# Proceedings of the 2000 IEEE International Conference on Control Applications (V. A)

# PROCEEDINGS OF THE 2000 IEEE INTERNATIONAL CONFERENCE ON CONTROL APPLICATIONS



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## Welcome

On behalf of the IEEE Control Systems Society, the Program and Operating Committees, and Technical Co-sponsors of the conference we would like to extend our warmest welcome to all attendees of the Joint 2000 Conference on Control Applications and Computer-Aided Control Systems Design Symposium.

For most of you this is probably your first visit to Anchorage/Alaska. So it might be interesting to know a little about the history of Anchorage/Alaska. Located in South-central Alaska on the shores of Cook Inlet, the Municipality of Anchorage is a unique urban environment situated in the heart of the wilderness. According to anthropological research using the Beluga Point Site located just a short distance from downtown Anchorage, human occupation of the Anchorage area occurred in three waves, the first in 3,000 BC, the second in 2,000 BC, and the third and last at the start of the new millennium. By the time of first contact with European cultures in 1756, the Eskimo people who had originally settled the area had been displaced by the Athabaskan Dena'ina people. This displacement has been estimated as early as 500 AD and as late as 1650 AD. It is estimated that more than 5,000 Dena'ina inhabited the South-central area at first contact with Europeans. Russian explorers had established themselves in southern Alaska by 1784, but the English explorer Captain James Cook is credited with first exploring and describing the Anchorage area in 1778 during his third voyage of discovery. Mistaking one of the arms of the inlet for a river, Cook named it "River Turnagain," later renamed Turnagain Arm by a subsequent British explorer, George Vancouver. During the next hundred years Russian trading activity increased in the Inlet, and Russian cultural influence increased. Then in 1867 problems at home forced the sale of Russian America to the United States for a sum of $7,200,000. Beginning in 1868 the Alaska Commercial Company began operating dozens of stations along Cook Inlet, and constituted the strongest organizational entity in the area. Until the advent of the Alaska Railroad, gold-mining activity throughout the Turnagain Arm and Kenai Peninsula promoted a steady influx of new inhabitants to South-central Alaska. In 1915 President Woodrow Wilson authorized funds for the construction of the Alaska Railroad. Ship Creek Landing was selected as the headquarters of this effort, coordinated by the fledgling Alaskan Engineering Commission. A "Tent City" sprang up in the wilderness at the mouth of Ship Creek, and soon "swelled" to a population of over 2,000. Although the area had been known by various names, in this same year the U.S. Post Office Department formalized the use of the name "Anchorage," – the place where ships could drop anchor. Despite some protest the name stuck. So here we are, on the last American Frontier, the land of superlatives, still exploring – except this time it is the scope and extent of control systems.

This brings us to the Technical Program. We have tried to integrate CCA and CACSD submissions into a single cohesive package while maintaining their individual identities and thanks to our program chairs Gary Yen and Vassilis Syrmos, we were able to accomplish this very successfully. The papers have been classified into six parallel tracks on Monday and Tuesday and four parallel tracks on Wednesday. The sessions are preceded by plenary talks whose details appear later. The conference itself is preceded by two tutorial workshops on Sunday.

A project of this magnitude can never be accomplished without a great team. We would like to thank Program Chairs Gary Yen and Vassilis Syrmos, Chaouki Abdallah and Francois Delebeque, Workshops Chair Mike Masten, Publicity Chair Thomas Parisini, Finance Chair Oscar Gonzalez, Industry Liaisons Tariq Samad and Pradeep Pandey, Publications Chair L.K. Mestha, Registration Chair Eduardo Misawa and Local Arrangements Chair George Wang. This joint conference was fortunate to have technical co-sponsorship of the American Society of Mechanical Engineers, USA the European Union Control Association and the Society of Instrument and Control Engineers, Japan – their support is gratefully acknowledged.

*Pradeep Misra and Andras Varga*
*Co-General Chairs*

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*Pradeep Misra and Andras Varga*
*Co-General Chairs*

## Conference Highlights

*Technical Program Overview*

With the assistance of an excellent Technical Program Committee, we have been able to put together a very exciting technical program for the Joint 2000 Conference on Control Applications and the Symposium on Computer Aided Control Systems Design. In order to retain the character of CCA and CACSD, we have maintained separate tracks for the two. On each day, the first two tracks are CACSD tracks and the remaining are CCA tracks. The technical program is spread over three days and each day we have morning, early afternoon, and late afternoon sessions. The morning sessions are preceded by plenary lectures on the first two days. A summary of Technical Program can be seen in the Program at a Glance – note that the titles of sessions have been abbreviated to accommodate the program on a single page.

