general will be joint positions between the Robotics Institute and an academic department or school, depending on the qualifications and backgrounds of the applicants. If so desired, a non-tenure-track research faculty position at the Robotics Institute can also be considered.

Applicants for tenured positions must have strong records of achievements in research and education in robotics and have demonstrated leadership in formulating and performing advanced research projects. Applicants for junior tenure-track positions must have a Ph.D. in a related discipline and have demonstrated competence in one or several areas of Robotics research together with potential for excellent teaching.

Outstanding candidates in all areas of Robotics are invited, including, but not limited to, mechanism, manipulation, control, locomotion, vision, design, planning, knowledge-based systems, simulation, graphics, micro-electronics, parallel computing, manufacturing, and management.

Applicants should send their applications with curriculum vitae and names of at least four references to: Professor Takeo Kanade, Director of the Robotics Ph.D. Program, The Robotics Institute, Carnegie Mellon University, Pittsburgh, PA 15213.

Carnegie Mellon is an Equal Opportunity/ Affirmative Action employer.

R&A AdCom and Officers Elected

Under the bylaws of the new IEEE Robotics and Automation Society 18 members have been elected to the Administrative Committee (AdCom). Adcom members will normally serve staggered three-year terms, with six new members to be elected each year. Since it was necessary to elect all 18 members this year, there were been randomly selected to serve for one-year, two-year, and three-year terms.

Ballots containing the names and vitae of 39 candidates were sent to the subscribers to the Journal of Robotics & Automation, who comprise the membership of the new society.

Society officers were elected by the new AdCom at the May meeting and will serve until the end of 1990. The following is a list of officers and other AdCom members.

Officers

President: Arthur C. Sanderson, Electrical, Computer & System Engineering Department, Rensselaer Polytechnic Institute.

Past President: Yu-Chi (Larry) Ho, Harvard University

Founding President: George N. Saridis, Electrical, Computer & System Engineering Department, Rensselaer Polytechnic Institute

Vice-President for Finances: Richard D. Klafter Electrical Engineering Department, Temple University

Vice-President for Member Activities: Harry E. Stephanou, Department of Electrical & Computer Engineering, George Mason University.

Vice-President for Technical Affairs: T.J. Tarn, Systems Science & Mathematics Department, Washington University.

Secretary: C.S. George Lee, School of Electrical Engineering, Purdue University

IEEE Division X (Division 10 Director:) Anthony Ephremides, Department of Electrical Engineering, University of Maryland

Editor of Transactions: Russell H. Taylor, IBM T.J. Watson Research Center

Chairman, Publications Committee: Robert B. Kelley, Electrical, Computer, & System Engineering, Rensselaer Polytechnic Institute.

Chairman, Meetings Committee: Roger W. Brockett, Harvard University

Chairman, Standards Committee: Leonard S. Haynes, Intelligent Automation, Inc.

Chairman, Education Committee: Alan A. Desrochers, Electrical, Computer & System Engineering Department, Rensselaer Polytechnic Institute

1990 Conference
General Chairman: Richard A. Volz, Computer Science Department, Texas A&M University
Program Chairman: Antii J. Koivo, School of Electrical Engineering, Purdue University

1991 Conference
General Chairman: T.C. (Steve) Hsia, Department of Electrical & Computer Engineering, University of California - Davis
Program Chairman: T.J. Tarn, Systems Science & Mathematics Department, Washington University

Other Administrative Committee Members

Antal K. Bejczy, Jet Propulsion Laboratory, California Institute of Technology
George A. Bekey, Computer Science Department, University of Southern California
Wayne J. Book, School of Mechanical Engineering, Georgia Institute of Technology
Toshio Fukuda, Department of Mechanical Engineering, Nagoya University (Japan)
Gerhard Hirzinger, Automation and Robotics Division, DFVLR (West Germany)
John M. Hollerbach, MIT Artificial Intelligence Lab
John F. Jarvis, Robotics System Research Department, AT&T Bell Labs

Takeo Kanade, The Robotics Institute and Computer Science Department, Carnegie Mellon University
John Y.S. Luh, Department of Electrical & Computer Engineering, Clemson University
Charles P. Neuman, Department of Electrical & Computer Engineering, Carnegie Mellon University
Richard P. Paul, Computer & Information Science Department, University of Pennsylvania
Wesley E. Snyder, Department of Electrical & Computer Engineering, North Carolina State University

Join the IEEE Robotics & Automation Society!

