CDC Turns 40 in Orlando

The 40th IEEE Conference on Decision and Control (CDC) was held at the Hyatt Regency Grand Cypress, Orlando, FL, 4-7 December 2001. The circumstances under which the meeting took place were anything but "normal," as the tragic events of September 11 still weighed heavily on everyone's minds. Although some registrants were prevented from attending, many traveled to Orlando, showing proper respect for the victims but nevertheless determined that "life must go on." At no time in my memory has the control community shown such resolve in rallying support for the CDC. The number of registrants was 763, just 20% lower than expected. Although a few more papers than usual were not presented, the conference record was complete, as 98% of accepted papers are in the *Proceedings*. There were 43 countries represented at CDC'01, and 54% of the attendees were from outside the host country, with the largest contingent from Japan. The conference organizers thank all participants for making the event a successful scientific meeting, especially those who traveled to Orlando from outside the United States.

Planning for this meeting began four years ago. After all, we had a lot going for us. According to some, this would be the first CDC of the new millennium. It would be a 40th birthday celebration of sorts for the IEEE Control Systems Society (CSS) and an opportunity for another "family CDC." In view of the world situation, however, we had to modify our plans accordingly and be very mindful of expenses. The situation during the three months prior to the conference added a lot of uncertainty and difficulty, but fortunately we were still able to hold the event. The weather was great during the entire conference, the launch of the Space Shuttle Endeavour was witnessed by many of us in Orlando, and everything went quite smoothly.

The Hyatt Regency Grand Cypress Resort was luxurious and large. Its location near a number of other hotels provided participants a wide selection in choosing accommodations. There were several restaurants on site, and to accommodate our tight lunch schedule, "cash lunches" with an assortment of sandwiches were served in the Portico area. Many of us took a dip in the grotto pool, and others enjoyed the Jack Nicklaus-designed championship golf course, world-class tennis facilities, and a full-service equestrian center. The resort was just a short walk from Downtown Disney and a short drive from Orlando's theme parks. The conference venue allowed quick and easy access to what Orlando had to offer but was also an oasis in the midst of all the attractions. The hotel conference facilities were perfect for our needs, having an appropriate layout and an ideal number of large conference rooms.

Program Chair Kevin Passino.

General Chair Ted Djaferis.

Technical Program Overview

A total of 1416 papers were submitted to the conference, of which 949 were accepted for presentation (contributed and invited) and assembled into 156 sessions. Based on this number of accepted papers, we were expecting approximately 950 attendees. The papers covered all aspects of the theory and applications of systems involving decision, control, optimization, and adaptation. On Tuesday morning, after opening remarks from the General Chair, Program Chair Kevin Passino introduced Prof. John Doyle of the California Institute of Technology, who presented a plenary lecture titled "A New Physics?" After the plenary, participants had the opportunity to attend one of the 13 parallel sessions. Later in the afternoon, we had a special invited presentation, organized by Dr. Kishan Baheti of the National Science Foundation. The session was to have been given by Rear Admiral Jay M. Cohen, Chief of Naval Research, to inform U.S. researchers about new joint initiatives being planned. The presentation was made instead by Dr. Albert Tucker of the Office of Naval Research and was titled "Opportunities and Challenges in Systems and Control at the Office of Naval Research." On Wednesday, two special invited presentations were held after the regular sessions. One was given by Dr. Siva S. Banda of Wright-Patterson Air Force Base, who spoke on "Current Research and Open Problems in Control Science: An Air Force Research Laboratory Perspective." The other was delivered by Prof. Bassam Bamieh of the University of California at Santa Barbara and was titled "Distributed Systems and Distributed Control." On Thursday morning, Prof. Dennis S. Bernstein of the University of Michigan gave the second plenary lecture: "From Infancy to Potency: Lyapunov's Second Method and the Past, Present, and Future of Control Theory." On Friday morning, Prof. Alberto Isidori of Washington University and the University of Rome, the recipient of this year's Bode Prize, delivered the Bode Lecture titled "Finesse et Géométrie: The Spirit of Nonlinear Feedback."

Three workshops, which were attended by 48 participants, were organized on Monday, prior to the conference. The workshops were "Simulation and Monte Carlo Methods," organized by J.C. Spall and I.-J. Wang; "Control Using Logic and Switching," by J.P. Hespahna, D. Liberzon, and A.S. Morse; and "Networked Autonomous and Semi-Autonomous Vehicles," by J. Sousa, R. Sengupta, A. Girard, K. Hedrick, S. Sastry, S. Tripakis, T. Simsek, P. Varaiya, W. Wei, and S. Yovine.