***Plenary Lecture 1.*** ***Monday, September 25***
*Dr. Michael Masten, Texas Instruments Incorporated* *8:00 am – 9:00 am*
*Recent and Projected Trends in Control Applications* *Aleutian Room*

***Abstract*** – Control "theory" has produced many significant advancements, and a serious debate would no doubt occur if we tried to identify the specific theories that have had the most impact on our field. At the same time, the impact of control "applications" has been just as dramatic! We could likewise debate which applications have been the most significant; which ones solved the most pressing technical and social challenges, which ones generated the most financial return for those who developed them, which ones started entire new industries, and which ones brought the most recognition to our field. Although we might not agree on the relative importance of specific applications, we can nevertheless identify several recent trends that have enabled our most significant applications: control performance/precision/accuracy has dramatically improved, costs (both developmental and operational) have declined by orders of magnitude, reliability has improved, energy consumption has been reduced, system size and weight has dwindled, and the "impossible" has in fact become doable. Several fundamental developments fostered these control advancements: new/improved sensors, more effective actuators, digital/computer implementation, merging of mechanical and electronic solutions, as well as improved control design and fabrication techniques. These same factors will no doubt facilitate even greater advancements as we further accelerate control application trends.

***Biography*** – Michael K. Masten is a TI Fellow in Corporate Research and Development at Texas Instruments Incorporated. During his career at TI, Mike has worked on line-of-sight stabilization, target tracking, inertial navigation, missile autopilot-flight control systems, real-time hardware-in-the-loop test processes, electric motor control, and hard disk drive systems. He holds five patents, has published over 50 articles, and has taught numerous workshops regarding stabilization-tracking systems. Dr. Masten is currently manager of a research program directed to practical implementation of control systems using state of the art electronics. He was elected Senior Member of Technical Staff on TI's technical ladder in 1980, and promoted to rank of Texas Instruments Fellow in 1989..

Dr. Masten received electrical engineering degrees from the University of Texas in Austin as well as a MBA from the University of Dallas. He served two terms as member of the IEEE Control Systems Society Board of Governors and VP Member Activities (1992-1993), VP Financial Affairs (1994), President-Elect (1995), and Society President in 1996. Mike was General Chair for the 1994 IEEE Conference on Decision and Control. He is a member of the Council, as well as Vice Chair of the Technical Board, for the International Federation of Automatic Control; he also serves on the Editorial Board for the IFAC journal, "Control Engineering Practice."

Dr. Masten was elected as member of the IEEE Board of Directors for 1997-98, and he is currently Chair of the Finance Committee for the IEEE Technical Activities Board. He was elected an IEEE Fellow in 1990.

*Plenary Lecture 2.* *Tuesday, September 26*

*Plenary Lecture 2.*
*Professor Keith Glover, University of Cambridge, UK*
*Control System Design: Matching Methods to Problems*

*Tuesday, September 26*
*8:00 am – 9:00 am*
*Aleutian Room*

***Abstract*** – The essence of applicable control theory is to formulate problems that are both analytically and computationally tractable and also address issues of practical importance. Applications driven theory then needs to identify the essential features of a problem area that characterize its potential performance (e.g. dynamic behavior, system uncertainty, input saturation, disturbance properties, nonlinearities, etc.). In addition, the availability or ease of development of generic or bespoke software needs to be considered.

This talk will consider the above issues with reference to our experience in both developing and applying robust control techniques in a variety of applications including flight control and automotive engine management systems.

***Biography*** – Keith Glover received the B.Sc. (Eng) degree from Imperial College, London in 1967, and the S.M., E.E. and Ph.D. degrees from the Massachusetts Institute of Technology, Cambridge, MA, USA in 1971, 1971 and 1973, respectively, all in electrical engineering.

From 1967 to 1969 he was a development engineer with the Line Communications Division of the Marconi Company, Chelmsford, England. From 1973 to 1976, he was on the faculty of the Department of Electrical Engineering, University of Southern California, Los Angeles. Since 1976 he has been with the Department of Engineering, University of Cambridge, U.K., where his present position is Professor of Engineering, Head of the Information Engineering Division and Deputy Head of Department (Research). His current research interests include robust control, model approximation, and applications in aerospace and automotive industries.

Professor Glover was a Kennedy Fellow at MIT from 1969-1971, a Visiting Fellow at the Australian National University, Canberra, in 1983-1984 and a JSPS Fellow visiting Japan in 1991. He was a co-recipient of the AACC O. Hugo Schuck Award for best paper at the 1983 ACC; of the George S. Axelby Outstanding Paper Award for 1990 and of the IEEE W.G.R. Baker Prize Award for 1991. He is a Fellow of the IEEE and a Fellow of the Royal Society.

