

**1996 IEEE International Conference on
Robotics and Automation
(V.1) (V. A)**

17201-57
R 666

1996

V. 1A

9860083

Proceedings

1996 IEEE International Conference on Robotics and Automation

April 22 - 28, 1996
Minneapolis, Minnesota

Sponsored by
IEEE Robotics and Automation Society



E9860083

ICRA-96 PROCEEDINGS

Additional copies may be ordered from:

IEEE Service Center
445 Hoes Lane
P.O. Box 1331
Piscataway, NJ 08855-1331 U.S.A.

IEEE Catalog Number 96CH35857
ISBN 0-7803-2988-0 (Softbound)
ISBN 0-7803-2989-9 (Casebound)
ISBN 0-7803-2990-2 (Microfiche)
Library of Congress Catalog Number 90-640158
ISSN 1050-4729

Copyright and Reprint Permission:

Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 27 Congress Street, Salem, MA 01970. Instructors are permitted to photocopy isolated articles for non-commercial classroom use without fee. For other copying, reprint, or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331. All rights reserved. Copyright © 1996 by the Institute of Electrical and Electronics Engineers, Inc.

Other copying, reprint, or republication requests should be addressed to: IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331.

The papers in this book comprise the proceedings of the meeting mentioned on the cover and title page. They reflect the authors' opinions and, in the interests of timely dissemination, are published as presented and without change. Their inclusion in this publication does not necessarily constitute endorsement by the editors or the Institute of Electrical and Electronics Engineers, Inc.

Printed in the United States of America by OMNIPRESS, . . . The Proceedings Printer.



The Institute of Electrical and Electronics Engineers, Inc.

Proceedings

**1996 IEEE International Conference on
Robotics and Automation**

Volume 1

Pages 1 - 974

Foreword

The 1996 IEEE International Conference on Robotics and Automation is the 13th meeting sponsored by the Robotics and Automation Society. This year Minneapolis, Minnesota — a city surrounded by organizations that utilize robotics and automation in areas such as biomedical engineering, manufacturing, space, and food processing is the host location. As in the past, the Conference provides an excellent forum and opportunity for technologists, engineers, and scientists to meet and assess the latest developments in this fast growing field. As we start the five-year countdown to the next century, it is appropriate to gather the leaders in the automation and robotics area and begin to prepare for an exciting future. The twenty-first century will become the century of intelligent machines in support of mankind. Therefore the conference theme “*Technical Innovations in Robotics and Automation for Increased Utility and Prosperity*” is representative of the discussions and deliberations that will launch progress into the future.

A record number of 910 papers from 39 countries, covering a wide spectrum of technical areas, were submitted to the Technical Program Committee (TPC) for consideration. A conscientious effort was made by the TPC to balance the program among papers in theoretical development, experimentation, and applications, and we regret that many excellent papers could not be accommodated. During an all-day TPC meeting in December, 1995 and based on the reviewers' comments on each paper, the TPC selected 588 papers, covering recent advances in all aspects of robotics and automation for presentation. The TPC focus was on technical excellence, balance, and broad coverage of various application areas to insure response to the conference theme.

Supplementing the technical presentations, the Program includes opening plenary and dinner addresses as well as a unique plenary session discussing industry's viewpoint as represented by the Robotics Industries Association (RIA), and an evening panel discussion focusing on the *Grand Challenges for Robotics and Automation*. In addition, the Program also offers several tutorials and workshops on the day before and on the day after the technical-session presentations.

We are grateful for the assistance of Dee Dee Dexter of the School of Electrical and Computer Engineering at Purdue University in handling the manuscripts and generating thousands of letters to the authors, and Denis Gracanin of the University of Southwestern Louisiana in putting the conference program and information on the World Wide Web. We like to extend our sincere thanks to the Vice Chairpersons and the members of the TPC for their effort in processing the reviews of the papers and the selection of papers in such a short time period, and also the external reviewers for their prompt response and valuable comments on the papers they reviewed. We also thank the Organizing Committee members, Peter B. Luh, Rajiv V. Dubey, T. J. Tarn, Nikolaos Papanikolopoulos, Maria Gini, Kimon P. Valavanis, and Harry Hayman for their tireless efforts in making this Conference a success.

Finally, a special thanks is owed to all the authors for contributing their research works, the participants, the exhibitors, and financial contributors for making the 1996 IEEE International Conference on Robotics and Automation a memorable event.

Norman Caplan
General Chairman

C.S. George Lee
Program Chairman

ORGANIZING COMMITTEE

General Chair

Norman Caplan
National Science Foundation., USA

Program Chair

C.S. George Lee
Purdue University, USA

Program Vice-Chairs

Georges Giralt
LAAS-CNRS, France

Tsuneo Yoshikawa
Kyoto University, Japan

Tutorials/Workshops Chair

Peter B. Luh
University of Connecticut, USA

Publications Chair

T. J. Tam
Washington University, USA

Local Arrangements Chair

Nikolaos Papanikolopoulos
University of Minnesota, USA

Exhibits Chair

Maria Gini
University of Minnesota, USA

Publicity Chair

Kimion P. Valavanis
University of Southwestern Louisiana, USA

Video Proceedings Chair

Rajiv V. Dubey
University of Tennessee, USA

Treasurer And Registration Chair

Harry Hayman, USA

Technical Program Committee

Fumihito Arai, Nagoya University
Helder Araujo, University of Coimbra
Suguru Arimoto, University of Tokyo
Minoru Asada, Osaka University
George Bekey, University of Southern California
Zeungnam Bien, KAIST
Alicia Casals, Universitat Politecnica de Catalunya
T. C. Chang, Purdue University
Raja Chatila, LAAS-CNRS
C.L. Philip Chen, Wright State University
Brian Christensen, Dencb Robotics
Myung Jin Chung, KAIST
Jill Crisman, Northeastern University
Paolo Dario, ARTS Lab., Pisa
Joris De Schutter, Katholieke Universiteit Leuven

