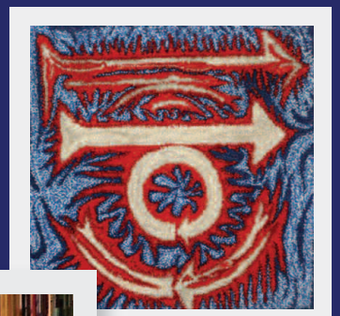
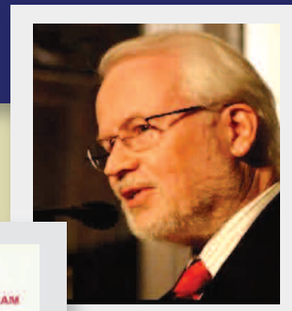
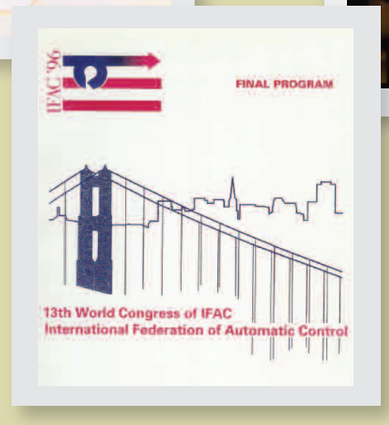







American Automatic Control Council

http://a2c2.org/

The American Automatic Control Council

AACC History and Collaboration with IFAC

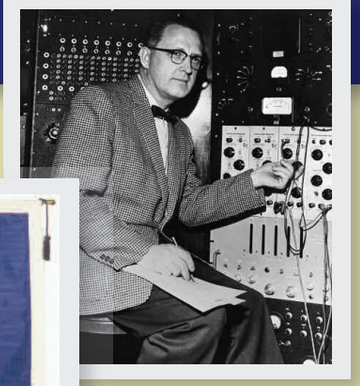
1957–2011

# The American Automatic Control Council

## *AACC History and Collaboration with IFAC*

**1957 - 2011**





IFAC

AACC

# The American Automatic Control Council 1957-2011

*AACC History and Collaboration with IFAC*

## ACKNOWLEDGEMENTS

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## American Control Conferences—Recent Venues

*2009 St. Louis*

*2010 Baltimore*

# Foreword

The second half of the twentieth century saw the emergence and rapid ascent of a new discipline, automatic control, which attracted many bright and creative minds to its ranks, with ensuing theoretical developments and major industrial applications—a trend that continues today. Along with this new wave came the emergence of organizations, national as well as international, that would promote collaborations and help dissemination of new knowledge across traditional engineering disciplines and beyond national boundaries through technical meetings (of all sizes) and technical publications accessible to all. The key such organization in the United States (US) was the American Automatic Control Council (AACC), founded in 1957. Fifty-four years later, today, AACC is an association of the control systems divisions of eight member societies, with the constituent institutes being AIAA (the American Institute of Aeronautics and Astronautics), AIChE (the American Institute of Chemical Engineers), ASCE (the American Society of Civil Engineers), ASME (the American Society of Mechanical Engineers), IEEE (the Institute of Electrical and Electronics Engineers), ISA (the International Society of Automation), SCS (the Society for Computer Simulation), and SIAM (the Society for Industrial and Applied Mathematics). Back in 1957, four of these current member societies constituted the first board of the AACC—AIChE, ASME, IEEE, and ISA (then called the Instrument Society of America), with IEEE (the name did not exist at the time) actually represented by AIEE (the American Institute of Electrical Engineers) and IRE (the Institute of Radio Engineers), making the total number of board members five (AIEE and IRE merged and created the IEEE in 1963).

Parallel to the founding of the AACC in the United States was an undertaking on an international scale: the creation of the International Federation of Automatic Control (IFAC), which was driven by the need to connect the control scientists, engineers, and educators across different countries through technical meetings and publications. AACC actually played a leading role in the founding of IFAC, whose

first president was from the US, Harold Chestnut. The US had two other IFAC presidents in later years: John Lozier (1972-1975) and Stephen Kahne (1993-1996), during whose presidencies the two US IFAC Congresses were held (the 6th Congress, in 1975, in Boston/Cambridge; and the 13th Congress, in 1996, in San Francisco).

Since it was founded fifty-four years ago, AACC has played an important role in the evolution and nurturing of the field of automatic control in the United States, while also being a major contributor to activities in systems and control worldwide through its membership in IFAC as well as through its incessantly growing and expanding annual conference, American Control Conference (ACC), which enjoys significant international participation. This publication is a record of the fifty-four years of history of AACC, focusing primarily on the relationships with IFAC and parallel developments. The historical account of AACC comprises the main core text of the booklet, which is enriched by inserts providing details on some of the important developments and on biographical sketches of leaders from the US who have been instrumental in shaping these developments within AACC as well as IFAC. The material in the core text is further supplemented with several appendices listing the current officers and directors of AACC, all the past officers of AACC, recipients of AACC awards, recipients from the US of various IFAC awards and recognitions, IFAC events held in the US, and people from the US who have taken on pivotal positions and responsibilities within IFAC.

This booklet was put together by a sub-committee of AACC, comprised of Steve Kahne (14th President of IFAC), as chair; Mike Masten (a former IFAC Vice-President and Council member); Abe Haddad (a current IFAC Council member); Frank Doyle (a member of the 2011-2014 IFAC Technical Board); and myself (a member of the 2011-2014 IFAC Council). Several other colleagues and friends, listed and acknowledged elsewhere in the booklet, have provided numerous information items, have shared with us various historical facts, and have helped with checking of the facts. Coincident with the occurrence of the 18th IFAC Congress, in Milan, Italy, we hope that the publication of this booklet will serve not only to have the fifty-four year history of AACC with its people and events under one cover, but also to provide a pathway for future leaders of IFAC and AACC to continue the tradition of close collaboration and cooperation.

Tamer Başar
President, AACC 2010-2011
August 2011

*Frank Doyle (l) and Tamer Başar (r)*

# The 1950s and the Earlier Years

Prior to World War II, control activity in the United States was mostly in the design of electronic feedback amplifiers and in chemical process control where the PID controller was the king. During the war, these technologies were merged and vastly expanded to meet the needs of military systems of all types. These included control of aircraft, bombsights, radar, artillery pieces on land, long range guns on ships, and torpedoes. This set the groundwork for a comprehensive theory of servomechanisms based on sophisticated mathematics and implementation using vacuum tube-based electronics. A major center of this early work was at MIT in the Radiation Laboratory. After the war, the results were reported in the twenty-seven volume Radiation Laboratory Series published by McGraw Hill. Volume 25 of that series, published in 1947, is entitled Theory of Servomechanisms by H. M. James, a Purdue physicist, N. B. Nichols, a process control engineer from the Taylor Instruments Company, and R. S Phillips, a University of Southern California mathematician.

Very few engineers had PhDs in what we would now think of as control science. Much engineering work was done by classically trained physicists and a small fraction of the work was devoted to atomic weapon development. In the United States, much of the control engineering work took place at a few institutions including General Electric, Hughes Aircraft, Bell Labs, Minneapolis Honeywell, MIT, Los Alamos, UCLA, Columbia, Westinghouse, and Leeds and Northrup. The war effort had prevented wide spread communication of technical advances although there were a few examples of small groups of contributors, particularly in the US and England who were in close touch about military technologies based on control ideas. There was almost no public communication of advances in control in academic institutions, few journals and conferences, and very little international sharing of scientific ideas. Little of the foreign literature was translated into English, which also contributed to the isolation of ideas in the world.



A few textbooks that contained basic control science concepts appeared prior to 1950 and it was in part through these few books in English, or translated into English, that an international community began to understand the potential for control to emerge as a separate field of coherent scientific study. These included English language books by MacColl, Eckman, Lauer et al, James, Nichols & Phillips mentioned above, and Brown & Campbell. In early 1951 what became the most influential of the early works was the textbook authored by General Electric Company engineers Harold Chestnut and Robert Mayer, Servomechanisms and Regulating System Design. By 1957 it had appeared in seven printings and had become a standard for engineering academic programs and was in wide use in the burgeoning control field in industry in the English speaking world. This book was in what became the traditional style of the academic textbook in control with a strong pedantic approach including numerous homework problems in each chapter. Many of the other existing books were either summaries of war-time developments, or focused on specific application areas in engineering.