## *Program at a Glance*

**2000 CCA/CACSD Sunday Workshops**

*8:00 a.m. – 6:00 p.m., Sunday, September 24, 2000*

**Workshop 1:** *Unmanned Air Vehicles: Coordination, Sensing, And Control.*
J. Hespanha, University of Southern California, F. Hoffmann, J. Koo, M. Prandini, L. Schenato, O. Shakernia, D. Shim, University of California at Berkeley, I. Kaminer, Naval Post-Graduate School and C. Tomlin, Stanford University

**Workshop 2:** *Control And Signal Processing Design Optimization Using Genetic Search Methods.*
Dr. P.K. Menon, Dr. V.H.L. Cheng and Dr. L.S. Crawford, Optimal Synthesis Inc.

2000 CCA/CACSD MONDAY SESSIONS

*Plenary I: 8:00 a.m. – 9:00 a.m., Monday, September 25, 2000 --- **Aleutian Room***

| | *CACSD* | | *CCA* | | | |
|---|---|---|---|---|---|---|
| Track | 1 | 2 | 3 | 4 | 5 | 6 |
| Room | Iliama | King Salmon | Katmai | Dillingham | Susitna | Portage |
| MA 9:30-11:30 | Advanced Num Methods in Syst and Control Theory | Simulation and Validation I | Novel Control App. in Industry and Business | Educational and Industrial Robot | Fault Detection and Diagnosis | Control Fundamental |
| MM 1:00-3:00 | Computational Methods in Control Design I | Multi-Paradigm Modeling: Hetero. Modeling | Control Issues in Flywheel | Motion Control | Neural Control | Control in Nonlinear Systems |
| MP 3:20-5:20 | Computational Methods in Control Design II | Multi-Paradigm Modeling: Behavior Analysis | Control of Acoustic Noise | Vehicle Control | Fuzzy Control | Nonlinear Control Techniques and Applications |

2000 CCA/CACSD TUESDAY SESSIONS

*Plenary II: 8:00 a.m. – 9:00 a.m., Tuesday, September 26, 2000 --- **Aleutian Room***

| | *CACSD* | | *CCA* | | | |
|---|---|---|---|---|---|---|
| Track | 1 | 2 | 3 | 4 | 5 | 6 |
| Room | Iliama | King Salmon | Katmai | Dillingham | Susitna | Portage |
| TA 9:30-11:30 | Computational Toolboxes in Control Design | Simulation and Validation II | Plasma Control in a Tokamak | Mobile Robot and Architecture | Fault Tolerant Control | Signal Processing and Filtering |
| TM 1:00-3:00 | New Toolboxes for Control System Analysis and Design | System Design Applications I | Sensitivity Analysis and Design for PDE Applications | Sensor Based Control | Manufacturing Systems | Estimation and Observers |
| | BANQUET | | | | | |

2000 CCA/CACSD WEDNESDAY SESSIONS

| | *CACSD* | *CCA* | | |
|---|---|---|---|---|
| Track | 1 | 2 | 3 | 4 |
| Room | Iliama | King Salmon | Katmai | Dillingham |
| WA 9:30-11:30 | Numerical Methods for Model Reduction | Sliding Mode Control Techniques and Applications | Industrial Control Applications | Robot and Manipulator Control |
| WM 1:00-3:00 | System Design Applications II | Industrial and Biological Process Control | Modeling and System Identification | Aerospace And Space Systems |
| WP 3:20-5:20 | Adaptive and Robust Control | Power Electronic Systems | Discrete Event Systems | Active Vibration Control |

**2000 IEEE CCA**
**Monday, September 25, 2000**

Aleutian

**CCA/CACSD Opening Remarks**
**7:50-8:00**

**General Chairs**
P. Misra — Wright State Univ.
A. Varga — DLR Oberpfaffenhofen

Aleutian

**CCA Plenary Presentation**
**8:00 - 9:00**

**Recent and Projected Trends in Control Applications**
Mike Masten, Texas Instruments

Chair: P. Misra — Wright State Univ.
Co-Chair: G. Yen — Oklahoma State Univ.

King Salmon

**CACSD-MA2**
**Simulation and Validation I**
Chair: L. Glielmo — Univ. of Napoli
Co-Chair: M. Loffler — Clemson Univ.

10:50 CCA-1
*A Transmission Model for Hardware-in-the-Loop Powertrain Control System Software Development*
L. Mianzo — Visteon Corporation

11:10 CCA-9
*A Linear Tracking-Differentiator and Application to the Online Estimation of the Frequency of a Sinusoidal Signal*
B. Guo — Beijing Inst. of Tech
J. Han — Inst. of Systems Science

Katmai

**CCA-MA3**
**Novel Control Applications in Industry and Business**
Chair: S. Agrawal — Univ. of Deleware
Co-Chair: M. Spong — Univ. of Illinois at Urbana Champaign

9:30 CCA-14
*On Forecast of Exchange Rate of a Foreign Currency*
A. Prasolov — St. Petersburg State Univ.
K. Wei — Ford Research Lab

9:50 CCA-20
*Constant Torque Walking*
K. Uchida — Tokyo Inst. of Tech.
K. Furuta — Tokyo Denki Univ.