Alan Desrochers, Rensselaer Polytechnic Institute
Rudiger Dillmann, University of Karlsruhe
Bernard Espiau, INRIA
Li-Chen Fu, National Taiwan University
Toshio Fukuda, Nagoya University
Georges Giralt, LAAS-CNRS
Ken Goldberg, University of California, Berkeley
Andrew Goldenberg, University of Toronto
Edward Grant, University of Strathclyde
Raymond Harrigan, Sandia National Laboratories
Hideki Hashimoto, University of Tokyo
Tom Henderson, University of Utah
Gerd Hirzinger, DLR Institute for Robotics & System Dynamics
Steve Holland, General Motors NAO Robotic Group

Technical Program Committee (cont)

John Hollerbach, University of Utah
 Ralph Hollis, Carnegie Mellon University
 Roberto Horowitz, University of California,
 Berkeley
 Han-Pang Huang, National Taiwan
 University
 Seth Hutchinson, University of Illinois
 Mo Jamshidi, University of New Mexico
 Makoto Kaneko, Hiroshima University
 Wisama Khalil, Laboratoire d'automatique
 de Nantes
 Lucy King, GMI Engineering &
 Management Institute
 Kazuhiro Kosuge, Tohoku University
 Krzysztof Kozlowski, Technical
 University of Poxnan
 Kenneth Kreutz-Delgado, University of
 California, San Diego
 Andrew Kusiak, University of Iowa
 Wook Hyum Kwon, Seoul National
 University
 Christian Laugier, LIFIA
 Bum-Hee Lee, Seoul National University
 Kok-Meng Lee, Georgia Institute of
 Technology
 J.Y.S. Luh, Clemson University
 Ren Luo, North Carolina State University
 Anthony Maciejewski, Purdue University
 Rene Mayorga, University of Waterloo
 Fumio Miyazaki, Osaka University
 Howard Moraff, National Science
 Foundation
 Yoshihiko Nakamura, University of Tokyo

Dmitry Okhotsimsky, Russian Academy of
 Science
 David Orin, Ohio State University
 T. C. Pong, Hong Kong University of
 Science & Technology
 Alberto Rovetta, Politecnico di Milano
 George Saridis, Rensselaer Polytechnic
 Institute
 Gunther Schmidt, Technische Universitat
 Munchen
 Helen Shen, Hong Kong University of
 Science & Technology
 Takanori Shibata, MIT
 Bruno Siciliano, Univ of Napoli
 Manuel Silva, University of Zaragoza
 Sergey Sokolov, Russian Academy of
 Science
 Mark Spang, University of Illinois at
 Urbana-Champaign
 Kazuo Tanie, MIT
 Tzyh-Jong Tam, Washington University
 L. W. Tsai, University of Maryland
 Kimon Valavanis, USL
 N. Viswanadham, Indian Institute of Science
 Richard Volz, Texas A&M University
 Fei-Yue Wang, University of Arizona
 John T. Wen, Rensselaer Polytechnic
 Institute
 William Wilson, University of Waterloo
 Chi-Haur Wu, Northwestern University
 Tsuneo Yoshikawa, Kyoto University
 Yuan F. Zheng, Ohio State University

Tutorial And Workshop Committee

William Gruver
 C.S. George Lee
 John Y. S. Luh
 Peter B. Luh (Chair)
 Ian Walker
 Shin'ichi Yuta

Local Arrangements Committee

Bonnie Bennett
 Daniel Boley
 Max Donath
 Maria Gini
 Nikolaos Papanikolopoulos (Chair)
 Christopher Smith
 Charles Sheaffer
 Kim Stelson

Video Proceedings Committee

Rajiv V. Dubey (Chair)
 Peter I. Corke
 Oussama Khatib
 Reid L. Kress
 Peter B. Luh
 Arthur C. Sanderson
 John T. Wen
 Shin'ichi Yuta

1996 IEEE International Conference on Robotics and Automation
Technical Session Schedule

Room	Salon B	Salon C	Salon E	Salon F	Salon G	Duluth	Marquette	LaSalle	Hennepin	Carver	Dir. Row 2	Dir. Row 3	Dir. Row 4
April 24/7 Session 8:00 - 8:35													
Plenary Session: "Enhancing Human Capacity Through Intelligent Systems" by Dr. Joseph Bordinaga, Asst. Director for Engineering, NSF (in Salon D)													
WA I 9:00 - 10:40	Tactile Sensor Technologies	Techniques for Robot Programming	Space Robots I	Vision-Guided Navigation	Motion and Path Planning I	Redundant Robots I	Workpiece Localization & Manipulation of Objects	Petri Nets	Actuators	Biped Locomotion	Adaptive Robot Control	Force Control	Dynamics Identification
WA II 11:00 - 12:40	Sonar Sensing Techniques	Friction-Compensation Control	Space Robots II	Outdoors Navigation	Motion and Path Planning II	Redundant Robots II	Fixture Design I	Flexible Manufacturing Systems	Haptic Interface	Adaptive and Dynamic Bipedal Locomotion (I)	Discrete Event & Industrial Control	Force Control & Manipulation	Calibration I
WP I 14:00 - 15:40	Multi-sensor Fusion	Control Architectures	Space Robots III	Environment Modeling	Collision Detection	Flexible Robots I	Fixture Design II	Manufacturing System Design and Layout	Surgical Robots	Mobile Robot Navigation I	Robot Control I	Mine and Field Applications	Calibration II
WP II 16:00 - 17:40	Human-Robot Coordination	Mechanisms I	Application-Driven Teleoperation (I)	World Model Generation	Collision Avoidance	Flexible Robots II	Design of Parts and Material Handling	Discrete Event Dynamic Systems	Bio-Robotic Systems	Mobile Robot Navigation II	Robot Control II	Hazardous Industrial Applications	Mechanisms II
18:00 - 20:00	Special Panel Discussions: The "Grand Challenges" for Robotics and Automation. Organized by George Bekey and Jill Crisman. (in Room Marquette)												