Subscribers to the *IEEE Journal of Robotics and Automation*, now the *IEEE Transactions on Robotics & Automation*, are the charter members of the IEEE Robotics & Automation Society. Since this newsletter goes to those same people, most of you who are reading this are already "among the elect".

However, occasionally people find things on their desks and wonder where they came from. If that's what happened to you and you'd like to know more, you are cordially invited to join the IEEE Robotics & Automation Society.

For IEEE members, society membership currently costs only $15. This membership fee includes the bi-monthly *Transactions*, this newsletter, announcements of conferences and workshops, and other society benefits.

For more information, call the IEEE Service Center, (201)981-0060. ext. 5530.

Calls for Papers

International Conference on Computer Integrated Manufacturing

May 21-23, 1990, Rensselaer Polytechnic Institute, Troy NY

Sponsored by the CIM Program of the Center for Manufacturing Productivity and Technology Transfer at RPI. Papers are requested in the areas of System Integration, Technology Management, Product/Process Design, Control, and Communications.

Send 1500 word summaries by December 1, 1989 to Prof. Alan Desrochers, Rensselaer Polytechnic Institute, Electrical, Computer,& Systems Engineering, Troy NY 12180-3590, (518)276-6718.

10th International Conference on Pattern Recognition

June 17-21, 1990, Atlantic City NJ.

Sponsored by the International Association for Pattern Recognition and the Computer Society. The conference will be organized as four specialty conferences. Each conference has its own conference committee and Program Chairman and will publish its papers as a separate proceedings volume.

The four specialty conferences are:

- **Computer Vision**: Prof. J.K. Aggarwal, Computer & Vision Research Center, Electrical & Computer Engineering, The University of Texas, Austin Texas 78712
- **Pattern Recognition Systems and Applications** Prof. R.M. Haralick, Dept. of Electrical Engineering, FT-10, University of Washington, Seattle WA 98195
- **Image, Speech and Signal Processing** Dr. Arun Netravali, Room 3D406, AT&T Bell Laboratories, 600 Mountain Ave., Murray Hill, NJ 07974
- **Computer Architectures for Vision and Pattern Recognition***Dr. Jorge Sanz, K53-802, IBM Almaden Research Center, 650 Harry Rd., San Jose CA 95120. *This conference replaces what would have been the 1990 IEEE Computer Society Workshop on Computer Architectures for Pattern Analysis and Machine Intelligence (CAPAMI).

Papers should be submitted to the appropriate Program Chairman.

News from Research Institutes

University of Bochum, FRG

Contact: W. Massberg and L. Howah, Ruhr-Universität Postfach 102148. D-4630 Bochum

An Autonomous Ferromagnetic Robot Claw Arm

An autonomous robot claw arm for picking up ferromagnetic workpieces has been developed at the Institute of Automation Technology (Dr. Massberg).

The claw arm is able to seize a single piece out of an unarranged heap of bulk material in order to lead it to a further step of processing.

The use of SMD-technology made it possible to integrate the entire control system electronics into the actual robot claw arm so that it can be regarded as an autonomous function element of a handling system. The claw arm communicates with the robot control (or an SPS) via a few binary constitutional trip lines.

The claw arm can be easily adapted to any robot arm or robot control system, independent of the producer.

Operation of the arm is based on a variation of the flow of an electro-magnet. A distance meter (for the optimization of the processing time and for the supervision of collision), an output tube for the electromagnet, a temperature detector, operational controls to support a workpiece-educational phase, and a serial data interface (RS 485) for diagnostics are all situated in the magnetic claw arm.

The elaborated claw arm draft can also be integrated into common CIM structures. By means of a serial interface (RS485) in the microcontroller which is currently used as a diagnostic interface it is quite possible to feed the magnetic claw arm with the specific workpiece system parameters by a cell calculator via a serial network. This enables the claw to react quickly to a change of the workpiece within a product spectrum.