*Harold Chestnut*

Largely due to the popularity of his book outside the US, Harold Chestnut was one of the best known American control engineers during the 1950s. Rufus Oldenburger of Purdue University was also a well-known US control figure at that time and in fact had the initial germ of an idea about what later became the International Federation of Automatic Control (IFAC). His role in the initial Heidelberg meeting in 1956 was instrumental in the founding of IFAC. However, his other obligations did not permit him to take on a leadership role in the new IFAC and he suggested to his international colleagues that Chestnut would be a good candidate. The Chestnut book had made him a well-known name among this organizing group. When the time came for IFAC to be created, Chestnut was therefore selected to be the first President of IFAC. In order to accommodate an international balance across the Iron Curtain, the Russian Aleksander Letov was selected as the Second IFAC President and he would preside over the first IFAC World Congress to be held

*Rufus Oldenburger (l), Aleksander Letov (c), and Harold Chestnut (r) ca1960*

Rufus Oldenburger received his BA in classics, and MS and PhD in mathematics from the University of Chicago. After teaching for two years at Case Institute of Technology in Cleveland, Ohio, he moved to Illinois Institute of Technology in Chicago, where he stayed as Professor of Mathematics from 1934 to 1948. In 1942 he joined Woodward Governor Company in Rockford, Illinois, and stayed there until 1956 as its chief mathematician and director of research. In 1956 he was appointed Professor of Engineering Science and Mechanical Engineering at Purdue University, Indiana, followed by Professor of Electrical and Mechanical Engineering and then founder and Director of Purdue's Automatic Control Center. He was instrumental in the founding of IFAC and served as the first President of the AACC. He died in 1969.



in Moscow in 1960. IFAC presidencies change only at IFAC General Assembly meetings. The first of these was held in Paris in 1957 where Chestnut was elected. The second IFAC General Assembly was held in Chicago in 1959 when Chestnut's term ended and Alexander Letov was elected President and went on to host the first IFAC Congress in 1960 in Moscow. Although many of them were unknown in the West at that time, the Russians had been making important mathematical contributions to control theory for decades particularly from the 1930s at the Steklov Mathematical Institute led by Pontryagin and the USSR Academy of Sciences Institute for Control Problems in Moscow. IFAC would eventually be the vehicle for communicating many of these world wide.

# Founding of AACC

One of the founding principles of IFAC was that there would be a single National Member Organization (NMO) from each member country which would be the formal member of IFAC. These NMOs had to reflect the interests of control engineers across all disciplines in that country. Although several professional societies were involved in control activities, there was no single organization in the US devoted to control across all engineering disciplines. As a result, during these earliest days such a US NMO was created and called the American Automatic Control Council (AACC), with Rufus Oldenburger as its first President. The initial AACC consisted of Officers and Directors with each Director representing one of the founding engineering professional societies in the US: American Society of Mechanical Engineers (ASME), American Institute of Electrical Engineers (AIEE), Institute of Radio Engineers (IRE), Instrument Society of America (ISA), and American Institute of Chemical Engineers (AIChE). There was some discussion of including a Canadian engineering society (and using the name North American Control Council) but that did not materialize. The first organizational meeting occurred on March 16, 1957 in Chicago. This was about one month before the critical Provisional Committee meeting for the formation of IFAC so when Oldenburger attended that meeting he was representing the putative NMO from the United States. Thus the formation of IFAC hastened the formation of the American Automatic Control Council. Several other countries which were also likely founding members of IFAC had no such national control organization and set about creating them. By the end of 1957 the only members of IFAC were Austria, Czechoslovakia, Denmark, Hungary, Italy, Poland, the USSR, and the United States of America. Eleven additional members joined in 1958 and by the time of the Moscow Congress there were 25 NMOs in IFAC. Today there are 50.



## The First AACC Directors

When the American Automatic Control Council was first formed in 1957, it consisted of the following members:

American Institute of Electrical Engineers
- Harold Chestnut, delegate
- Gerhart Heumann, alternate

American Society of Mechanical Engineers
- Rufus Oldenburger, delegate
- William E. Vannah, alternate

Institute of Radio Engineers
- John C. Lozier, delegate
- Eugene Grabbe, alternate

Instrument Society of America
- Robert Jeffries, delegate
- John Johnson, Jr., alternate

American Institute of Chemical Engineers
- Joel O. Hougen, delegate
- Norman H. Ceaglske, alternate

Officers were elected and are listed in the Appendix.

# Early AACC Leadership and Activities

To start the AACC it was necessary to create a leadership cadre, draft governance documents, initiate activities consistent with the purpose of the organization, create a secretariat, and facilitate interactions with IFAC. The first major decision was that members would be American professional societies in the control field. There was concern that if individuals were to be AACC members, that would compete with existing professional societies for membership. It was quickly decided to create an annual technical conference, establish the working relationship with the American engineering societies that constituted the AACC, develop a financial model for operation, and determine how to bring in major contributors to the control profession in the US to play leading roles in AACC activities. It was also determined that two levels of membership would be authorized. Sponsor Members were entitled to have representation on the AACC itself and to be the sponsor of technical meetings taking financial responsibility and managing all aspects of the meeting. There was also defined a Participating Member which was entitled to attend and participate in Council discussions, but had no vote and was not entitled to be the host of AACC technical meetings.

AACC would be financially supported by annual dues from all member societies. All expenditures exceeding $25 required written authorization by the President. Still one other feature of the first constitution of AACC was the need to create a program committee to mimic an IFAC equivalent. In these early days, submission of papers to the first IFAC Congress needed to be formally certified by AACC and become a “US submission” to fit within a “US quota” of papers for the Moscow Congress. This was a short lived feature of IFAC, which today seems very strange indeed. It was one of several accommodations needed to create an INTERNATIONAL Federation of Automatic Control acceptable to countries on both sides of the Iron Curtain. At least, the official IFAC language was English, which made interaction easier for the Americans than some of our foreign colleagues. The fact that so many of our foreign friends were at least somewhat fluent in English emphasized the importance of multi-lingual dictionaries and glossaries. There was emphasis on terminology and standards in the early days of AACC and IFAC. Even as late as 1975, when the IFAC Congress was held in Cambridge, there was a discussion about simultaneous translation, and a decision to finally stop that practice which had persisted in one form or another up to that time.

The early model for an annual national control conference under the auspices of the AACC was that the sponsoring member societies would take turns as the meeting host and take full financial responsibility for the event. AACC was to coordinate the dates and locations of the meetings. The first of these technical meetings, which were called Joint Automatic Control Conferences, was held in 1959 in Dallas. Prior to this first “formal” conference (JACC) the technical activities of AACC were devoted to preparing for and participating in the first IFAC Congress in Moscow in 1960. In those days there were major Congress paper reviewing responsibilities for each NMO. This required extensive effort for the fledgling IFAC and its NMOs. In the middle of the Cold War, there were national quotas to be negotiated. Complex communication and travel plans had to be folowed in order to satisfy Soviet Congress rules. In those days all Soviet control engineers involved with IFAC had a single mailing address in Moscow; personal exchanges were prohibited and all contacts were tightly monitored. There are interesting accounts of the successes of the 1960 IFAC World Congress in Moscow and local efforts in the US to ensure that American papers were reviewed and presented there. The key Americans involved with putting all this together were Rufus Oldenburger (then AACC President), Hal Chestnut (initial IFAC President until 1958), and Jack Lozier (second AACC President and an IFAC President from 1972 to 1975). The congress organizers determined that the only American citizens who would be allowed to come to Moscow were those whose papers were accepted for the Congress. Thus the paper review process had this added constraint as well—an American not welcome in the Soviet Union at that time would not have a paper accepted! The following is a partial list of people in the American delegation to Moscow in 1960:

Bellman, Kalaba, Kalman, Jury, Merriam, Aseltine, Tou, Gibson, Bass, Reswick, Axelby, Higgins, Kranc, Van Valkenburg, Bertram, Sarachik, Kirchmayer, Mesarovic, Cohn, Stout, Friedland, Kochenberger, Nichols, Zeigler, Widrow, Oldenburger, Chestnut, Lozier, Kokotović, and Draper. It is hard to imagine the effort that was expended by the AACC team to organize the American contribution to the IFAC Congress in Moscow.