10:10 CCA-26
*Dynamic Bandwidth Allocation Algorithm for a Mixed Traffic Network*
T. Fry — Northwestern Univ.
A. Haddad — Northwestern Univ.
C. Lee — Northwestern Univ.

10:30 CCA-32
*On the Controllability of an Air Hockey Puck*
M. Spong — Univ. of Illinois at Urbana-Champaign

10:50 CCA-38
*Flat-Based Controlled Fed-Batch Fermentation of the Bacterium Photorhabdus luminescens*
P. Seydel — Christian-Albrechts Univ. of Kiel
H. Rock — Christian-Albrechts Univ. of Kiel

11:10 CCA-44
*A Computational Approach for Time-Optimal Planning of High-Rise Elevators*
M. Schlemmer — Mechanical Systems Lab
S. Agrawal — Mechanical Systems Lab

Dillingham

**CCA-MA4**
**Educational and Industrial Robot**
Chair: B. Potsaid — Rensselaer Polytechnic Inst.
Co-Chair: P. Pagilla — Okla. State Univ.

9:30 CCA-50
*Edubot: a Reconfigurable Kit for Control Education-Part I: Mechanical Design*
B. Potsaid — Rensselaer Polytechnic Inst.
J. Wen — Rensselaer Polytechnic Inst.

9:50 CCA-56
*Edubot: a Reconfigurable Kit for Control Education Part II: Identification and Control*
B. Potsaid — Rensselaer Polytechnic Inst.
J. Wen — Rensselaer Polytechnic Inst.

10:10 CCA-62
*Application of the Interval Control Systems Parameter Synthesis Method to the Industrial Robot Parameter Design*
A. Nesenchuk — Belarusian Natl. Acad. of Sciences
G. Naidyonov — Scientific-Production Govt. Enterprise "Granat-Automatika"
V. Nesenchuk — Belarusian Natl. Acad. of Sciences

10:30 CCA-68
*Adaptive Control of a Robot Carrying a Time-Varying Payload*
P. Pagilla — Oklahoma State Univ.
B. Yu — Oklahoma State Univ.

10:50 CCA-74
*Model-Based PID Control of Constrained Robot in a Dynamic Environment with Uncertainty*
Y. Li — Nanyang Tech. Univ.
Y. Ho — Nanyang Tech. Univ.
C. Chua — Nanyang Tech. Univ.

11:10 CCA-80
*Time-Efficient Input Shaping Control of Container Crane Systems*
B. Park — Pusan National Univ.
K. Hong — Pusan National Univ.
C. Huh — Pusan National Univ.

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Susitna

**CCA-MA5**
**Fault Detection and Diagnosis**
Chair: B. Boston — Univ. of Pittsburgh

9:30 CCA-86
*Robust Control and Fault Detection Synthesis with Application to Tractor-Semitrailer Automatic Steering*
S. Mammar — INRETS
V. Baghdassarian — INRETS
D. Koenig — CNRS-INPG-UJF

9:50 CCA-92
*Winner Take All Experts Network for Sensor Validation*
G. Yen — Oklahoma State Univ.
W. Feng — Oklahoma State Univ.

10:10 CCA-98
*Combination of Data Approaches to Heuristic Control and Fault Detection*
J. Boston — Univ. of Pittsburgh
L. Baloa — Univ. of Pittsburgh
D. Liu — Univ. of Pittsburgh
M. Simaan — Univ. of Pittsburgh
S. Choi — Univ. of Pittsburgh
J. Antaki — Antakamatics, Inc.

10:30 CCA-104
*A Combined Method Based on Neural Network for Control System Fault Detection and Diagnosis*
Z. Ren — Univ. of California, Riverside
J. Chen — Univ. of California, Riverside
X. Tang — Northwestern Polytechnical Univ.
W. Yan — Northwestern Polytechnical Univ.

10:50 CCA-109
*Optimal Adaptive Control of an Ash Stabilization Batch Mixing Process Using Change Detection*
T. Svantesson — Kalmar Univ. College
G. Olsson — Lund Univ.

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Portage

**CCA-MA6**
**Control Fundamental**
Chair: P. Hsu — San Jose State Univ.
Co-Chair: R. Pujara — Wright State Univ.

9:30 CCA-115
*Stability Analysis of AC Steady-State Control for Inverters*
P. Hsu — San Jose State Univ.

9:50 CCA-121
*Energy Shaping Revisited*
R. Ortega — CNRS-SUPELEC
A. van der Schaft — Univ. of Twente
I. Mareels — Univ. of Melbourne
B. Maschke — CNAM

10:10 CCA-988
*Analysis of Control Systems with Delay Using Differential Transformations Method*
O. Stoukatch — TUCSR

10:30 CCA-127
*Necessary and Sufficient Conditions for a Polytope of Real Polynomials to Contain a Hurwitz Polynomial*
L. Pujara — Wright State Univ.