Technical University of Munich

Contact: J. Milberg, Arcisstraßß21, D-8000 München 2

The research projects of the **Institute for Machine Tools and Industrial Management (IWB)** are concerned with the optimization of manufacturing systems, processes, and methods.

Current research activities are in the following areas:

Autonomous Mobile Robots

Research activities in this field are part of an interdisciplinary project at the university. Three different projects are concerned with task planning for autonomous mobile robots, motion planning with the aid of simulation techniques, and the development of a laser scanner for the exact positioning of the robot.

Generic Workcell Controller

A generic concept of a workcell controller is developed according to a uniform workcell-structure. T' can be used in the same way for part-manufacturing and assembly, which raises the system availability by strict decoupling several components. Most important is the possibility of integrating the workcell controller into CIM. The workcell controller software consists of a standard software base and the cell specific drivers. The final user is able to configurate the software and program his intended sequence of actions in runtime.

Assembly Planning

Together with three other institutes of the university, the IWB works within a special research program to establish computer tools for Assembly Planning. Different projects entail a hierarchical modeling of assembly programs, optimizing automatic layout, user interfaces, expert systems for cell-configuration, flexible sensory systems, concepts to improve the flexibility of assembly cells, and integrating methods of DFA (Des for Assembly) and SE (Simultaneous Engineering).

CIRSSE/RPI

Prof. Alan Desrochers has been named Associate Director of CIRSSE, the NASA-sponsored Center for Intelligent Robotic Systems for Space Exploration Rensselaer Polytechnic Institute.

New Products

Robug II
A Large Structure Inspection Vehicle

The need to inspect, clean and maintain large structures such as oil tanks, ships' hulls, and high-rise buildings has prompted research into mobile robots designed to climb vertical surfaces without the need of scaffolding. Robug II is a light weight low-cost articulated limb robot designed for this purpose. Any number of pairs legs can be coordinated and connected to a chassis which carries tools appropriate to the job required.

The pneumatically driven legs are semi-intelligent and controlled by individual single chip computers under command of an IBM compatible computer. A feature of the design is the ability to negotiate obstacles and changes in level or inclination. The command computer may be programmed to carry out searches using 'dead reckoning' information derived from the robot.

Vacuum driven suckers are available for the feet and the chassis to lock onto the surface when a rigid work platform is required. Alternative magnetic or claw grippers may be substituted. Power is supplied via a compressed air line coaxial with a low voltage electric supply and a fiberoptic communication cable.

Contact: A.A. Collie, Walton Road, Farlington, Portsmouth PO6 1SZ, 0705 210210 UK.

Newsletter Deadlines

Please send calendar items and other news on or before the due dates to ensure inclusion in the newsletter. Submissions by e-mail (wes@ecelet.ncsu.edu) in LaTeXformat are most appreciated by the editors.

Issue	Deadline
September	**August 1**
December	**October 25**
March	**Feb 5**
June	**May 20**

Advertising in the IEEE Robotics & Automation Newsletter

The Newsletter is distributed to the 5000+ members of the IEEE Robotics & Automation Society. These include the world's leaders in both industry and research in the field of robotics and automation.

Advertising Rates

Issues/year	x1	x2	x3	x4
Full page	$700	$1350	$2050	$2550
Half page	375	725	1100	1350
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Sixth Page	150	295	430	575
Classified (per column inch,)	$35			

There is a $25 surcharge for advertisements with halftones.

For more information contact: Rosalyn Snyder, Managing Editor
IEEE Robotics & Automation Newsletter
3603 Octavia Street
Raleigh North Carolina 27606
Tel.: (919)851-1433