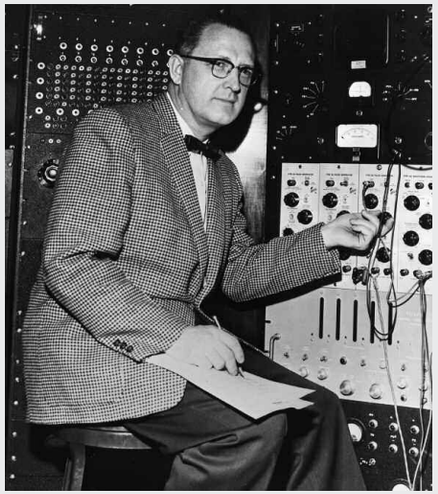
*Opening ceremony, First IFAC Congress, Moscow 1960. A.N. Kosygin (First Deputy Prime Minister of the U.S.S.R.), unknown, Oldenburger, Broïda, Ruppel.*



# The Early Decades

During the first decade of its existence, there were two major challenges for the new AACC. One was support of and participation in activities of IFAC. The other was nurturing the JACC series. As noted earlier, the JACCs were being organized by one member society at a time, with the current host being responsible for all aspects of its JACC. Since there was no track record for these meetings, each organizing committee had to start from the beginning. There was no history, no good record of how previous JACCs were operated, no common volunteer staff continuing beyond their own JACC, little experience with conference accounting, dealing with various university administrations for facility use, etc. An early decision of the AACC was to encourage the organizers of the JACCs to host the conference in a university setting in order to keep conference expenses low for the "poorly paid faculty and student" attendees. This, in retrospect, was remarkable since the AACC presidency, with the sole exception of its first President was occupied by one industry leader after another. In fact, in its first two decades, all AACC presidents were from non-academic organizations including Bell Labs, General Electric, Lincoln Labs, Monsanto, Minneapolis-Honeywell, IBM, Aerospace Corporation, Leeds & Northrup and the United States Air Force. After 1980 there was a 3:1 ratio between academia and industry among the Presidents, each serving a two year term. The JACCs occurred prior to 1980 and all but one of the Presidents in that period were industry leaders (one switched from industry to academia during this period) and all the conferences occurred on college campuses. After 1980 all but four of the AACC Presidents were academic leaders and almost all the conferences (now called ACCs) took place in conference hotels around the country.

At the same time the US continued to play a leading role in IFAC. In 1962, a few years after Chestnut's term as the first IFAC President, the US and IFAC suffered a tragic loss when Donald Eckman, a leading systems engineering professor at Case Institute of Technology, was killed in an automobile accident in Europe while travelling to an IFAC Council meeting in Cambridge, UK. At that time Eckman was



## Donald Eckman

Donald P. Eckman was educated at the University of Michigan (BS, MS) and Cornell University (PhD) in Mechanical Engineering. He was a man of many interests: science, engineering, pedagogy, technical writing, consulting, music, sports cars, inventions, and process control. After 11 years in industry and doctoral studies he went to Case Institute of Technology in Cleveland in 1950 and assembled a research team to study computer control of complex industrial processes. By 1958 he had authored three books, Principles of Industrial Process Control , Industrial Instrumentation, and Automatic Process Control which were important in bringing servomechanisms and process control ideas together as the basis for improving automation systems in the manufacturing and processing industries. Eckman created a university-based, industrially funded research program at Case in "concepts, techniques, and methodology for real-time computer applications in industry" at the same time that explosive growth was occurring in analog and digital computer technology. He was elected Chairman of the IFAC Advisory Committee at the time of the Moscow Congress, which today is equivalent to Vice President and Chairman of the IFAC Technical Board. In 1962, on his way to a meeting of the IFAC Executive Council (today's Council) in Cambridge, he was killed in an automobile accident on the European continent. AACC named an annual award for an outstanding young contributor in the control field after him soon after his death.



chairman of what we now know as the Technical Board (then Advisory Committee) of IFAC. John Lozier, an engineering manager at Bell Labs, was Past President of the AACC, an IFAC Executive Council member and would continue on to be the key US participant in the senior leadership of IFAC until his term as IFAC President from 1972 to 1975 when the IFAC held its 6th Congress, this time at MIT. The tradition of holding the IFAC Congress in the home country of its President has remained a consistent practice from the founding of IFAC until the present time. Since the IFAC constitution calls for only one member of the Council from any given country, there have been relatively few Americans who have served on the IFAC Council. In particular these have been Hal Chestnut, Jack Lozier, Bill Miller, Steve Kahne, Mike Masten, and Abe Haddad. More about these gentlemen as the story unfolds.

In the early 1960s Harold Chestnut made a proposal to change the name of AACC to AFACS, the American Federation of Automatic Control Societies. His reasoning included that: a) the emerging organization was really more of a "federation" than a "council," b) the word "federation" was by then well established in IFAC and might more readily convey the idea that the AACC was a member of IFAC, and c) the IFIP (International Federation of Information Processing) and AFIPS (American Federation of Information Processing Societies) pairing already existed and AACC/IFAC was similar organizationally. In any event, this proposal was not adopted and the name AACC has persisted up to this day.

# AACC's Technical Meetings

The JACCs experienced some difficulties as their sponsorship rotated among the AACC members. Not all member societies chose to serve as hosts and it was always a topic of discussion about who was next up as host. The meeting had to be planned several years in advance so these discussions pertained to meetings several years out. There was no AACC Newsletter in the early decades so occasional notes in the various society journals and special mailings were the only early warnings of JACC dates. Since Chestnut's IFAC Presidency did not include an IFAC Congress, very early in AACC's history there was discussion of when, if, and how an IFAC Congress would be held in the US. As is usual with Congress planning in IFAC there are informal discussions among national leaders in the control field from IFAC members (countries) who have an interest in possibly hosting the Congress. These discussions started about one decade before the proposed Congress because the IFAC leadership hierarchy is a fundamental part of any Congress proposal. It is interesting to note that the selection of the site for holding an IFAC Congress has always been a competitive process among several IFAC member countries. The more IFAC matured the more competitive it has gotten.

In the mid-1960s John Lozier, had achieved senior status in the IFAC hierarchy as a member of the IFAC Executive Council and the way was paved for AACC to host the 1975 IFAC World Congress. In 1968 a provisional committee for IFAC'75 was established within the AACC. Because AACC itself had no experience organizing large technical meetings—recall that it was the member societies of AACC that hosted successive JACCs—a member society sponsor was needed for the Congress. The Instrument Society of America, one of the founding members of the AACC agreed to sponsor, on behalf of the AACC, the 6th IFAC World Congress to be held at MIT and Harvard in Cambridge, Massachusetts. The Chairman of the National Organizing Committee (NOC) was Nathan Cohn, Executive Vice President of Leeds and Northrup, a major instrument company in the US, and friend of a number of the former AACC officers, all of whom had industrial backgrounds as noted earlier. With his industrial contacts Nathan Cohn was an ideal candidate for this task. The NOC consisted of control engineers from industry, and local arrangements were handled by Larry Ho, Mike Athans, and George Newton from Harvard and MIT.