10:50 CCA-133
*Identifiability of Hybrid System Models*
I. Hiskens — Univ. of Illinois at Urbana-Champaign

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Katmai

**CCA-MM3**
**Control Issue in Flywheel Attitude Control, Energy Transmission & Storage**
Chair: Jerry L. Fausz — Air Force Research Lab
Co-Chair: M. Oshima — The Boeing Company

1:00 (I) CCA-138
*Low-Bias Control of AMB's Subject to Saturation Constraints*
P. Tsiotras — Georgia Inst. of Tech.
E. Velenis — Georgia Inst. of Tech.

1:20 (I) CCA-144
*Effect of Sinusoidal Base Motion on a Magnetic Bearing*
M. Kasarda — Virginia Tech.
J. Clements — Cummins Engines
A. Wicks — Virginia Tech.
C. Hall — Virginia Tech.
R. Kirk — Virginia Tech.

1:40 (I) CCA
*Missing*

2:00 (I) CCA
*Missing*

2:20 (I) CCA
*Missing*

2:40 (I) CCA-991
*Flywheel Simultaneous Attitude Control and Energy Storage Using a VSCMG Configuration*
J. Fausz — Kirtland AFB
D. Richie — Georgia Tech.

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Dillingham

**CCA-MM4**
**Motion Control**
Chair: F. Khorrami — Polytechnic Univ.
Co-Chair: M. Freemaster — Clemson Univ.

1:00 CCA-150
*Sensorless Rotor Velocity Tracking Control of the Permanent Magnet Stepper Motor*
A. Behal — Clemson Univ.
M. Feemster — Clemson Univ.
D. Dawson — Clemson Univ.
A. Mangal — Clemson Univ.

1:20 CCA-156
*Robust Two Degree of Freedom Regulators for Velocity Ripple Elimination of AC Permanent Magnet Motors*
W. Gan — The Hong Kong Univ. of Science and Technology
L. Qiu — The Hong Kong Univ. of Science and Technology

1:40 CCA-162
*A Design Method of an Adaptive PI Controller for a Positioning Mechanism with Stand*
K. Sato — Saga Univ.
K. Watanabe — Saga Univ.
H. Honda — Yaskawa Electric Corp.
R. Oguro — Yaskawa Electric Corp.

2:00 CCA-168
*A New Approach to Biaxial Cross-Coupled Control*
S. Yeh — National Chiao Tung Univ.
P. Hsu — National Chiao Tung Univ.

2:20 CCA-17
*Design of an Acceleration Rate Controller for a Linear Drive of a Vertical Transportation System*
M. Platen — Institut für Elektrische Maschiner
D. Brakensiek — Institut für Elektrische Maschiner
G. Henneberger — Institut für Elektrische Maschiner

2:40 CCA-178
*Robust Adaptive Friction Compensation in Servo-Drives Using Position Measurement Only*
Z. Wang — Polytechnic Univ.
H. Melkote — Polytechnic Univ.
F. Khorrami — Polytechnic Univ.

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Susitna

**CCA-MM5**
**Neural Control**
Chair: R. Rysdyk — Georgia Tech.
Co-Chair: Y. Yamada — Kure Inst. Natl. College

1:00 CCA-184
*Adaptive Recurrent-Neural-Network Control for Linear Induction Motor*
R. Wai — Yuan Ze Univ.
F. Lin — Chung Yuan Christian Univ.
C. Hong — Chung Yuan Christian Univ.

1:20 CCA-190
*Adaptive Pole-Placement Control with Multi-Rate Type Neural Network for Pneumatic Servo System*
Y. Yamada — Kure Inst. National College
K. Tanaka — Yamaguchi Univ.
S. Uchikado — Tokyo Denki Univ.

1:40 CCA-196
*Synthesis of a Robust Neurocontroller in the Face of Strong External Disturbances*
M. Efe — Bogazici Univ.
O. Kaynak — Bogazici Univ.

2:00 CCA-202
*Temperature Control of CST Process Using Gaussian Neural Network with Adaptive Learning Rate*
S. Saxena — Univ. of Roorkee
V. Kumar — Univ. of Roorkee
L. Waghmare — SGGS College of Engineering & Tech.

2:20 CCA-208
*Neural Network Based Flow Controller*
J. Kulkarni — KBP
R. Jamkar — SGGS College of Engineering & Tech.

Portage

**CCA-MM6**
**Control in Nonlinear Systems**
Chair: Y. Michitsuji — Tokyo Inst. of Tech.
Co-Chair: J. Hsu — St. John's and St. Mary Inst. of Tech.

:00 CCA-214
*Dynamic Wavelet Neural Network for Nonlinear Dynamic System Identification*
Y. Tan — Guilin Inst. Electronic Tech.
X. Dang — Guilin Inst. Electronic Tech.
F. Liang — Guilin Inst. Electronic Tech.
C. Su — Concordia Univ.