Calendar

Date	Event	Place	Sponsors/Info
July 16-29	NATO Advanced Study Inst. on Active Perception & Robot Vision	Maratea, Italy	*Contact* Arun Sood or Harry Wechlser, George Mason Univ., Fairfax VA 22030: (703)323-2318; Internet: ASOOD@GMUVAX.GMU.EDU
July 18-20	3nd Int'l IEEE Conf. on Image Processing & Its Application	Univ. of Warwick, England	*Contact:* M.C. Fairhurst, Conference Services, Institution of Elect. Engineers, Savoy Place, London WC2R England; (44 +1)240 1871.
Aug. 7-9	IEEE Cornell Conf. on Advanced Concepts in High Speed Semiconductor Devices & Circuits	Ithaca NY	IEEE Electron Devices Society.*Contact:* George M. Maracas, Elect. & Computer Eng. Dept., Arizona State Univ. Temp AZ 85287-6206, (602)965-2562
Aug 8-12	18th Annual Int'l Conf. on Parallel Processing	University Park PA	*Contact:* T. Feng, EE East Bldg., Pennsylvania State Univ., University Park PA 16802
Aug 8-11	2nd Workshop on Military Robotic Applications	Kingston, Ontario (CANADA)	Royal Military College of Canada and The Defence and Civil Inst. of Environmental Medicine. *Contact:* M. Farooq, Dept. Elect. & Computer Engineering, Royal Military College of Canada, Kingston, Ont. CANADA K7K 5L0, Tel. (613)541-6366.
Aug. 14-16	3rd ORSA/TIMS Conf. on Flexible Mfg. Systems	MIT, Cambridge MA	In cooperation with the IEEE Robotics & Automation Society. *Contact:* Stephen C. Graves, Conf. Chair, Massachusetts Inst. of Technology, Sloan School of Management, Cambridge MA 02139, (617)253-6602.
Aug. 20-25	11th Int'l J. Conf. on Artificial Intelligence	Detroit MI	Amer. Assoc. for Artificial Intelligence, 445 Burgess Dr., Menlo Park CA 9402[illegible] 415-328-3123.
Aug. 24-28	IEEE Int'l Workshop on Intelligent Robots & Systems	Tsukuba JAPAN	In cooperation with the IEEE Robotics & Automation Society. *Contact:* Prof. Shin'ichi Yuta, Robotics Society of Japan, Inst. of Information Science & Electronics, Tsukuba, 305 JAPAN, Phone (0298)53-5509.
Sept. 18-21	IFAC Int'l Workshop on DecisionalStructures in Automated Manufacturing	Genoa, ITALY	*Contact: Prof. Agostino Villa:* Dipartimento di Tecnologi e Sistemi, di Produzione Politecnico, Torino, Acorso Ducadegli Abruzzi, 24, I-10129 Torino (Italy). Phone(39)11-556 7969; Telex 330646 POLITO I; Telefax (39) 11-556-7991.

Continued on back cover

**** *FIRST CALL FOR PAPERS* ****

THIRD IEEE WORKSHOP
on

MICRO ELECTRO MECHANICAL SYSTEMS

An Investigation of Micro Structures, Sensors, Actuators, Machines and Robots

Sponsored by the IEEE Robotics and Automation Society

12-14 February 1990
Napa Valley, California USA

SCOPE OF WORKSHOP

The IEEE Micro Electro Mechanical Systems (MEMS-90) Workshop embraces the design, fabrication, operation and application of devices, machines and systems constructed of sub-millimeter-scale electromechanical elements. Within MEMS, electromagnetic fields can be generated or detected, and mechanical elements can be displaced for distorted in order to execute desired functions. Applications of MEMS are emerging in optics, fluids, chemical and biological processes, measurement and instrumentation, and robotics. Recent fabrication advances (such as micromachining sensor and actuator systems on silicon substrates) offer a myriad of new system possibilities. The Workshop seeks to bring together researchers in the many diverse fields impacting the development of MEMS.

WORKSHOP TOPICS

* **Theory and Simulation** -- scaling, device physics, field and system modeling, and computation.
* **Design tools** -- CAD/CAM for 3D micro-fabrication.
* **Control** -- feedback, drivers, sensors, model-based.
* **Materials** -- metals, magnets, polymers, dielectrics, ferroelectrics, semiconductors, superconductors.
* **Fabrication Techniques** -- substrate and surface micromachining, Si-Si bonding, X-ray lithography, thin films, laser-assisted etching.
* **Assembly and Packaging** -- pre- and self-assembly.
* **Analytical tools** -- SEM, STM.
* **Experimental Evaluation** -- testing, calibration.

APPLICATIONS

* **Actuators** -- microactuators for small-scale machines; concatenated microactuators for large-scale machines.
* **Sensors** -- economical high performance sensors for the detection of strain, position, force, pressure, flow, acceleration, temperature, chemicals.
* **Optics** -- optical devices for the generation, modulation and detection of light.
* **Systems** -- MEMS embodying integrated microsensors and actuators.
* **Robotics** -- micro robots and teleoperators for uses ranging from industrial production to microsurgery.