Room	Salon B	Salon C	Salon E	Salon F	Salon G	Duluth	Marquette	LaSalle	Hennepin	Carver	Dir. Row 2	Dir. Row 3	Dir. Row 4
April 25/7 Session 8:00 - 8:35													
Plenary Panel Discussion: "Research Frontiers: Industry's Viewpoint on Barriers to Rapid Implementation of Automation." Speakers: Philip Mordant, Guy Puth, Steven Hollman, Klaus Niekum. (in Salon D)													
TA I 9:00 - 10:40	Robotic Vision I	Contact I	Teleoperation I	Mobile Robot Localization	Cooperative Mobile Robots I	Redundant Robots III	Grasping Mechanisms	Geometric Modeling	Assembly I	Optimal Trajectory Planning	Optimal Robot Control	Neural Network Applications	Multitask Systems
TA II 11:00 - 12:40	Robotic Vision II	Contact II	Teleoperation II	Mobile Robot Navigation III	Cooperative Mobile Robots II	Redundant Robots IV	Grasp Force Analysis	Model Generation & CAD	Assembly II	Singularity-Consistent Motion Planning	Impact Control	Neural Net Control	Flexible Robot Modeling & Simulation
TP I 14:00 - 15:40	Active Vision	Contact-State Transition in Assembly	Teleoperation III	Mobile Robot Navigation IV	Multiple Mobile Robots	Flexible Robots III	Grasp Synthesis	Underwater Robotics Sensing, Navigation, and Control (I)	Precision Assembly	Micro Manipulation and Actuation	Hybrid Control I	Fuzzy Control Applications	Learning and Learning Control
TP II 16:00 - 17:40	Real-Time Vision	Flexible Object Manipulation	Virtual Reality and Collaboration	Mobile Manipulation and Planning	Cooperating Robot Manipulators	Flexible Robots IV	Sensor-Based Grasping	Space and Underwater Robots	Task Planning & Scheduling	Micro/Macro Robotics	Hybrid Control II	Fuzzy/Genetic Control for Robot Manipulators	Compliant Motion
19:00 - 22:00	Conference Banquet in The Grand Ballroom. Banquet Address by Dr. Bonnie J. Duharnhar, NASA Johnson Space Center.												

Room	Salon B	Salon C	Salon E	Salon F	Duluth	Marquette	LaSalle	Hennepin	Carver	Dir. Row 1	Dir. Row 4
April 26/7 Session 8:00 - 9:40											
FA I 8:00 - 9:40	Vision-Based Control	Nonholonomic Systems	Human Skill Acquisition	Control of Walking Robots I	Trajectory Planning I	Grasping Strategy	Manufacturing Scheduling	Mobile Robot Control I	Multiple Robot Motion Planning	Robot Control III	Manipulator Design
FA II 10:00 - 11:40	Visual Tracking	Trajectory Planning for Nonholonomic Systems	Human-Robot Skill	Control of Walking Robots II	Path Planning with Uncertainty	Grasping	Estimation and Performance Measures	Mobile Robot Control II	Autonomous Vehicles	Robot Control IV	Kinematics
FP I 13:00 - 14:40	Vision-Based Manipulation	Tactile Sensing	Inspection	Motion Planning of Walking Robots	Motion and Path Planning III	Grasping and Manipulation	Manufacturing and Assembly	Motion Planning for Mobile Robots	Controls and Visions	Robot Control V	Mechanisms III
FP II 15:00 - 16:40	Object Recognition	Tactile Sensing Shape Estimation	Redundant Robots V	Walking/Mobile Robots	Motion and Path Planning IV	Neural Networks for Control and Feature Recognition	Navigation and Control	Mobile Robot Applications	Robot Control VI	Robot Control VII	Parallel Manipulators

Author Index

Abe, Y.	1720	Barendt, N. A.	858
Abrams, S.	1972	Barman, R. A.	3283
Adlema, A.	521	Barnier, J.	1121
Afshar, A.	2529	Barshan, B.	1218
Aghili, F.	2865	Basañez, L.	1825
Agrawal, S. K.	2450	Basu, A.	3253
Ahmadi, M.	2712	Battilotti, S.	1578
Aiyama, Y.	2781	Baumgartner, E. T.	726
Akbarally, H.	686	Bayoumi, M. M.	2835
Akella, P.	1687	Bell, G. S.	1650
Al-Jarrah, O. M.	1000, 2610	Bellingham, J. G.	2174
Alami, R.	43, 1620	Bemporad, A.	1205
Alexander, H.	3336	Ben Ouezdou, F.	3179
Alford, C. O.	1935	Ben Shahar, O.	159, 172
Allen, P. K.	1972	Benhabib, B.	1980
Almeida, J.	2822	Benjaafar, S.	852, 2787
Amat, J.	895	Bennett, J. K.	3073, 3420
Amato, N. M.	113	Bergerman, M.	3714
Ames, A. L.	3361	Berkemeier, M. D.	213
Anderson, M. O.	1750	Berkowitz, D. R.	1127
Anderson, R. J.	698, 1024, 2025	Berry, F.	3413
Ando, S.	7	Bessala, J.	3179
Andréasson, S.-A.	521	Bestaoui, Y.	448
Ang Jr., M. H.	3720	Betgé-Brezetz, S.	757, 1048
Angeles, J.	1281, 3167	Betourne, A.	2810, 3631
Antonio, J. K.	1255	Bhattacharya, P.	3490
Aoki, T.	2055	Bicchi, A.	884, 3123
Arai, F.	878, 1614, 1720, 2079, 2214, 2220, 2226	Bidaud, P.	1229, 3179
Arai, H.	3707	Bin, Z. H.	1275
Arai, T.	680, 1744, 2781	Bishay, M.	1656
Arai, Y.	2091	Bitó, J. F.	2598
Arimoto, S.	1584, 2414, 2420	Blair, L. M.	1030
Arita, Y.	771	Blake, A.	1458
Arkin, R. C.	2389	Bohringer, K.-F.	822
Armstrong, B.	945	Boley, D. L.	1381
Artigue, F.	909	Bon, B.	2041
Asaad, S.	1656	Boncellet, C.	127
Asada, H. H.	2289	Bone, G. M.	1465, 1511
Asada, M.	1314	Bonitz, R. G.	622, 3047
Asama, H.	1754, 2091	Bonivento, C.	3234
Aspotolopoulos, D.	3652	Bonnifait, P.	1395
Astuti, P.	1153	Book, W. J.	1036, 1935, 1941, 2549
Azenha, A.	366	Borenstein, J.	423
Bachmann, S.	329	Boshra, M.	3472
Backes, P. G.	50	Bossert, D. E.	2252, 2567
Baginski, B.	3303	Bouffard-Vercelli, Y.	3520
Bailey, S.	270	Bouman, C. A.	3246
Balestrino, A.	3123	Boussac, S.	1813
Balluchi, A.	3123	Bowling, A.	2883
Barakat, N.	3637	Boyer, F.	1947
		Boyer, M.	1042