1:20 CCA-220
*A Composite Controller for Unknown Nonlinear Dynamical Systems Using Robust Adaptive Fuzzy-Neural Control Schemes*
W. Wang — Fu-Jen Catholic Univ.
C. Hsu — St. John's & St. Mary's Inst of Tech.
Y. Leu — Hwa-Chia Inst of Tech.

1:40 CCA
*Missing*

2:00 CCA-226
*Swing-Up Control of Inverted Pendulum Using Vibrational Input*
Y. Michitsuji — Tokyo Inst. of Technology
K. Furuta — Tokyo Denki Univ.
M. Yamakita — Tokyo Inst. of Technology

0 CCA-232
*Robust, Near Time-Optimal Control of Nonlinear Second Order System with Model Uncertainty*
K. You — Univ. of Minnesota
E. Lee — Univ. of Minnesota

2:40 CCA-237
*Discrete Adaptive Sliding Mode Control for Idle Speed Regulation in IC Engines*
X. Li — The Ohio State Univ.
S. Yurkovich — The Ohio State Univ.

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Katmai

**CCA-MP3**
**Control of Acoustic Noise**
Chair: H. Rota — ADFA
Co-Chair: A. Kelkar — Kansas State Univ.

3:20 (I) CCA-243
*Review of DSP Algorithms for Active Noise Control*
S. Kuo — Northern Illinois Univ.
D. Morgan — Lucent Technologies

3:40 (I) CCA-249
*An Adaptive Feedback Active Noise Control System*
T. Tsuei — Ta Hwa Inst. of Tech.
A. Srinivasa — Northern Illinois Univ.
S. Kuo — Northern Illinois Univ.

4:00 (I) CCA-255
*Subspace Based System Identification for an Acoustic Enclosure*
T. McKelvey — Chalmers Univ. of Tech.
A. Fleming — Univ. of Newcastle
S. Moheimani — Univ. of Newcastle

4:20 (I) CCA-261
*Experiments in Feedback Control of an Acoustic Duct*
I. Petersen — Aus. Defence Force Academy
H. Pota — Univ. of New South Wales

4:40 (I) CCA-267
*Analysis of Perfect Noise Cancelling Controllers*
H. Pota — Univ. of New South Wales
A. Kelkar — Kansas State Univ.

5:00 (I) CCA-273
*Robust Broadband Control of Acoustic Duct*
A. Kelkar — Kansas State Univ.
H. Pota — Univ. of New South Wales

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Dillingham

**CCA-MP4**
**Vehicle Control**
Chair: A. Phillips — Ford Research Lab.
Co-Chair: M. Larsen — Univ. of California, Santa Barbara

3:20 CCA-279
*Heading-Aided Odometry and Range-Data Integration for Positioning of Autonomous Mining Vehicles*
J. Bakambu — Ecole Poly. de Montréal
V. Polotski — Ecole Poly. de Montréal
P. Cohen — Ecole Poly. de Montréal

3:40 CCA-285
*Robust Sampled-Data Control for Vehicle Steering Systems*
L. Hu — Shanghai Jiao Tong Univ.
Y. Cao — Duisburg Univ.
H. Shao — Shanghai Jiao Tong Univ.

4:00 CCA-291
*Exact Model Matching with Limiting Properties of LQR and its Application to Cooperative Transportation by Two Vehicles*
R. Suzuki — Kanazawa Inst. of Tech.
S. Furuya — Kanazawa Inst. of Tech.
S. Kawashima — Kanazawa Inst. of Tech.
N. Kobayashi — Kanazawa Inst. of Tech.
H. Yamada — Kanazawa Tech. College

4:20 CCA-297
*Vehicle System Controller Design for a Hybrid Electric Vehicle*
A. Phillips Ford Research Lab.
M. Janković Ford Research Lab.
K. Bailey Ford Research Lab.

4:40 CCA-303
*Application of Direct Adaptive Generalized Predictive Control to an Automatic Gear Box with a Continuous Variable Transmission*
G. Ramond ESIEA
D. Dumur Supélec
P. Boucher Supélec

5:00 CCA-309
*Indirect Passivation Design for a Diesel Engine Model*
M. Larsen Visteon Advanced ETS
M. Janković Ford Research Lab.
P. Kokotovic Univ. of Calif., Santa Barbara

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Susitna

**CCA-MP5**
**Fuzzy Control**
Chair: J. Juang Natl. Taiwan Ocean Univ.
Co-Chair: K. Krishnamurthy Texas A&M Univ.

3:20 CCA-315
*Trajectory Synthesis Based on Different Fuzzy Modeling Network Pruning Algorithms*
J. Juang National Taiwan Ocean Univ.

3:40 CCA-321
*Automated Mode Inferencing for Intelligent Aircraft*
K. Krishnamurthy Texas A&M Univ.
D. Ward Texas A&M Univ.