Conference Highlights

Social Events

The Opening Reception was held on Monday evening. The Companions Orientation was held the following day. The Newcomer/Student Reception, where several CSS officers welcomed newcomers and students, was held on Tuesday and drew many attendees. The Farewell Reception, held on Friday, also was very well attended. Everyone agreed that the food at all social functions was plentiful and tasty.

The Space Shuttle at the CDC

Since Orlando is the attraction capital of the world, the only organized excursion was a trip to the Kennedy Space Center. No launches were planned for CDC week, and the tour was scheduled for Wednesday. Due to launch delays, the Space Shuttle Endeavour would actually be launched that Wednesday. In fact, even though there was cloud cover over Orlando, many of us had the opportunity to actually view the spectacular launch at 5:19 EST. The tour on Wednesday had to be postponed to Thursday because of the launch.

Speakers' Breakfast

The tradition of serving complimentary breakfast to presenting authors and session chairs for each day was revived in Orlando. It was a wonderful opportunity for speakers and session chairs to meet in a pleasant atmosphere, get acquainted, and plan for the session. Complimentary breakfasts were served every morning starting at 7:00 a.m. in Regency Hall and were very well received.

Exhibits

Eight exhibitors were present: dSPACE Inc., Magnetic Moments, SIAM, Springer-Verlag, Kluwer, McGraw-Hill, INSPEC/IEE, and Taylor and Francis. They were located in Regency Hall, right next to the CDC'01 registration desk. This number was lower than expected, which can be attributed to several factors, including the downturn in the world economy and the events of September 11. An extra effort was made to encourage participants to visit the exhibits area by scheduling the coffee breaks in Regency Hall.

Student Travel Support

The NSF provided partial travel support for U.S. students to attend the CDC; 33 students took advantage of this opportunity. I want to thank the NSF and Dr. Kishan Baheti for providing funds for student travel. In addition, the CSS also

The Student Best Paper finalists.

provided financial support in the form of reduced student conference registration.

Travel Support for Participants from Financially Disadvantaged Countries

A new travel support program has been adopted by the CSS to help participants from financially disadvantaged countries attend the CDC. Twelve individuals applied to this program and attended the conference. Several more grants were awarded, but their recipients were unable to attend.

Conference Registration

Starting with CDC'01, the CSS began hosting its own online registration service for CSS-sponsored conferences. The Operating Committee wishes to give special thanks to Prof. Pradeep Misra and Chris McCall for their efforts in the development of this system and their assistance during the conference. Just as they have done for so many years, Cathy Tanner and Judy Alexander helped with registration. Their courteous attitude, willingness to help, and friendly interaction with attendees make them indispensable!

Awards Ceremony

The Awards Ceremony took place on Thursday evening. This was the second year that the Awards Ceremony was held separately from the Conference Banquet. It provided a dignified setting for the awards and was very well attended. CSS President Wilson J. Rugh opened the ceremony and introduced N. Harris McClamroch, Chair of the Awards Committee. The Outstanding Chapter Award was presented by Michel Gevers, Vice President, Membership Activities, to the Vancouver Chapter (accepted by Mihai Huzmezan, Chair). The citation read: "For the organization of an impressive list of talks and technical visits dedicated to the pursuit of bridging the gap between industry and academia." He also presented the IEEE CSS Distinguished Member Award to Pradeep Misra. The CDC Best Student Paper Award was presented by Pablo Iglesias, Selection Committee Chair, to Ryozo Nagamune (advisor, A. Lindquist). The other three finalists for this award were Zhiyuan Ren (advisor, B.H.

From left to right: CSS President Wilson J. Rugh, Bode Prize recipient Alberto Isidori, and IEEE President Joel Snyder.