Brady, K. J.	1024	Chen, C. L. P.	503
Brajovic, V.	1638	Chen, D.	393
Brogliato, B.	1121	Chen, I.-M.	1440
Brokowski, M.	1133	Chen, J.	2694
Brost, R. C.	495	Chen, N.	3496
Brown, H. B.	1434, 2383, 3658	Chen, P. C.	24
Bruderlin, B.	341	Chen, Y.-C.	503, 3147
Brumitt, B. L.	2396	Cheng, F.-T.	1768
Bruyninckx, H.	1333	Cheung, Y. P.	2816
Buehler, M.	2712, 2865	Chevallereau, C.	1871
Bulata, H.	1054	Chiacchio, P.	3520
Burchard, R.	712	Chiang, T.-W.	2517
Burdet, E.	2656	Chirikjian, G. S. ...	139, 442, 1012, 1452, 2749
Burdick, J.	1294, 1795, 3584	Chiu, D.	1903
Burg, T.	939, 2561, 3155	Cho, H. S.	590, 3259
Burnett, M. S.	641	Cho, Y.-J.	706
Burtnyk, N.	1073	Chodavarapu, P. A.	1101
Buss, M.	1807	Choi, S. K.	2160
Cadiou, J.-C.	1566	Choset, H.	3584
Cahill, A. J.	1547, 1559	Christensen, H. I.	1986
Cai, A.	2079	Christiansen, A. D.	846
Cai, L.	933	Chung, M. J.	1726
Caldwell, D. G.	1375, 3215	Chung, W.-K.	480, 1247, 1357, 3538
Calton, T. L.	3361	Ciarallo, F. W.	3240
Campion, G.	2810, 3631, 3664	Clarke, E. M.	527
Campos, J.	1159	Cleary, M. E.	3093
Campos, S.	527	Clymer, B.	563
Canepa, G.	884	Coelho Jr., J. A.	2137
Cannon, D. J.	1845, 3613	Coello, C. A.	846
Cannon, D. W.	2549	Colbaugh, R.	276, 2628, 3067
Cannon Jr., R. H.	1413, 1539	Cole, J.	2890
Canny, J.	830, 1127, 1140, 1694	Colgate, J. E.	539, 551
Caraffi, E.	3508	Commuri, S.	2604
Carlisle, B.	1140	Corke, P. I.	1018
Casalino, G.	3123	Coste-Manière, E.	2492
Casals, A.	895	Cox, B.	58
Caselli, S.	353, 3508	Craig, J.	1140
Caudill, R. J.	2793	Crisman, J. D.	3093
Causey, G. C.	858	Crosnier, A.	1813
Celanovic, N.	226	Cruz, N.	2822
Celaya, E.	2731	Cunha, S.	2822
Ceres, R.	969	da Silva, E. P.	2822
Chan, D.	329	Dadios, E. P.	2276
Chan, T. F.	2033	Damaren, C.	1959
Chang, C. C.	2402	Davies, B. R.	2377
Chang, F.-M.	1768	Daviet, P.	3129
Chang, H.	108	Dawson, D.	939, 2561, 3155
Chang, S.-L.	1178	De Geeter, J.	3478
Charlebois, M.	3502	De Luca, A.	816, 1205, 1760
Chase, T. A.	3598	De Rossi, D.	884
Chatila, R.	43, 757, 1048	De Schutter, J.	1333, 2616, 3478
Chedmail, P.	1199, 3466	de Queiroz, M. S.	2561
Chen, B.	1596	de Silva, C. W.	329
Chen, C.-H.	3277	Decréton, M.	3478