4:00 CCA
*Missing*

4:20 CCA-327
*Application Oriented Control System Design Based on the Fuzziness of Parameter Uncertainties*
A. Weinmann Vienna Univ. of Tech.

4:40 CCA-333
*Satisfactory Optimization Control in Fuzzy Dynamic Environment for Complex Systems*
S. Li Shanghai Jiaotong Univ.
Y. Xi Shanghai Jiaotong Univ.

5:00 CCA-339
*Self-Learning Neural Network Fuzzy Control Applied to the Synthetic Ammonia Production*
S. Li Shanghai Jiaotong Univ.
Y. Xi Shanghai Jiaotong Univ.
W. Xiaoye Hebei Univ. of Tech.

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Port

**CCA-MP6**
**Nonlinear Control Techniques and Applications**
Chair: J. Chang Natl. Taiwan Ocean Un
Co-Chair: M. Aliyu Louisiana State Un

3:20 CCA-3
*Adaptive Solution of Hamilton-Jacobi-Isaac Equation f Practical H-Infinity Stabilization of Nonlinear Systems*
M. Aliyu Louisiana State Un

3:40 CCA-3
*Design of a Nonlinear H-Infinity Controller Applied t Ship Control System*
P. Yang The 202nd Arsenal, C.S
S. Hu The 202nd Arsenal, C.S
J. Juang National Taiwan Ocean Un

4:00 CCA-3
*Tracking for Nonlinear Underactuated Surface Vessels with Generalized Forces*
G. Toussaint Univ. of Illinois at Urbana Champa
T. Başar Univ. of Illinois at Urbana Champa
F. Bullo Univ. of Illinois at Urbana Champa

4:20 CCA-3
*Controllable Set Based Saturation Management Using Backstepping Control*
T. Rendon Oklahoma State Un
B. O'Dell Oklahoma State Un
E. Misawa Oklahoma State Un

4:40 CCA-3
*Integral Backstepping Control and Experimental Implementation for Motion System*
Y. Tan Rockwell Science Cen
J. Chang Rockwell Science Cen
H. Tan Rockwell Science Cen
J. Hu Rockwell Science Cen

5:00 CCA-3
*Adaptive Robust Precision Motion Control of Linear Motors with Ripple Force Compensations: Theory and Experiments*
L. Xu Purdue Un
B. Yao Purdue Un

## 2000 IEEE CCA
## Tuesday, September 26, 2000

Aleutian

**CCA/CACSD Plenary Presentation**
**8:00 - 9:00**

**Control System Design: Matching Methods to Problems**
Keith Glover, University of Cambridge, UK

ir: A. Varga
Chair: V. Syrmos

King Salmon

**CSD-TA2**
**ulation and Validation II**
ir: J. Freuderberg — Univ. of Michigan
Chair: D. Dawson — Clemson Univ.

50 — CCA-379
*dified Evolution Strategies with a Diversity-Based ent-Inclusion Scheme*
T. Huang — Natl. Taiwan Univ.
Y. Chen — Natl. Taiwan Univ.

Katmai

**A-TA3**
**sma Control in a Tokamak**
ir: G. Ambrosino — Univ. di Napoli Federico II
Chair: M. Ariola — Univ. di Napoli Federico II

0 (I) — CCA-385
*rrent, Position, and Shape Control of Tokamak smas: A Literature Review*
R. Albanese — Univ. di Reggio Calabria
G. Ambrosino — Univ. di Napoli Federico II

0 (I) — CCA-395
*gregation-Based Model Reduction for Tokamak ntrol*
A. Beghi — Univ. di Padova
D. Ciscato — Univ. di Padova

:10 (I) — CCA-401
*rtical Stabilization and Plasma Shape Control in the ER-FEAT Tokamak*
M. Ariola — Univ. di Napoli Federico II
A. Pironti — Univ. di Napoli Federico II
A. Portone — European Fusion Dev. Agreement

10:30 (I) — CCA-406
*Non-Linear Simulations by Numerical Magneto Hydro Dynamics Equilibrium Codes in ITER-FEAT*
M. Cavinato — ITER JCT
A. Kavin — ITER JCT
V. Lukash — KIAE
R. Khayrutdinov — TIITR

10:50 (I) — CCA-412
*Initial Implementation of a Multivariable Plasma Shape and Position Controller in the DIII-D Tokamak*
D. Humphreys — General Atomics
M. Walker — General Atomics
J. Leuer — General Atomics
J. Ferron — General Atomics

11:10 (I) — CCA-419
*Design and Experimental Testing of Robust MIMO Controllers on TCV*
M. Ariola — Univ. di Napoli Federico II
J. Lister — Ecole Polytechnique-Fédérale
A. Pironti — Univ. di Napoli Federico II de Lausanne

Dillingham

**CCA-TA4**
**Mobile Robot and Architecture**
Chair:P. Tsiotras — Georgia Tech.
Co-Chair: S. Thongchai — Vanderbilt Univ.