Krogh), Sheila Ross (advisor, B.R. Barmish), and Paulo Tabuado (advisor, G. Pappas). Rugh presented the Control Systems Technology Award to James F. Antaki and Bradley E. Paden. The citation read: "For their development of the StreamLiner artificial heart, a mechatronics design that epitomizes the integration of control with electromechanical systems to achieve a novel design that has the potential to save over 3,500 lives per year." Mark Spong, Vice President, Publication Activities, presented the three outstanding paper awards. The *IEEE Control Systems Magazine* Outstanding Paper Award went to Thomas L. Vincent and Tania L.S. Vincent for their article "Evolution and Control System Design" (Bradley E. Paden accepted on their behalf). The *IEEE Transactions on Control Systems Technology* Outstanding Paper Award was presented to Rajesh Rajamani, Han-Shue Tan, Boon Kait Law, and Wei-Bin Zhang for their paper "Demonstration of Integrated Longitudinal and Lateral Control for the Operation of Automated Vehicles in Platoons" (Rajesh Rajamani accepted). The George S. Axelby Outstanding Paper Award was presented to George Barrett and Stephane

Lafortune for their paper titled "Decentralized Supervisory Control with Communicating Controllers." Rugh presented the Hendrik W. Bode Lecture Prize to Alberto Isidori. Rugh then announced the new IEEE Fellows and was joined by IEEE President Joel Snyder in presenting certificates to Stephen L. Campbell, Bozenna Pasik-Duncan, Ian Postlethwaite, and Anders Rantzer, who chose to receive them at the CDC. Finally, Snyder presented the 2001 IEEE Control Systems Society Field Award to Keith Glover.

Awards Banquet

The Conference Banquet was held following the Awards Ceremony. It began with opening remarks from the General Chair followed by comments by Program Chair Kevin Passino. The event concluded with the "passing of the gavel" from Rugh to incoming CSS President Leonard Shaw and an invitation by Ümit Özgüner to attend CDC'02 in Las Vegas, NV.

Acknowledgments

The 40th CDC was made possible by the vital contributions of numerous individuals. First to be recognized are the authors, without whose support the conference would not have taken place. My sincere thanks to all the authors, plenary speakers, special session presenters, workshop organizers, and session chairs for enriching the technical content. All members of the "CDC'01 team" (Operating Committee, Program Committee, Conference Editorial Board, and other individuals) did an excellent job of making sure that every aspect of the conference ran efficiently and accurately. I extend my deep gratitude to all! The "technical program team" was led by Kevin Passino (Program Chair), who was assisted by James C. Spall (Vice-Program Chair, Invited Sessions), Wei Lin (Vice-Program Chair, Short Papers), and the entire Program Committee. A key role in the development of the technical program was played by the members of the Conference Editorial Board, led by Jim and Yan Zhu. The "registration team" was directed by Ed Chong (Registration Chair), who was assisted by Pradeep Misra, Cathy Tanner, Judy Alexander, and Chris McCall. The CDC'01 Web site was set up by Pam Williams and maintained by Orhan Beker and Rajesh Patwari. Conference finances were managed by Jay Farrell (Finance Chair). Panos Antsaklis (Workshops Chair) made sure that appropriate workshops were selected for the Conference and oversaw their smooth operation. Publications were overseen by Dan Repperger, Exhibits by Dimitry Gorinevsky, and Publicity by Kris Hollot. Local arrangements were handled by Zhihua Qu, who was assisted during the conference by students Apiwat Saengdeejing, Yufang Jin, and Xiahe Wu. Finally, I want to thank the Control Systems Society for giving me the opportunity to serve in the capacity of General Chair.
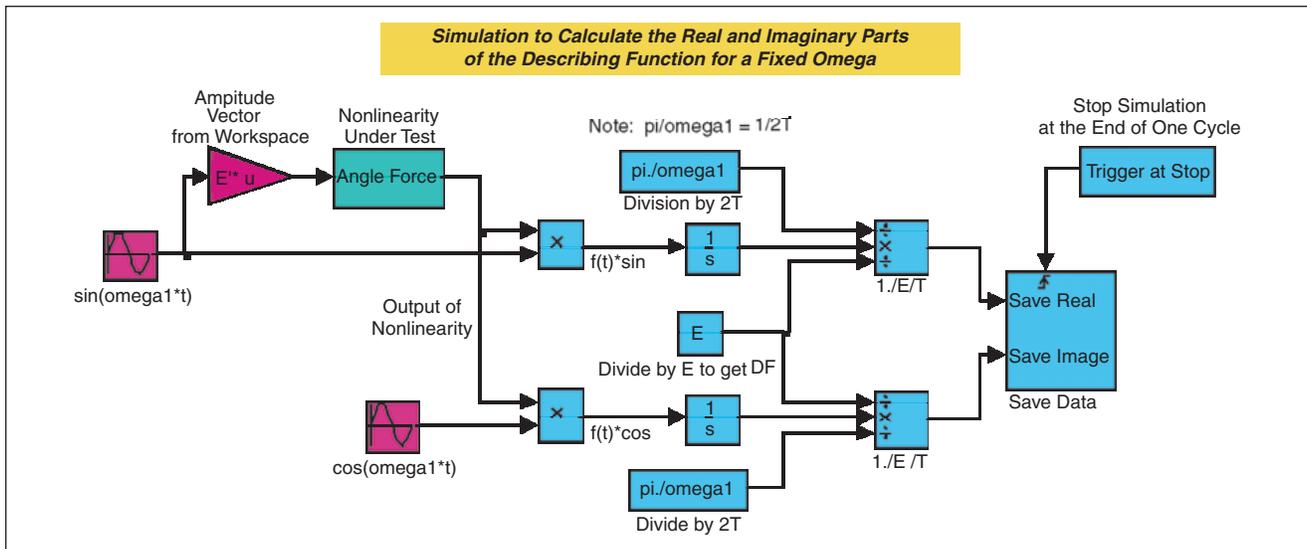
Theodore E. Djaferis
General Chair, CDC'01