Decuyper, J.	3369	Ferriere, L.	3664
Dekhil, M.	341	Field, G.	2755
del Pobil, A. P.	779	Fiorini, P.	1553, 3689
Delson, N.	30	Fischer, J.	1917
Deng, W.	765	Flash, T.	2470
Desai, J.	2073	Freedman, P.	667, 1224
Desai, K. V.	213	Fu, L.-C.	192, 2232
Devy, M.	1048, 1054	Fuchun, S.	3440
Di Giamberardino, P.	3141	Fuentes, O.	1700
Dickson, W. C.	1413	Fuji, S.	205
Diffler, M.	58	Fujimoto, H.	1533
Dillmann, R.	2700	Fujimoto, Y.	2724
Djerassi, S.	3695	Fuke, Y.	411
Dohrmann, C.	596	Fukuda, T.	305, 372, 878, 1407, 1614, 1720, 2019, 2049, 2079, 2214, 2220, 2226
Dombre, E.	975	Funahashi, Y.	3040
Donald, B. R.	822	Fung, Y. H.	2816
Draper, J. V.	1030	Gallice, J.	3413
Drouin, M.	133	García, G.	1395
Dubey, R.	2033	Garcia, M. A.	1825
Dubowsky, S.	360, 1909, 2498, 2890	Ge, Q. J.	1819
Dudek, G.	76, 667, 1224	Gelfand, J. J.	3526
Dundon, B.	2477	Gengenbach, V.	1320
Dunn, E. R.	578	George, R.	2804
Dupont, P. E.	378	Ghallab, M.	1620
Durrant-Whyte, H.	745	Ghorbel, F.	3677
Dutré, S.	1333	Ghosal, A.	1241
Ebert-Uphoff, I.	139	Ghosh, B. K.	3197
Eda, H.	1006	Ghoshray, S.	1087
Edelman, S.	2470	Gini, M.	1917, 2061, 2295
Edwards, A. D.	846	Glass, K.	276, 2628, 3067
El Moudni, A.	178, 609	Goldberg, K. Y.	1133, 1140, 1858
El Omri, J.	3173	Goldenberg, A. A.	1115, 1775, 2246, 3428
ElMaraghy, H. A.	1499	Goldfarb, M.	226
Endo, I.	1754, 2091	Goldwasser, M.	1851
English, J. D.	460	González, E.	909
Erdmann, M. A.	165, 3317	Gonzalez-Galvan, E. J.	3407
Espiau, B.	246	Gosselin, C. M.	3732, 3738
Etzel, K. R.	3185	Goswami, A.	246
Everett, L. J.	641	Goto, N.	1754
Everett, S.	2033	Gourdeau, R.	2622
Fabien, B. C.	2450	Graves, S.	2616
Faibish, S.	3695	Gray, B. L.	1
Farooq, M.	2835	Greenspan, M.	1073
Farooqi, M. A.	2774	Griesmeyer, J. M.	2371
Farritor, S.	2890	Grudic, G. Z.	2962
Fayek, R. E.	3625	Grupen, R. A.	2137, 2988, 3434
Fayman, J. A.	1986	Gruver, W. A.	3619
Fearing, R. S.	1	Gu, Y. L.	146
Feddema, J. T.	596, 712, 3395	Gullapalli, V.	3526
Fedder, G.	13	Gunawardana, R.	3677
Feng, L.	423	Guo, S.	2226
Ferbach, P.	2935, 2949	Guoqiang, Z.	2871
Ferney, M.	178, 609		
Ferreira, P. M.	533, 864		

Gupta, K.	454, 3502	Hosseini-Sianaki, A.	18
Gurumoorthy, B.	1831	Hougen, D. F.	1917
Gutsche, R.	1067	Hovland, G. E.	1166, 2706
Habert, O.	751	Howe, R. D.	578, 3228
Hager, G.	2636	Hsia, T. C.	622, 3047
Hallam, J.	603	Hsieh, L.-H.	1268
Hamasaki, Y.	2208	Hsu, F.-Y.	2232
Hamidzadeh, B.	2529	Hsu, J. Y.-J.	1632
Hamilton, D. L.	3073, 3420	Hsu, W.	3355
Han, H.-Y.	3061	Hu, B. S.	200
Han, L.	3401	Hu, J.	939
Hanebeck, U. D.	1387, 3081	Huang, C.-C.	1493
Harashima, F.	3551	Huang, H.-P.	1471, 3452
Harrison, F. W.	299	Huang, S.-Z.	1602
Hartonas-Garmhausen, V.	527	Huang, W.	981
Hashimoto, H.	545, 2650	Huat, Y. S.	1275
Hashimoto, K.	3551	Huber, M.	2988
Hashtrudi-Zaad, K.	1369	Hughes, K.	2067
Hatamura, Y.	2194	Hujic, D.	1980
Hattori, M.	205, 219	Hunter, M. W.	1345
Hau, H.-Y.	2517	Hutchinson, S. A.	2847, 3034
Haung, W.	981	Hwang, Y. K.	24
Hayward, V.	2743	Iacconi, P.	884
He, D.	1980	Idogaki, T.	1614
Healey, A. J.	2149	Iiyama, H.	3002
Hébert, P.	757, 1048	Ikushima, K.	680
Heinrichs, B.	284	Inaba, A.	184
Heisterkamp, D. R.	3490	Inaba, M.	83, 2921
Hemami, H.	563	Ingrand, F. F.	43
Hemmerle, J. S.	1093	Inokuchi, H.	1261
Henderson, T. C.	341	Inooka, H.	1184, 2332
Henning, J.-O.	2761	Inoue, H.	83, 2921
Henrich, D.	3289	Inoue, T.	2208
Heppler, G. R.	2438	Inui, M.	2202
Heuring, J. J.	2908	Ishihara, H.	2049, 2079
Hill, B.	2896	Ishii, I.	2309
Hirai, S.	2006, 3324	Ishikawa, M.	2309
Hirano, G.	2853	Ishikawa, T.	2968
Hiraoka, N.	2049	Isidori, A.	1891
Hirata, M.	771	Ito, S.	1720
Hirose, S.	1421, 3002, 3265	Itoh, T.	2019
Hirzinger, G.	1883, 2282, 3295	Ivanescu, M.	3701
Hoberock, L. L.	1596	Iwata, K.	2006, 3324
Hodgins, J. K.	3271	Jacobsen, S.	3222
Hoeve, H.	3234	Jagannathan, S.	258, 2586
Holder, M. B.	1738	Jakiela, M. J.	838
Hollerbach, J. M.	647, 661, 2865, 3222	Jalics, L.	563
Hollis, R. L.	2188	James, M. R.	1547, 1559
Holloway, L. E.	515	Janét, J. A.	3598
Holweg, E. G. M.	3234	Jansen, J.	2484
Hong, S.-G.	1212	Jean, M.	3732
Hori, T.	1706	Jeon, J.-Y.	2258
Horn, J.	673, 3081	Jeon, Y.	706
Horst, J. A.	1061	Jeong, K. W.	1357