*Nathan Cohn*

The JACC series of annual meetings began by reflecting a reasonable balance between theoretical and practice-oriented contributions in the 1960s and early 1970s. Although it is only speculation, this balance may have partly been realized by the strong presence of industry based AACC leaders during the early years of the meeting series. Because of the early agreements among the member societies of AACC, the JACCs tended to be the most important control engineering meetings in the US each year. Member societies had agreed not to hold independent control

## John Lozier

John C. "Jack" Lozier was educated at Columbia University (A.B.) and Princeton University. His career was based at Bell Telephone Laboratory in both engineering and engineering management. He worked on control aspects of weapons system design during WW II and telecommunications. After the war he supported the Shockley transistor development group by designing precise temperature control systems for crystal growing and zone refining processes. He led a group that worked on real-time digital system technology for the TELSTAR radar tracking system in the US and France and received several patents for his work. He was the second President of the AACC, a past President of the predecessor to the IEEE Control Systems Society, and played a leading role in the creation and maturation of IFAC, later to become the seventh IFAC President. Lozier was a Fellow of the IEEE, received the French "Chevalier de la Legion d'Honneur" in 1962 for his TELSTAR work, and the AACC Richard E. Bellman Control Heritage Award in 1987. He died in 1994.

meetings that could compete with the JACCs. Attendance and interest from foreign authors was modest and growing but the original idea of having the JACC being the only control meeting of the member societies was rather quickly becoming untenable. In many of the member societies, sessions on control engineering were often present in larger scope conferences. Over time the planned exclusivity of the JACC caused all sorts of havoc for the member societies. Problems of date conflicts with other meetings, including IFAC conferences in the US were common. Although there was a planning function for JACCs envisioned in the Bylaws of AACC, and guidelines were developed, rotating responsibility every year among the sponsoring members of AACC led to problems that were not to be rectified until the early 1980s. The JACCs suffered from lack of continuity among organizing teams and a growing unhappiness with university style "hotel" rooms in often remote locations. There was a growing sense that the "national American control meeting of the year" should be a bit more elegant, more centrally organized in a consistent style, and less of a burden to single societies each year. It should be more poised for growth, and more recognizable as a continuing annual event with a consistent image, more stable attendance, ever higher quality papers, and presentation in professional surroundings. In the midst of all of this the AACC prepared to host the 6th IFAC World Congress in 1975 in Cambridge. There was no JACC held that year.

Thus during the mid-1970s the focus of AACC was on the organization of the IFAC Congress and the following JACCs in succeeding years which were still plagued by the difficulties mentioned above. JACC attendance was not strong, and even with a substantial JACC Operating Manual in existence, the whole process of having an annual meeting was neither smooth nor financially stable. Occasionally one of the annual sponsors would simply not follow the agreed upon rules about meeting dates or other details that deviated from that society's standard operating procedures for their other meetings. John Zaborszky, a Professor at Washington University in St. Louis was moving toward the AACC Presidency and committed himself to resolve this long standing problem with the JACC around the time of his two-year AACC Presidential term in 1980-1981. For several years prior to the emergence of the American Control Conference, JACC attendee surveys were taken and analyzed, old ideas about rotational hosting, inconsistent image and conflicts were



## John Zaborszky

John Zaborszky received both the Diploma of Engineering in 1937 and the D.Sc. degree, with special honors, in 1943 from the Royal Hungarian Technological University, Budapest.

After coming to the U.S. in 1947 he spent most of his professional career at Washington University in St. Louis where he founded and chaired the Department of Systems Science and Mathematics. After retiring, he continued to contribute to the School as a senior professor. He was an active industry consultant and authored two books and over 200 technical papers.

Dr. Zaborszky was instrumental in the formation of the Control Systems Society as one of the first three IEEE Societies and was President of it in 1970. He was President of the AACC from 1980 to 1981, and played a leading role in the JACC/ACC transition. He was a Fellow of IEEE, a member of the U.S. National Academy of Engineering, an Honorary (foreign) Member of the Hungarian Academy of Science, and won numerous other awards for his technical accomplishments. John Zaborszky died in 2008.

removed from new operating principles. One of the key principles of the new annual meeting, the American Control Conference (ACC), was that there was to be an AACC standing committee for the ACCs with rolling membership including individuals who were involved in organizing contiguous ACCs. Another fundamental principle was that the AACC itself would have financial responsibility for all ACCs and that the surplus from each ACC was to be used for AACC expenses plus a distribution by formula back to member societies. The formula included weightings that benefitted member societies according to the number of ACC papers accepted and number of attendees from each society. So it was that in 1982 the first ACC was held in Arlington, Virginia, a suburb of Washington, DC. The IEEE accepted permanent responsibility for the distribution of post conference ACC pro-

ceedings, an arrangement that has evolved over time but in various forms has continued to this day and has been an important source of income to the AACC and its member societies.

In the 1970s the process control industries, a major sector for automation, were not benefitting from rapid advances in control and computer technology. This led the ACC to plan and execute a national industry wide study of automation with the potential for near-term implementation. A subcommittee of AACC was established called the Automation Research Council which was designed to manage research funding to determine research needed to make qualitative improvements in automation in US industry.

*AACC reception for IFAC officials, Budapest 1984*



# Automation Research Council

Control theory was growing in importance and suggesting new practical implementations in the 1960s. New computing devices were being created that enabled some applications of this theory. These early applications of automatic control were severely hindered by the practice of studying individual control devices, without consideration for the interactions that might occur across the hundreds of devices in a typical industrial system. This “reductionist” decomposition was engrained in the corporate culture as separate teams of engineers would work in isolation on individual units, despite the strong interactions that were known to exist in an overall process.

*Ted Williams*

The rapid advances with process automation in the industries of US and Japan raised concerns about the effects of such automation on the workforce, employment, working conditions, as well as industrial profitability and product quality. The AACC, then headed by the leadership team of Duane McRuer, Nathanial Nichols, William Vannah, and Joseph Shapiro, all control specialists from various US corporations, were encouraged by Ted Williams to take a broader look at the emerging field of automation and its potential impact on US industry and US society. Williams had been at Monsanto but by then was a Professor at Purdue University. To address the challenges of interacting complex unit operations in industrial processes, Ted Williams and his colleagues developed mathematical models of these complex units. The models enabled the detailed study of control strategies that could systematically address the interactions, thus employing a “systems engineering” approach.

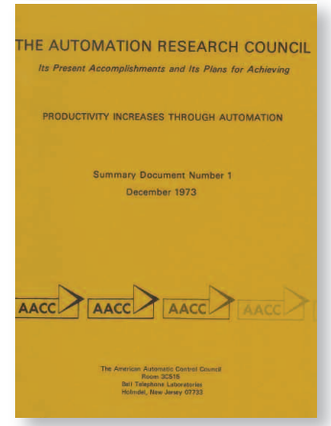
This was the era in which national industrial policy was discussed in the United States, a subject that went out of favor later in the 20th century in this country. The AACC initiated a study of the broad implications of automation in the US including societal and economic impacts. With incremental funding in the mid-1970s from the US National Science Foundation, AACC created the Automation Research Council (ARC) which was established as a new standing committee of AACC. It proposed to organize a series of workshops and summarize conclusions in reports dealing with automation issues in various US industrial sectors. The sectors were chosen in which automation was of fundamental importance to product quality and cost effective manufacturing. Even at that time, it was clear that the focus would be on improvements in system design and system engineering. Workshops and focus groups were conducted in such areas as manufacturing architecture, CAD/CAM, man-machine interface systems, health services, and discrete manufacturing. Most participants in these workshops were from industry, but the intention was to identify research that could be performed in academia as well.

The Automation Research Council existed for approximately 4 years, and was closely associated with the Instrument Society of America (ISA). It did, in fact, conduct the workshops and developed what we would call today white papers on significant research needs of interest to the US industry. Industrial participation was strong with representatives from tens of major US corporations. A number of research universities in the country also participated. The companies included Chrysler, Foxboro, Ford, IBM, United Rubber Works, Taylor Instruments, Bethlehem Steel, Systems Technology, Cincinnati Milicron, Western Electric, General Motors, Perkin-Elmer, Whirlpool, Honeywell, McDonnel Douglas, among others. In addition, the US Departments of Labor and State, several labor unions, and key universities were also involved in the workshops and resulting reports. Professor Williams worked under a contract between the AACC and Purdue University as the multi-year Director of the ARC.

The ARC was to be the only contract work undertaken by the AACC in all of its 50 year history and in fact marked the beginning of transition from industrial leadership of AACC to academic leadership.



There were additional attempts to obtain federal support for research planning studies but the AACC was not a particularly good vehicle for obtaining such support. Even in those days the federal government was not enthusiastic to fund industrial groups or even industrial/academic consortia since the National Science Foundation was a research funding agency rather than a research planning funding agency. Many of the individuals in AACC who were working in universities had individual research grants from the NSF, but these were not related to AACC activities.




After the transition from the JACC to the ACC in the early 1980s, AACC leadership was drawn more from academia than industry. In the United States there tended to be less support for professional society activities from American industry; academia moved into the void thus created. Unfortunately this characteristic has persisted into the 21st century. It can be argued that this shift reflected more emphasis by US companies on short term planning and growing emphasis on short term goals driven in part by financial market pressures and globalization. However, the research community in the control field responded well to the new style of the ACCs and the conference, although somewhat more research oriented than may be wished by the development and manufacturing communities, has thrived for several decades up to now.