9:30 — CCA-425
*Application of Fuzzy Control to a Sonar-Based Obstacle Avoidance Mobile Robot*
S. Thongchai — Vanderbilt Univ.
K. Kawamura — Vanderbilt Univ.

9:50 — CCA-431
*Visual Servo Control of a Class of Mobile Robot*
J. Carvalho — Automation Institute/CTI
P. Rives — INRIA
A. Santa-Bárbara — Automation Institute/CTI
S. Bueno — Automation Institute/CTI

10:10 — CCA-437
*Robust Control of a Mobile Robot System with Kinematic Disturbances*
W. Dixon — Clemson Univ.
D. Dawson — Clemson Univ.
E. Zergeroglu — Clemson Univ.

10:30 — CCA-443
*Time-Invariant Stabilization of a Unicycle-Type Mobile Robot: Theory and Experiments*
B. Kim — Georgia Inst. of Tech
P. Tsiotras — Georgia Inst. of Tech

10:50 CCA-449
*A General Invariance Principle for Nonlinear Time-Varying Systems and its Applications*
T. Lee — Ming Hsin Inst. of Tech.
D. Liaw — National Chiao Tung Univ.

11:10 CCA-455
*New Reference Point for Guiding an Articulated Vehicle*
V. Polotski — Ecole Polytech. de Montréal

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Susitna

CCA-TA5
**Fault Tolerant Control**
Chair: J. Boskovic — Scientific Systems Co.
Co-Chair: G. Provan — Rockwell Science Ctr.

9:30 CCA-461
*Numerical Synthesis of a Failure-Tolerant, Nonlinear Adaptive Autopilot*
L. Crawford — Optimal Synthesis Inc.
V. Sharma — Optimal Synthesis Inc.
P. Menon — Optimal Synthesis Inc.

9:50 CCA-467
*Optimal Design of Fault Tolerant Sensor Networks*
G. Hoblos — Univ. Sciences Tech. and Hautes Etudes Industrielles
M. Staroswiecki — Univ. Sciences Tech.
A. Aïtouche — Hautes Etudes Industrielles

10:10 CCA-473
*Model-Based Fault Tolerant Control Reconfiguration for Discrete Event Systems*
G. Provan — Rockwell Science Center
Y. Chen — Rockwell Science Center

10:30 CCA-479
*Reconfigurable Flight Control Design Using Multiple Switching Controllers and On-Line Estimation of Damage-Related Parameters*
J. Bošković — Scientific Systems Co., Inc.
S. Li — Scientific Systems Co., Inc.
R. Mehra — Scientific Systems Co., Inc.

10:50 CCA-485
*Fault Feature Extracting by Wavelet Transform for Control System Fault Detection and Diagnosis*
Z. Ren — Univ. of California, Riverside
J. Chen — Univ. of California, Riverside
X. Tang — Northwestern Polytech. Univ.
W. Yan — Northwestern Polytech. Univ.

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Portage

**CCA-TA6**
**Signal Processing and Filtering**
Chair: X. Lu — Univ. of California, Berkeley
Co-Chair: C. Birdsong — Michigan State Univ.

9:30 CCA-490
*An Adaptive Nonlinear Filter Approach to Vehicle Velocity Estimation for ABS*
F. Jiang — Cleveland State Univ.
Z. Gao — Cleveland State Univ.

9:50 CCA-496
*Time Delay Filter Design in the Non-Minimum Phase Systems*
C. Liang — Shanghai Jiaotong Univ.
J. Xie — Shanghai Jiaotong Univ.

10:10 CCA-501
*Integral Filters from a New Viewpoint and Their Application in Nonlinear Control Design*
X. Lu — Univ. of California at Berkeley
J. Hedrick — Univ. of California at Berkeley

10:30 CCA-507
*Switched Kalman Filter in a High Frequency Series Loaded Resonant Converter*
A. Hultgren — Univ. of Kalmar
W. Kulesza — Univ. of Kalmar
M. Lenells — Växjö Univ.

10:50 CCA-513
*Design of a Normalized Delayless LMS Adaptive Subband Digital Filter*
S. Tenqchen — Natl. Taiwan Univ.
M. Sun — Natl. Taiwan Univ.
W. Feng — Chang Gung Univ.

11:10 CCA
*Missing*

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Katmai

**CCA-TM3**
**Sensitivity Analysis and Design for PDE Applications**
Chair: B. King — Virginia Tech
Co-Chair: J. Burns — Virginia Tech

1:00 (I) CCA-519
*Sensitivity Analysis for Chemical Laser Design: A Model Problem*
J. Borggaard — Virginia Tech
E. Cliff — Virginia Tech

1:20 (I) CCA-524
*A Sensitivity Equation Method for Molding Processes*
L. Stanley — Montana State Univ.