Jia, Y.-B.	165	Kieffer, J. C.	1547, 1559
Jiménez, A. R.	969	Kiguchi, K.	372
Jiménez, P.	1485	Kim, G. H.	2798
Jin, Y.	3619	Kim, J.-H.	2258
Jo, J.-Y.	858	Kim, J.-S.	635
Johannsson, R.	347	Kim, J. H.	1732
Johnston, D.	3222	Kim, K. R.	1732
Jones, R. E.	1525, 3361	Kim, M.	1247
Jongkind, W.	3234	Kim, M.	1247
Joo, S.	291	Kim, M.S.	1081
Joshi, R.	1306	Kim, S.-D.	1726
Jung, D.	454	Kim, S.-W.	1212
Junge, R.	2264	Kim, S.	590
Kaetsu, H.	1754, 2091	Kim, T. W.	3605
Kagaya, H.	1184	Kim, Y. H.	1923
Kaiser, M.	2700	Kim, Y. H.	858
Kajita, S.	570	Kimura, F.	2202
Kakambouras, P.	3389	Kinoshita, N.	232
Kamel, M. S.	2762	Kirchhof, J.	629
Kamon, I.	429, 2470	Kitagaki, K.	2976, 3209
Kanade, T.	1638	Kitayama, H.	305
Kanayama, N.	2555	Kleeman, L.	686
Kanayama, Y.	2804	Kleinmann, K. P.	1807, 2761
Kaneko, K.	1687	Knoll, A.	2270
Kaneko, M.	1681, 2131, 2555, 3557	Ko, J. H.	1726
Kang, D.	3551	Kobayashi, H.	2877
Kanno, R.	205, 219	Kocak, O.	1375
Kanzaki, K.	1781	Koenig, S.	2301
Kanzawa, T.	2444	Koh, K.	2258
Kao, I.	616	Koinuma, M.	2668
Kao, J.-H.	1093	Kolountzakis, M. N.	3020
Kato, I.	232	Komenda, J.	178
Kato, N.	2505	Komoriya, K.	1687, 2462
Kaufman, S. G.	3361	Konno, A.	635
Kavraki, L.	3020	Konopka, C.	2477
Kawamura, A.	2724	Kosuge, K.	305, 2019
Kawamura, K.	1656	Kotosaka, S.	2091
Kawamura, S.	2365, 3061	Kovacs, G. L.	3343
Kawasaki, H.	1781	Koyano, K.	2541
Kaynak, M. L.	2598	Kozłowski, K.	317
Kazerooni, H.	1147	Krantz, D.	2061
Kecskeméthy, A.	3167	Kraus Jr., W.	2352
Kelly, A.	3309	Kress, R.	2484
Kelly, R.	927, 2643	Krikelis, N. J.	3389
Keramane, A.	246	Krishnasamy, J.	838
Kesavadas, T.	1845	Kroll, E.	1517
Keymeulen, D.	3369	Krotkov, E.	411
Khalid, M.	1184	Kruse, E.	1067
Khalil, W.	323, 1947	Ku, S.	889
Khatib, O.	2883	Kube, C. R.	2085
Khawaja, K. W.	3246	Kubota, T.	70
Khorasani, K.	798, 2432	Kumar, V.	121, 2073, 3277
Khosla, P. K.	13, 1434, 2456	Kun, A.	240
Kibe, K.	739	Kunii, Y.	545

Kurabayashi, D.	1744	Lin, F.-C.	1632
Kurazume, R.	1421	Lin, L.-R.	1471
Kuzuoka, H.	1706	Lin, T.	1115
Kvrgic, V. M.	1801	Lin, W.-S.	1929
Kwon, W.	2408	Lin, W.	1275
Kyriakopoulos, K. J.	3389	Lin, X.	765, 3484
Lakhani, H.	3336	Linderstam, C.	3330
Lamiraux, F.	3014	Lindstedt, G.	347
Lanari, L.	1578	Linnett, J. A.	3458
Lane, D. M.	2505	Liu, G.	2523
Lane, H.	1036	Liu, J. S.	1929
Lane, S. H.	3526	Liu, L.	994
Lange, F.	2282	Liu, Y.-H.	2414, 2420
Langer, D.	417	Liu, Y.	2346
Lankalapalli, S.	1241	Lizama, E.	311
Laporte, E.	895	Lizarralde, F.	2682
Lassiter, N.	1738	Lloyd, J. E.	1877, 2743
Latombe, J.-C.	1851, 3020	Long, M.	3689
Laugier, C.	1669, 3117	Love, L. J.	810, 1036
Laumond, J. P.	3014, 3383	Lu, C. J. J.	870
Laval, L.	1566	Lucibello, P.	2117
LaValle, S. M.	2847, 3034	Lück, C. L.	1446
Lawrence, P. D.	329, 2962	Luh, P. B.	2523
Lawther, S.	3215	Lumelsky, V. J.	3578
Lee, B. H.	1081, 2408	Luo, R. C.	1714, 3598
Lee, C.	2383, 2982	Luthiger, J.	2656
Lee, C. S. G.	2798, 3355	Ly, U.-L.	2252, 2573
Lee, D. T.	1178	M'Sirdi, N. K.	1566
Lee, J.-J.	1212	Ma, D.	661
Lee, J. C.	1732	MacDonald, N. C.	822
Lee, K.-M.	2859	MacDonald, W. S.	2988
Lee, M.	2492	Machado, J. A. T.	366
Lee, S.	1903, 2694	Maciejewski, A. A.	460, 3246
Lees, D. S.	1012, 2749	MacKenzie, D. C.	2389
LeGrand, R.	1714	Maeda, Y.	2781
Lemieux, S.	3738	Maekawa, H.	2462, 3055, 3514
Leonard, J. J.	2174	Magee, D. P.	810, 1036, 2549
Lever, P. J. A.	957	Magnanini, C.	3508
Lew, J. Y.	2549	Manickam, N.	1427
Lewis, C. L.	1626	Marapane, S. B.	1738
Lewis, F. L.	1923, 2586, 2604	Marco, D. B.	2149
Li, D.	1775	Marconi, L.	3234
Li, J.M.	200	Marefat, M.	1505, 3240
Li, L.	58	Margrave, F.	963
Li, S.	2450	Marhefka, D. W.	1662
Li, S.-H.	2289	Martin, D. M.	146
Li, X.	152	Martinet, P.	3413
Li, Y.	945	Martínez, B.	779
Li, Z.	152, 1339	Martínez, J.	2315
Liégeois, A.	915	Martins, A.	2822
Lim, A.	3355	Maruyama, T.	771
Limaiem, A.	1499	Maruyama, Y.	1261
Lin, C.-H.	192	Masoud, A. A.	3564
Lin, C.-J.	3592	Matos, A.	2822