# AACC/IFAC Foundation Building

As noted, Jack Lozier's leadership within IFAC occurred from the late 1960s through his Presidency from 1972 to 1975. In mid 1960s IFAC had a few technical committees, including Theory, Applications, Education, and Terminology. In addition, each of these committees had many subcommittees on various contemporary topics. It became obvious to Lozier that IFAC's growth depended on the success of such committees and their expansion and leadership. It is hard from today's perspective to realize in those days how important terminology and standards were to this fledgling professional field of control and systems. Rather than continue to try to force all control technical interests into so few committees with numerous subgroupings (task forces, subcommittees, working groups), it was useful to convert many of the subgroups into technical committees in their own right. By the end of his presidency there were between 15 and 20 IFAC Technical Committees. The presence of so many TCs in IFAC influenced the AACC as well, and the number of AACC technical committees also expanded. In part, this expansion introduced many more middle level international technical leadership openings for Americans and, of course, for all the other IFAC member states.

Following Lozier's service on the IFAC Council and as IFAC President, William Miller, an American technical marketing executive for General Electric's steel mill automation department took on the senior leadership role from the United States within IFAC. He had extensive industrial contacts in many IFAC countries and by virtue of all this experience was well informed and well recognized within the IFAC countries. He had served as chairman of several IFAC committees including as Chairman of the powerful IFAC Advisory Committee (later to become the IFAC Technical Board) and eventually as an IFAC Vice President. By the early 1980s the other American who was taking a leading role in the US-IFAC relationship was Professor Stephen Kahne. Kahne already had more than a decade of IFAC experience in committee leadership roles and in publications including creation and leadership of the IFAC Publications Managing Board (PUMB), a joint publications venture between IFAC and Pergamon Press (and after mergers, Elsevier Science, Ltd.). He was in line to be President of the IEEE Control Systems Society in 1981 and thus a Director of the AACC at that time.

Americans had always been part of the IFAC family since the beginning, and as the Federation matured they realized that certain symbolic traditions were valuable for a stable and growing organization. It was Nat Cohn, IFAC'75 NOC Chairman, who developed the idea of creating an original banner to symbolize each IFAC Congress. The collection of these would be prominently displayed at each Congress venue. Of course at the time of IFAC75 there was not a collection for previous Congresses. Cohn and his colleagues from AACC designed and produced one banner for each of the previous five Congresses as well as one for IFAC75 (See

### Stephen Kahne

Stephen Kahne was educated at Cornell University (BEE) and the University of Illinois (MS, PhD). Much of his professional career was as a professor and administrator at the University of Minnesota, Case Western Reserve University, Polytechnic Institute of New York, Oregon Graduate Center, and Embry-Riddle Aeronautical University. He was also a Director of InterDesign, an environmental design firm in Minneapolis, Division Director at the National Science Foundation, and Group Chief Scientist at the MITRE Corporation, all in the United States. He was President of the IEEE Control Systems Society, Vice President for Technical Activities of the IEEE, and President of IFAC and is a Fellow of the IEEE, AAAS, and IFAC. He has been a leader in technical publications in the control field including serving as Editor-in-Chief of the IEEE Transactions on Automatic Control, member and Chair of the IFAC Publications Managing Board, member of numerous journal Editorial Boards, and a founder of IFAC Papers-On-Line. An extensive biography of Dr. Kahne appears in the June 2010 issue of the IEEE Control Systems Magazine.

front cover). That tradition has continued to this day. The tradition, started by the AACC in 1975, is for each upcoming Congress NOC to create its own banner (all the same overall size with an image appropriate for the Congress venue) and unveil it at the Closing Ceremony of the previous Congress. The complete collection of banners, growing by one each triennium, appears at each Congress site as part of ceremonial displays. At the IFAC Congress in Seoul, South Korea in 2008, the Korean NMO distributed a booklet "Book of Banners" that shows the entire collection of 17 banners up to that time.

Just before IFAC'75, another AACC contribution was introduced into IFAC traditions when Irena Kahne, artist wife of Stephen Kahne, created and donated to IFAC an artistic tapestry displaying the IFAC logo. This became the official IFAC Presidential tapestry. It is presented by the outgoing to the incoming IFAC President as part of the transfer of office ceremony at the closing session of each Congress. It remains in the office or home of the current President for three years until passed on to the next President during the next Congress. Other symbolic objects have been created by other NMOs and are now part of IFAC's continuing traditions.


*IFAC Presidential Tapestry*

Once the 1975 Congress was behind them, AACC took on two pressing problems. One of these was the transition from JACC to ACC and the second was a new and stable structure for the AACC Secretariat. Following one-man operations for the first 20 or so years of AACC existence, the AACC Secretariat had briefly been housed at the Instrument Society of America (ISA) headquarters. The institutionalized secretariat operation at the ISA could not keep up with the growing load of responsibilities. Numerous IFAC related correspondence was being overlooked and the AACC/IFAC relationship was becoming somewhat strained. The volunteer AACC Secretary in the early 1980s was Marion (Bud) Keyes from the Bailey Controls Company. Keyes was promoted to President and General Manager of Bailey and did not have time to continue as AACC Secretary. Bill Miller was approaching retirement at General Electric, had extensive knowledge of IFAC and of AACC, and was prepared to take on the AACC Secretariat function. His appointment as AACC Secretary, which would turn out to be nine years long, set the stage for AACC to see success for its Newsletter, its new annual conference, its finances, and the gradual modernization into computerized secretarial operations. While AACC needed to continually update its data processing technology, there was also a need to try to remain compatible with the IFAC Secretariat as it also was modernizing its office operations. There were frequent debates about Mac vs. PC office computer setups between IFAC's Laxenburg staff and the new AACC office run by Bill Miller. Teletype machines were being replaced by facsimile technology. Electronic records were being created in various incompatible formats and these were changing at different speeds around the world. Miller had developed some expertise in this new office automation and became a principal advisor to the IFAC Secretariat on these matters. He was an advocate of the Mac style of office automation. There were some differences between the American approach and the European approach, but it was all very friendly.

# Americans in IFAC Publications

From the beginning of the AACC it was realized that communication of technical developments should lie at the heart of any professional society in the control field. Although there was occasional discussion of some sort of AACC technical publication, it became clear that member societies' journals, some of which had been in existence for decades before 1960, would form the basis of the American scientific journal output in the control field. Thus the IRE Transactions on Automatic Control, the AIEE Transactions, the ASME Journal of Dynamics and Control, the American Institute of Chemical Engineers (AIChE) Journal, Chemical Engineering Progress (CEP), and the Instrument Society of America (ISA) Transactions continued or merged to create a strong American control journal presence in the late 1960s. AACC would stay with its JACC (and later ACC) Proceedings as its sole publishing work.

In the UK, Pergamon Press had started a control journal in 1963—AUTOMATICA. This was a commercial control journal originally initiated by Robert Maxwell, owner and publisher of Pergamon Press. AUTOMATICA was only modestly successful in the 1960s with an honorary editorial board, many of whose members were part of the IFAC founding community. Maxwell was a flamboyant figure in the global publishing scene; a Member of the British Parliament, owner of a British football team, and publisher of a major London newspaper. He was eager to enhance the international prestige of his company Pergamon Press. Creation of international scientific journals was one of his ideas for achieving this. One of the AUTOMATICA Editorial Board members was Professor John Coales, the third President of IFAC. Hal Chestnut was Chairman of the AUTOMATICA Board.