2001 CSS President Wilson Rugh passes the gavel to 2002 CSS President Len Shaw.

Figure 1. *Correct Simulink "GenerateDescribingFunction" model used to calculate the describing function for a fixed ω.*

Updated Code

Our article titled "Describing Function Analysis Using MATLAB and Simulink," which appeared in a recent issue of the *Magazine* (Lecture Notes, vol. 21, pp. 19-26, August 2001), describes the analysis of a clock using describing functions. In preparing the final manuscript, an earlier version of the Simulink model in Fig. 4 and the code used to develop the describing function (Fig. 5) was inadvertently used. The Simulink model as published has an error, and the code in Fig. 5 was written to be a MATLAB function and not a script. We would like to thank Dr. T. Selim Eskiizmirliler of Orebro University in Sweden for pointing out these errors in the published article.

The correct Simulink model (replacing Fig. 4 in the original article) is shown in Fig. 1, and the MATLAB script is shown in Fig. 2.

For those readers who contacted the authors and received the MATLAB and Simulink code, the files sent were the correct ones.

Once again, for anyone wishing to receive the files by e-mail, the contact is rgran@cfl.rr.com.

Richard Gran
Mathematical Analysis Co.
Melbourne, FL, U.S.A.
20 January 2002

```
%  GetDF generates a describing function for the nonlinear element
%    in the Simulink model "GenerateDescribingFunction"
%
%  To generate a describing function for a different nonlinearity, edit the model.
%    Note that different nonlinear elements might need different amplitude and
%    frequency ranges, so to change the amplitudes, E, and frequencies, omega,
%    edit this m-file and modify the defining vectors for E and omega.

E=[[0.15:.01:0.25],[0.3:0.1:0.9],[1:.5:3]];
omega=[.5:.5:5 5.5:.1:6.2 2*pi 6.3:.1:6.5 7:.5:10];
Nf=length(omega);
array=zeros(1,1,length(omega),length(E));
s=zeros(length(omega),length(E));

for j=1:Nf
   omega1=omega(j);
   sim('GenerateDescribingFunction');
   DF = (DFreal+sqrt(-1)*DFimag);
   s(j,:)=DF;
   array(1,1,j,:)=DF;
end

% Now plot the describing function:
   % Amplitude
figure(1)
surf(E,omega,abs(s));  shading interp
ylabel('Frequency (rad/sec)'); xlabel('Amplitude'); zlabel('Describing Function Gain')
title('Describing Function Amplitude vs. Frequency and Amplitude of Input')
   % Phase
figure(2)
surf(E,omega,angle(s));  shading interp
ylabel('Frequency (rad/sec)'); xlabel('Amplitude'); zlabel('Describing Function Phase')
title('Describing Function Phase vs. Frequency and Amplitude of Input')
```

Figure 2. *Correct m-code for the script GetDF that generates the describing function from the Simulink model of Fig. 1.*

The Magazine *welcomes letters for publication in the Feedback department. Contributions should be of general interest to the control systems community. All letters should be sent to the editor-in-chief, preferably by e-mail.*