DEADLINES FOR AUTHORS

29 September 1989: Initial Abstracts Due.
Prospective authors should submit a one-page abstract, with an additional page for figures, mailed in triplicate to:

IEEE MEMS-90 Workshop
Preferred Meeting Management, Inc.
640 East Wilmington Ave.
Salt Lake City, UT 84106 USA
PHN: (801) 466-3500 FAX: (801) 466-9616

10 November 1989: Notification of Authors.
Acceptance letters and author kits will be sent by above date. Due to limited speaker slots, some papers may be accepted as poster presentations, but still given six pages in the digest.

1 December 1989: Late-News Papers Due.
Recent MEMS developments can be submitted as two-page abstracts for consideration as Late-News papers.

15 December 1989: Accepted Papers Due.
Accepted papers will be limited to six camera-ready pages (two pages for Late-News papers) in the digest, including figures.

WORKSHOP ENVIRONMENT

The MEMS-90 workshop will be held at the Silverado Country Club & Resort in the Napa Valley - about a one hour drive from the San Francisco International Airport. In keeping with the format of the IEEE MRT Workshop (Hyannis, Massachusetts, 1987) and the IEEE MEMS-89 Workshop (Salt Lake City, Utah, 1989), no concurrent sessions will be held. Sessions will be in the mornings and evenings, with afternoons free for informal gatherings, such as tennis, golf, ballooning or horseback-riding, or for visits to the renowned Napa Valley wineries. Registration will be limited to 180 participants, with preference given to speakers and early registrants.

ORGANIZING COMMITTEE

General Co-Chairs:
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Stephen C. Jacobsen (University of Utah)
Kurt E. Petersen (NovaSensor)

Calendar (continued)

Date	Event	Place	Sponsors/Info
Sept. 24-26	4th Int'l Symposium on Intelligent Control	Albany NY	IEEE Control Systems Society. *Contact* A.A. Desrochers, Rensselaer Polytechnic Inst., or K.P. Valavanis, Northeastern Univ.
Sept. 25-28	Symposium on Advanced Manufacturing	Lexington, Kentucky	Univ. of Kentucky in cooperation with the IEEE. *Contact:* Juanita Graves (606)257-3973
Oct. 23-27	2nd Int'l Symposium on AI, Knowledge-Based Systems & Applications	Monterrey, Mexico	*Contact:* Francisco J. Cantu, ITESM Suc. Correos J, Monterrey N.L., Mexico 64849
Nov. 27-29	IEEE Workshop on Interpretation of 3D Scenes	Austin, Texas	*Contact:* Anil K. Jain, Computer Science Dept., Michigan State Univ., East Lansing, MI 48824, (517)353-5150.
Nov. 27-30	3rd IEEE Conf. on Neural Information Processing Systems	Denver CO	(NIPS) - Natural & Synthetic *Contact:* Kathie Hibbard, NIPS89 Local Committee, Engineering Center, Campus Box 425, Boulder CO, 80309-0425.
Dec. 19-22	Int'l Conf. CAD/CAM, Robotics & Factories of the Future	New Delhi, INDIA	*Contact:* Suren N. Dwivedi, Dept. of Mechanical & Aerospace Eng., West Virginia Univ., PO Box 6101, Morgantown, WV 26506-6101, Tel (304)293-3111.
Feb. 12-14, '90	IEEE Micro Electro Mechanical Systems Workshop	Napa Valley CA	IEEE Robotics & Automation Society. See *Calls for Papers*
May 13-18, '90	IEEE Int'l Conf. on Robotics & Automation	Cincinnati OH	IEEE Robotics & Automation Society. *See Announcement*
May 21-23, '90	Int'l Conf. on Computer Integrated Manufacturing	Troy NY	Rensselaer Poly. Inst., See *Calls for Papers.*
June 17-21, '90	10th Int'l Conf. on Pattern Recognition	Atlantic City, NJ	Int'l Assoc. for Pattern Recognition and the IEEE Computer Society. *See Calls for Papers.*

IEEE Robotics & Automation Society

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