At the same time, IFAC, still in its first decade of existence, was giving serious consideration to creating its own scientific journal. So, Maxwell had his rather weak journal and IFAC was thinking about starting an IFAC Journal. IFAC's financial situation in those days was rather precarious since its main money making ventures were actually sponsored by its national members, which assumed financial responsibility and reaped any surplus from the Congress or other technical meetings. Maxwell, Coales, and Chestnut formed a plan to have AUTOMATICA become the official IFAC journal, with Pergamon providing the journal vehicle and a decade of financial underwriting and IFAC providing the technical content. The only thing remaining was to determine who should be the Editor (now called Editor-in-Chief). At that time George Axelby was recognized throughout the world as the premier editor of control engineering technical publications, having created and led for 14 years, the IEEE Transactions on Automatic Control. The deal breaker for Maxwell was that his contribution to the project—AUTOMATICA and financial support—was contingent on naming Axelby as Editor. George was at first reluctant to step down as the Transactions Editor—"his" journal from birth to maturity. After several back and forth negotiations, he finally accepted the assignment, left the Transactions, and was AUTOMATICA Editor-in-Chief from 1969 until his retirement in 1993. After a Dutch Editor Huibert Kwakernaak's term, AUTOMATICA again has an American Editor-in-Chief, Professor Tamer Başar. There have been numer-

After several years as a technician designing timing circuits and mechanisms, George Axelby earned his BS at the University of Connecticut in 1950, and MS at Yale University in 1951. He then joined the Westinghouse Aerospace Division in the Baltimore area and spent his entire professional career there. He was part of the founding group of the new IRE Professional Group on Automatic Control in the 1950s, and before long was the key leader in publications for that Group. He was the founding Editor (now called Editor-in-Chief) of what became the IEEE Transactions on Automatic Control and served in that leadership position from 1954 to 1968 until he was selected as Editor (now called Editor-in-Chief) of the new IFAC Journal AUTOMATICA and continued in that position until 1993. Axelby was an IEEE Fellow, an IFAC Fellow, and the namesake of the George S. Axelby Outstanding Paper Award of the IEEE Control Systems Society. He died in 2008.

Janos Gertler graduated from the Technical University of Budapest, in Electrical Engineering, and then received the Candidate of Science (Ph.D.) and Doctor of Science degrees in Control Engineering from The Hungarian Academy of Sciences. For 10 years, he was Vice Director of a large research institute in Budapest. He came to the US in 1981 and held visiting positions at Case Western Reserve University and the New York Polytechnic University. Since 1985 he has been Professor of Electrical and Computer Engineering at George Mason University in Virginia. Dr. Gertler's research interests have concerned various aspects of computer control and monitoring of engineering processes, including high-level programming, systems identification, fault detection and diagnosis.

Janos Gertler has served IFAC in many capacities. He was the first chair of the Technical Committee on Computers, chair of the Policy Committee and the Publications Committee, and member of the Constitution Committee. He was a member of the Publications Managing Board from 1976 to 2011 and served as its chair for six years. He was also the Editor-in-Chief of the Conference Proceedings Series for ten years and has been the Editor of the IFAC Journal Annual Reviews in Control since 1996. He served as Program Chair of the 1984 IFAC Congress (in Budapest) and as Editor of the 1996 IFAC Congress in San Francisco. Dr. Gertler is a Fellow of IEEE, Fellow and Advisor of IFAC, and a Foreign Member of the Hungarian National Academy of Sciences.

ous Americans taking leading editorial positions in AUTOMATICA over the decades. They are listed elsewhere.

The IFAC—Elsevier (current name of what was Pergamon Press) relationship has developed over the decades and has been overseen by a so-called Publications Managing Board. Americans Janos Gertler and Stephen Kahne have served on this Board since its creation in 1976. Professor Kahne, the third American to be IFAC President, is profiled elsewhere.



# Preparing for a Second World Congress in the US

The IFAC Council has always included an American member. Three years after Lozier completed his Presidency, Bill Miller was elected to the Council from the US. Miller served one term as ordinary member of the Council and then two terms as IFAC Vice President. Following this Kahne was elected to the Council as a Vice President. Miller moved into the AACC Secretary position and during his term (1982-1991) there were 35 IFAC technical events in the US. To support the coming ACC in 1982 and beyond, a new AACC Newsletter was being designed and implemented. In addition, the first discussions were taking place within AACC to invite IFAC to hold its World Congress in the US in the mid-1990s. This would require that an American, to be IFAC President in the future, would need to be identified a decade ahead.

At first the AACC delegated to specific US institutions the authority to host IFAC technical meetings in the US. This led to a somewhat disorganized collection of IFAC conferences each with its own conference proceedings, each prepared by a different printing company and later available for purchase from different local distributors. The hosts were different local units, typically universities. AACC formally authorized each meeting and ensured that basic IFAC rules were followed. As IFAC publications policies evolved and as the JACC/ACC transition progressed, AACC's role changed. Since the middle 1980s AACC gives formal national approval of a meeting recommended by an IFAC technical committee to ensure that IFAC policies are followed by the US organizers. This approval includes a financial underwriting commitment for the event in case of financial difficulties. In any case, ultimately it has always been IFAC's decision whether or not to agree to the date, place, and proposed content of the event.

There is value in having active specialists from an NMO as members of the various technical committees of IFAC and participating in decisions made by those committees about topics, venues, and dates of such IFAC events. All IFAC technical

meetings are the responsibility of the appropriate IFAC Technical Committee and IFAC's rules require that the International Program Committee (IPC) for each IFAC technical event be truly international. There was an early tendency to only use national technical experts on the IPC for IFAC events held in a particular country. The requirement for a truly international team of experts to frame the technical program of these events was firmed up during IFAC's evolution. This ensured that some Americans were almost always on IPCs for all IFAC meetings and represented still another way that new international opportunities for leadership were available to the AACC community. At the same time, the annual ACC Program Committees grew into truly international groups of technical experts to shape the annual ACC programs. Workshops and Tutorials at the ACCs were a popular feature of the meetings and an international group of lecturers became a standard feature of the meetings, often serving as plenary lecturers or workshop organizers. Thus by mid 1980s the American Control Conference was really an international meeting.

In 1991 Lennart Ljung (Sweden) was an IFAC Vice President and Chairman of the IFAC Technical Board. He and the IFAC Council were eager to keep US and IFAC interests aligned and to ensure that the major US control conference (the ACC) was operated and scheduled in a manner that would facilitate strong international participation. The suggestion from both sides was that some sort of relationship be established to accomplish that. Thus it was that since 1991 the ACCs have been "affiliated with" IFAC and the idea of IFAC regional conferences grew to include European, and Asian IFAC regional conferences. Once again the American-IFAC relationship proved to be a creative force within the international community.

After the Boston/Cambridge IFAC Congress, AACC arranged occasional special technical visits by American scholars and industry control engineers. This is one way for the IFAC community to bring control and automation ideas to countries that can benefit from this technology. In the 1970s a South American lecture tour was arranged by Purdue University's Ted Williams. Americans, under the auspices of the AACC and its members went abroad in small groups on teaching and technical tours. In 1981, the IEEE Control Systems Society led a multi-city technical tour of China with many participants from the AACC technical community. An Eastern European technical tour was led by Bill Miller to several countries in the mid-1980s. Another such study visit was a Chinese trip in the late 1980s. In each case AACC facilitated the arrangements through its contacts with other IFAC NMOs in the visited countries. Such institutional help was important in those days because there remained numerous government impediments to free travel and interchange of technical ideas.

With the 1986 IFAC commitment to hold its World Congress in the US in 1996 and the several previous years of preparation leading to that decision, many AACC activities began to focus on IFAC and the AACC-IFAC relationship. Kahne had always believed that the American control community should be better informed about IFAC and the American role in it. In 1987 he initiated "Global Concerns" a regular column in the AACC Newsletter which conveyed to the American audience insights into IFAC and other international issues of interest to the AACC. This regular column in the Newsletter has been authored by the contemporary US member of the IFAC Council up to the present time. In addition there were more opportunities for Americans to serve in technical leadership positions in IFAC.

As part of a strategic plan for IFAC, the structure of the IFAC Technical Board changed in 1993 to create more technical committees within IFAC. The IFAC TCs

### AACC Newsletter Editors

Since 1981 the AACC has published a semi-annual Newsletter, first in print, then in electronic form only. The Newsletter Editors have been:

| | |
|---|---|
| 1981-1989 | Hiro Mukai, Washington University |
| 1990-1995 | Bonnie Heck Ferri, Georgia Institute of Technology |
| 1995-2001 | Lucy Pao, University of Colorado |
| 2002-2003 | Randy Freeman, Northwestern University |
| 2004-2006 | Pradeep Misra, Wright State University |
| 2006- | May-Win Thein, University of New Hampshire |

had previously developed a complicated structure of various task forces and sub committees to accomplish the technical work in their fields of interest. It was found that volunteers leading these efforts had more success in getting the support needed for their volunteer tasks if they were heading a technical committee rather than sub-units of TCs. Under Ljung's leadership, a new IFAC Technical Board structure was initiated. During the next two triennia, Vladimir Kucera (IFAC Technical Board Chair following Ljung and later IFAC president) and his vice chairs (Mike Rabins and Mike Masten, from the US), refined the new Technical Board into the operational structure used today. The number of IFAC TCs jumped from about 15 to about 40. They are organized into Coordinating Committees (CCs) and the Chairs of these CCs became members of the IFAC Technical Board. These senior technical leadership positions provided opportunities for Americans and other NMO members to serve in higher level IFAC positions. Names of Americans who have served in all these IFAC leadership roles are in an appendix to this document.