Matsumoto, A.	1754	Mrad, F.	1533
Matsumoto, Y.	83	Mulligan, J.	2326
Matsuno, F.	2444	Murai, S.	1261
Matsura, H.	878, 2214	Murakami, H.	305
Matrone, R.	1760	Murakami, T.	205
Mattson, K. G.	1287	Murase, H.	1326, 2321
Maurine, P.	975	Murphy, R. R.	2067
Mavroidis, C.	1909	Murray, D. W.	2908
Mayorga, R. V.	2841	Muto, S.-Y.	2012
Mazon, I.	101, 987	Nagamatsu, H.	70
McAree, P. R.	2238	Nagao, T.	1706, 2194
McCarragher, B. J.	1153, 1166, 1172, 1351, 2352, 2706	Nagata, K.	1787
McCarthy, J. M.	3185	Nagata, S.	1421
McGhee, R. B.	2149	Nagatani, K.	2828
McKay, M. D.	1750	Nagel, H.-H.	1320
McClean, A.	101	Nahvi, A.	647
McPherson, J.	945	Nakabo, Y.	2309
Melchiorri, C.	3234	Nakagaki, H.	3209
Merat, F. L.	858	Nakamura, H.	3087
Merlet, J.-P.	3726, 3738, 3744	Nakamura, T.	2226
Michalska, H.	2712, 3161	Nakamura, T.	1314
Miller, III, W. T.	240	Nakamura, Y.	718, 2668
Mills, J. K.	1980, 2340	Nakatani, I.	70
Ming, H.	1275	Nakayama, T.	1584
Mirtich, B.	1140	Nam, Y. S.	1081
Mitsuishi, M.	1706, 2194	Nandhakumar, N.	3191
Mitsumoto, N.	1614	Nassal, U.	2264
Miura, H.	2208, 3087	Nayar, S. K.	1326, 1644, 2321
Miura, M.	2202	Nebot, E. M.	745
Miyazaki, F.	291	Nechyba, M. C.	2688
Miyazaki, H.	2535	Negoro, M.	878, 2226
Mizoguchi, H.	2968	Neira, J.	673
Moallem, M.	798, 2432	Nelson, B. J.	2456
Mochiyama, H.	2877	Nelson, R.	1700
Mohri, A.	2853	Nenchev, D. N.	385, 1235, 1864, 1883, 2332
Monaco, S.	3141	Nene, S. A.	2321
Moore, C.	551	Newman, W. S.	858
Moorehead, S.	804	Ng, K. C.	1590
Moradi, H.	1858	Nguyen, W.	2340
Morel, G.	360, 1229	Nicosia, S.	1953
Moreno, C.	909	Nikolaev, A.	1644
Morgansen, K. A.	1897	Nilsson, B.	3026
Mori, S.	3671	Noguchi, H.	2006
Mori, T.	2921	Noll, E.	2067
Morikawa, H.	64	Nonoda, Y.	2220
Morishima, K.	2214	Noritsugu, T.	2650
Morita, S.	2365	Normand-Cyrot, D.	3141
Morita, T.	2902	Novakovic, B.	1608
Morrey, R.	963	Nygards, J.	3026
Motwani, R.	1851	O'Neil, K. A.	3147
Mouaddib, M.	89	O'Reilly, P.	2622
Moussa, M. A.	2767	Obergfell, K.	1036
		Obinata, G.	1184
		Oda, M.	732, 739

Ogasawara, T.	2414, 3209
Ogata, T.	1191
Oguamanam, D. C. D.	2438
Oguro, K.	219, 2226
Oh, S.-R.	706
Ohashi, T.	1184
Ohkawa, K.	2426
Oka, T.	2055
Okuma, S.	184, 2055
Ollis, M.	951
Olsson, G.	347
Omata, T.	1787, 2774
Ong, C.-J.	785
Oota, T.	2220
Oppel, F.	2371
Orin, D. E.	1662
Oriolo, G.	1205, 1760, 2676
Osamu, M.	2871
Ostrowski, J.	1294
Ota, J.	1744, 2781
Overgaard, L.	2456
Ozaki, H.	3592
Pack, D.	2994
Pagac, D.	745
Pai, D. K.	557, 3283
Palmquist, R. D.	2377
Pamecha, A.	442, 1452
Pandalai, D. N.	515
Panzieri, S.	2117, 2676
Papadopoulos, E. G.	3111
Papakonstantinou, G.	921
Papanikolopoulos, N. P.	2915, 2929, 3203
Pardo-Castellote, G.	1539
Paredis, C. J. J.	1434
Parent, M.	3129
Park, J.	480, 1247, 3538
Park, J.	706
Park, K.-B.	1212
Park, K.	3613
Parker, G.	596
Paromtchik, I.	3117
Parra-Vega, V.	2420
Pastore, A.	1121
Patel, R. V.	798, 2432
Paulos, E.	1694
Pavlidis, I.	2915
Payandeh, S.	3502
Pegard, C.	89
Pelletier, M.	2622
Pennock, G. R.	1287
Perdureau, V.	133
Pereira, F. L.	692, 2822
Pérez, M.	779
Pérez-Jiménez, C. J.	1159