Key IFAC96 Congress leaders were appointed by the AACC. Dr. Harold Sorenson, Senior Vice President and General Manager of the MITRE Corporation was appointed NOC Chairman for the Congress. Professor Jose Cruz at UC-Irvine, then Ohio State University Engineering Dean, was appointed IPC Chairman, and Professor David Auslander at UC-Berkeley was the Conference Manager. As part of the early planning, the IEEE underwrote financial responsibility for the Congress, a guarantee that was never used because of the eventual success of the Congress.


At the same time, annual ACCs were handled with professional skill each year by a growing cadre of volunteers. The strength of each program and level of attendance grew almost monotonically with each event. For 1996, the ACC was replaced by the IFAC Congress in San Francisco. In order to gain experience with the San Francisco conference management community, the 1993 ACC was also held in San Francisco, a dry run for the 1996 Congress.

During this period from the mid 1980s to the mid 1990s, AACC became more active with new awards being created, not only for the AACC but also for IFAC. Harold Chestnut's family approached Steve Kahne in 1986 with an offer to fund an IFAC prize for the best textbook in control. As noted earlier in this narrative, it was Harold Chestnut's earliest textbook that was instrumental in his selection as the first IFAC President in the late 1950s. The family thought it would be appropriate if they contributed to the recognition of authors of outstanding control textbooks. It was agreed by IFAC to use these funds for a textbook prize and at Kahne's recommendation, they agreed that the Chestnut name would not be used for this prize while Harold Chestnut was still living. The first of these triennial awards was made in 1987 and after Harold died in 2001, this IFAC prize was renamed the Harold Chestnut Control Engineering Textbook Prize. Based on his experience as the chair of the IFAC Quazza Medal Committee, Petar Kokotović suggested a new IFAC award to recognize important achievements in control engineering practice to honor Nathaniel Nichols. With strong support of Steve Kahne, AACC agreed and worked with IFAC to produce IFAC's Nathaniel B. Nichols Medal which was awarded for the first time at the 1996 IFAC Congress in San Francisco to Professor Jurgen Ackermann (Germany). Nick Nichols was in the audience for the presentation. AACC underwrote the startup costs of the award and IFAC has supported it in the long term. Four out of the next five

*Nathaniel Nichols*


*Nichols Medal*

triennial IFAC Nichols Medals went to four outstanding American control experts from US industry.

By the late 1990s the ACC regularly used electronic media for producing its Proceedings. The technology used for proceedings changed from CDs, then DVDs and some conferences now use flash drives. Various attempts to encourage industrial participation in the ACCs have been tried, with modest success. Pre-conference workshops as part of the ACC program have been in place since the early 1980s. Special review processes for industrial papers have been tried. In addition, experiments have been tried using industrial practice invited sessions, daily registration fees to attract local industrial specialists, special topic panel discussions, jointly sponsored technical sessions with industrial groups, have come and gone over time.

### Michael K. Masten

Michael K."Mike" Masten was born in Texas in 1939. He earned BSEE, MSEE, and PhD from The University of Texas in Austin and spent his professional career at Texas Instruments. He managed technical support organizations which designed and developed a variety of control implementations for military and consumer products. Mike Masten was granted ten patents and was elected TI Fellow in 1989.

Dr. Masten has been active in IFAC including as member of the IFAC Council (1999-2005) and IFAC Vice President -Technical Board (2002-2005). He received the IFAC Outstanding Service Award in 2002, was appointed as IFAC Advisor in 2005, and was elected IFAC Fellow in 2006.

Regarding his service to other professional societies, Dr. Masten was IEEE Control Systems Society President (1996) and a member of the IEEE Board of Directors (1997-98). He was elected IEEE Fellow in 1990, and he received the IEEE Millennium Medal in 2000.



Pre-conference workshops offer opportunities for conference participants to receive in-depth information and training about well established techniques, emerging developments, and new topics within the control field. Modest enrollment fees are charged for these additional conference opportunities.

Pre-conference workshops have been offered for many years at the American Control Conferences (ACCs). However the selection of workshop topics and the overall operation of the workshops were only informal in the early years. The number of workshops offered at each ACC varied from year to year, and they were generally limited in duration and scope. The 1986 ACC in Seattle was the first ACC in which a specific volunteer was assigned the task of identifying workshop topics, selecting qualified workshop presenters, and managing the overall operation of the workshops. This was Mike Masten's first service to ACC, and he subsequently served each of the ACCs—except one— for the next 17 years (1986 - 2002). Around 1988-89, the AACC formally established an ACC Workshops Committee to provide increased focus, and Dr. Masten also chaired this committee until 2002. As greater attention was given to pre-conference workshops, several innovations were made. Detailed attendance records were kept for each workshop topic, feedback questionnaires were collected following each workshop, surveys were conducted to identify new topics of interest, and periodic market surveys were conducted to evaluate the cost and quality of ACC workshops compared to similar offerings from other associations. As a result, subsequent ACCs offered a combination of proven topics of interest plus new emerging topics which were in early development. The number of workshops offered at each ACC was significantly increased, enrollment fees became indexed to ACC registration fees, and surplus-sharing financial arrangements were developed for the presenters. Workshop quality improved, while enrollment costs remained low for attendees, and workshop presenters received suitable stipends.

# New Century

In the US, questions about security and intelligence for safety of industrial processes led to the creation of a Process Control Security Forum (PCSF) at the start of the 21st century. The lead agency in the US government was the newly created Department of Homeland Security. Its purpose was to share information about security of process industries that were susceptible to terror threats. Control systems are at the heart of many of these industrial sectors including electric power, petrochemical companies, pharmaceutical manufacturing, and public works. There are many barriers to free exchange of information in this environment and it is uncomfortable for AACC to play an active role. However, the technologies represented by the AACC member organizations play key roles in all these industries and a common base of science and engineering practice recommended that AACC participate in this PCSF. The national security implications of this topic finally led to its demise outside of the US intelligence community and so AACC's role was minimal. However it did remind us of the relevance of the control sciences to a wide range of safety and security matters facing the United States.

For the past ten years the AACC in cooperation with other societies has created an Ideas and Technology Control Systems workshop for middle- and high-school teachers and students. These workshops are held twice a year, one of which coincides with the time and venue of the ACC. During the last decade the workshops were presented to over 3,000 students and teachers in Baltimore, Chicago, Denver, Hawaii, Las Vegas, New Orleans, Portland, San Diego, Seattle, St. Louis, and Atlanta.

The activity strives to bring control system concepts and technologies to the attention of high-school and middle-school students and teachers. It is explained that control is used in many common devices and systems, such as computer hard drives, VCRs, automobiles, and aircraft, but it is usually hidden from view. It is understood that the longevity of the control field which spans science, technology, engineering and mathematics (STEM), depends on its continuous success in attracting the most gifted young people to the profession. Furthermore, early ex-



*High School Workshop, Atlanta 2010*

posure is a key to achieving that goal. This pioneering effort brings control systems to middle- and high-school students and their teachers. The goal of these outreach efforts is to promote an increased awareness among students and teachers of the importance and cross-disciplinary nature of control and systems technology.

Much before NSF was concerned with K-12 education, our control community had the idea that high-school teachers and their students should be made aware of and become involved in basic ideas of control theory. The idea was that education is at all levels an inclusive process. It should integrate scholarship, teaching, and learning both horizontally and vertically. Professor Bozenna Pasik-Duncan from the University of Kansas has spear-headed the effort since its inception. AACC and its partners have developed a model that has been followed by other organizations and societies. It has established a sustainable outreach partnership among the control communities and school districts at the places where major conferences are held.