Perrier, M.	2492
Peshkin, M. A.	539, 551, 1133
Peters, R. R.	495
Peters, S. F.	50
Peuch, A.	2492
Pfeiffer, F.	2182
Phan, L.	50
Pierrot, F.	3520
Pin, F. G.	468, 1897
Pinchard, O.	915
Pisoni, A. C.	2498
Pledel, P.	448
Plut, W. J.	1465
Podgurski, A.	858
Pollard, N. S.	2124
Ponce, J.	509
Pons, J. L.	969
Popa, D. O.	2662
Porta, J. M.	2731
Pougnet, F.	915
Prattichizzo, D.	3532
Prinz, F. B.	1093
Prinz, M.	3695
Probert, P. J.	95
Prokop, G.	2182
Protopopescu, V.	1427
Pruski, A.	751
Qian, W.-H.	1268
Quaid, A. E.	2188
Quinn, R. D.	858
Rachid, A.	3099
Rahn, C.	3155
Rajagopalan, R.	3637
Ralli, E.	3295
Ramabhadran, R.	1255
Ramadorai, A. K.	3191
Ramdane-Cherif, A.	133
Ramos, C.	2511
Ramstein, E.	3466
Ranjbaran, F.	3167
Rao, N. S. V.	1427
Raucent, B.	3664
Reddy, K.	1375
Register, A.	1935
Rehman, F. U.	3161
Rekleitis, I. M.	667
Restrepo, P.	323
Reveliotis, S. A.	533, 864
Rey, D.	1121
Rey, D. A.	3111
Reznik, D.	1669
Rhodes, W.	3155
Richardson, B. S.	1750
Riffard, V.	1199

Rigaud, V.	2492
Rimon, E.	429, 1458, 1795
Rink, R.	3496
Rit, J.-F.	2935
Rivlin, E.	159, 172, 429, 1986
Ro, P. I.	2943
Robert, F.	43
Roberts, J. W.	3458
Robinett, R.	596
Rocchi, A.	335
Rocco, P.	1941
Rock, S. M.	1413, 2492
Rogers, B.	58
Romero, V.	596
Rongjun, Z.	3440
Rosheim, M. E.	399
Rossi, M.	2109
Roth, Z. S.	655
Roy, N.	1224
Rudas, I. J.	2598
Ruhm, C.	2761
Rutman, N.	2890
Ryu, Y. K.	3259
Sabatini, A. M.	335
Sakai, H.	3087
Sakamoto, Y.	3087
Salcudean, S. E.	329, 404, 889, 1369
Sanderson, A. C.	1306
Santibáñez, V.	927
Sargent, D. M.	858
Sarkar, N.	2000, 3105
Sasaki, J.	2781
Sashida, N.	1421
Sato, M.	1754
Sato, T.	2535, 2541, 2968
Sato, Y.	771
Sayers, C. P.	1363
Schafer, K.	1320
Schempf, H.	3652
Schenkat, L.	341
Schenker, P. S.	726
Schlemmer, M.	474
Schmidt, G.	673, 1387, 3081
Schmit, J.	2477
Schmitt, D.	596
Scilingo, E. P.	884
Sebaaly, M.	1533
Sekhavat, S.	3383
Sekiyama, K.	1407
Selig, J. M.	2238
Seliger, G.	1268
Senft, V.	1883
Seng, J.	3147
Sepehri, N.	284

Seraji, H.	2041, 3689
Seward, D.	963
Sgouros, N. M.	921
Sharf, I.	1959
Sharma, R.	1966, 3572
Sharma, S. M.	3349
Sheaffer, C.	2295
Sheikhzadeh, M.	852, 2787
Shelton, S.	58
Sherkat, N.	2103
Shetty, B. R.	3720
Shi, Q.	1339
Shi, X.	2346
Shi, X.	957
Shibata, T.	2426
Shigeki, T.	2871
Shih, C.-H.	2103
Shih, C.-L.	3008
Shiller, Z.	1553
Shim, J. H.	590
Shimada, A.	3061
Shimada, Y.	1184
Shimemura, E.	2877
Shimizu, T.	1781
Shimajima, K.	878, 1720
Shimokura, K.	2012
Shimoyama, I.	2208
Shinoda, H.	7
Shirkey, P.	2643
Shkel, A. M.	3578
Shyamsundar, N.	1831
Siciliano, B.	2567
Siira, J.	557
Sikka, P.	1351, 2706
Sillitoe, I.	353
Silva, M.	1159
Simmons, R. G.	2301, 3375
Singh, L.	2737
Singh, S.	3309
Skaar, S. B.	3135, 3407
Slagle, J.	1917
Smith, C. E.	3203
Smith, P. W.	3191
Snyder, T.	1147
Sobral, L.	347
Söderquist, B. AT	3330
Soloway, D. I.	299
Sommerville, I.	963
Son, J. B.	1357
Son, J. S.	3228
Song, I.	706
Song, K.-T.	2402
Song, P.	2246
Souccar, K.	3434