The workshop activities include presentations by control systems experts from our technical community, informal discussions, and the opportunity for teachers to meet passionate researchers and educators from academia, industry, and gov-

ernment. The talks are designed to be educational, inspirational and entertaining, showing the excitement of being an engineer.

In addition, discussions and presentations of "Plain Talks" were initiated. This important educational activity was closely related to the outreach efforts described above. The goal has been to develop short excellent presentations, not only for teachers and students, but also for other non-control engineering communities.

AACC is proud of its history of facilitating a strong control presence in the US and continuing contributions to the international scene through IFAC. The current team of American leaders remains committed to providing a structure for constructive exchange of ideas across all engineering disciplines and to ensure close collaboration with the world-wide control community.






## This AACC history in an IFAC context

After Steve Kahne completed his 12 year service on the IFAC Council in 1999, IFAC was beginning to think about its coming 50th anniversary. There is something about 50 years of existence that seems to stimulate thoughts of organizational history. Kahne was asked by the Council to assemble a team to develop a 50th anniversary program to reflect on IFAC's 50 years of service to the international control community. The only specification for what became known as IFAC50 was to include a celebratory event marking 50 years of IFAC. The event itself was chaired by Rolf Isermann from the German NMO and was held in Heidelberg in 2006. IFAC50 consisted of 7 projects:

1. The event in Heidelberg in 2006.
2. An archive of recent (since 2005) IFAC Proceedings which has evolved into IFAC-Papers On Line, with Professor Juan de la Puente (Spain) as its first Editor-in-Chief. There is a permanent hard copy archive of all past IFAC Proceedings (1960-2004) now housed in a science museum in Milan (www.istitutolombardo.it) with a duplicate collection at the IFAC Secretariat.
3. On-line control materials for students which is evolving as "Control Resources" on the IFAC website now under the guidance of Bozenna Pasik-Duncan from the US, and the IFAC Education Committee.
4. A reference listing of control textbooks which evolved into a special book on classic control textbooks designed and edited by Janos Gertler from the US. AACC and other NMOs now use the book as gifts for award winners.
5. A history of IFAC which evolved into several articles, Kahne's presentation at the 2006 Heidelberg celebration, and a decision to create an IFAC History Committee to become active in September 2011.
6. A means to help students from developing countries to attend IFAC events, which is now a major task of the IFAC Foundation.
7. And finally, encouragement for all IFAC NMOs to document their own history, which has evolved into a growing collection of NMO histories including those from Italy, Slovenia, South Africa, Austria, France, and now the United States.

The AACC team that wrote this document hopes that it will stimulate other IFAC NMOs to share their history with the rest of the control community.

Appendix A

# American Automatic Control Council 2011 Board of Directors

The government of the *American Automatic Control Council* (AACC)—the IFAC National Member Organization (NMO) for the United States—resides entirely in the AACC Board of Directors. The Board is composed of the AACC Executive Officers and the Society Directors from each Member Society of the AACC.

## AACC Executive Officers

The Executive Officers are responsible for the day-to-day operation of AACC.
The 2011 officers are:
**President:** Tamer Başar, University of Illinois at Urbana-Champaign
**Past President:** B. Wayne Bequette, Rensselaer Polytechnic Institute
**President Elect:** R. Russell Rhinehart, Oklahoma State University
**Treasurer:** Jordan Berg, Texas Tech University
**Secretary:** Pradeep Misra, Wright State University

## Member Society Directors

Each member society of AACC is represented on the Board of Directors by its Society Director. The term of office for each Member Society Director is two years.
The 2011 AACC Member Societies and their Directors are:

**American Institute of Aeronautics and Astronautics** (AIAA)
Jurek Z. Sasiadek, Carleton University

**American Institute of Chemical Engineers** (AIChE)
Masoud Soroush, Drexel University

**American Society of Civil Engineers** (ASCE)
Erik A. Johnson, University of Southern California

**American Society of Mechanical Engineers** (ASME)
Jeffrey Stein, University of Michigan

**The Institute of Electrical and Electronics Engineers** (IEEE)
Christos Cassandras, Boston University

**The International Society of Automation** (ISA)
Karlene Hoo, Texas Tech University

**Society for Modeling & Simulation International** (SCS)
Robert P. Judd, Ohio University

**Society for Industrial and Applied Mathematics** (SIAM)
William S. Levine, University of Maryland

Appendix B

# American Automatic Control Council Officers

The IFAC National Member Organization (NMO) for the United States is the American Automatic Control Council (AACC). AACC was organized in 1957, and the first meeting was held March 16, 1957—prior to the first organizational meeting which officially formed IFAC.

The initial founding societies of AACC included the American Society of Mechanical Engineers (ASME), American Institute of Electrical Engineers (AIEE), Institute of Radio Engineers (IRE), Instrument Society of America (ISA), and the American Institute of Chemical Engineers (AIChE).
Today, the member societies of AACC are:

- American Institute of Aeronautics and Astronautics (AIAA)
- American Institute of Chemical Engineers (AIChE)
- American Society of Civil Engineers (ASCE)
- American Society of Mechanical Engineers (ASME)
- The Institute of Electrical and Electronics Engineers (IEEE)
- The International Society of Automation (ISA)
- Society for Modeling & Simulation International (SCS)
- Society for Industrial and Applied Mathematics (SIAM)

## AACC Officers

Over the years, there have been 27 presidents of AACC, and since 1962, each president has served a two-year term. Of particular note, AACC has greatly benefited from several secretaries and treasurers who served extensive periods. These include the following who served eight or more years:

- William Vannah who served five years as secretary & treasurer, two years as vice president, and another six years as treasurer a few years later. Vannah's career affiliation was with Control Engineering Magazine.
- Gerald Weiss (Brooklyn Polytechnic Institute) who served ten years as secretary and six years as treasurer.
- William Miller (General Electric Company, retired) who served eight years as secretary.
- Mal Beaverstock (The Foxboro Company) who served over 23 years as treasurer.
- Abe Haddad (Northwestern University) who served 14 years as secretary.

Pradeep Misra (Wright State University) is currently serving in his eighth year as secretary while Jordan Berg (Texas Tech University) is in his third year as treasurer.





The complete AACC leadership teams have been,

| | President | Vice President | Secretary | Treasurer |
|---|---|---|---|---|
| 1957 | Rufus Oldenburger | John Johnson, Jr. | William Vannah | William Vannah |
| 1958-60 | Rufus Oldenburger | John Lozier | William Vannah | William Vannah |
| 1961 | John Lozier | David Boyd | William Vannah | William Vannah |
| 1962-63 | Harold Chestnut | William Vannah | Gerald Weiss | Gerald Weiss |
| 1964-65 | John Ward | Ted Williams | Gerald Weiss | Gerald Weiss |
| 1966-67 | Ted Williams | Hugo Shuck | Gerald Weiss | Gerald Weiss |
| 1968-69 | Hugo Shuck | Charles Doolittle | Gerald Weiss | William Vannah |
| 1970-71 | Charles Doolittle | Duane McRuer | Gerald Weiss | William Vannah |
| 1972-73 | Duane McRuer | Nathaniel Nichols | I. J. Shapiro | William Vannah |
| 1974-75 | Nathaniel Nichols | Roland Lex | I. J. Shapiro | John Bernard |
| 1976-77 | Roland Lex | Bernard Morgan | I. J. Shapiro | John Bernard |
| 1978-79 | Bernard Morgan | John Zaborszky | Marion Keyes | John Bernard |
| 1980-81 | John Zaborszky | Tom Stout | Marion Keyes | John Bernard |
| 1982-83 | Tom Stout | Michael Rabins | William Miller | Mal Beaverstock |
| 1984-85 | Michael Rabins | Robert Larson | William Miller | Mal Beaverstock |
| 1986-87 | Robert Larson | William Powers | William Miller | Mal Beaverstock |
| 1988-89 | William Powers | Thomas Edgar | William Miller | Mal Beaverstock |
| 1990-91 | Thomas Edgar | J. Boyd Pearson | Abe Haddad | Mal Beaverstock |
| 1992-93 | J. Boyd Pearson | Dagfinn Gangsaas | Abe Haddad | Mal Beaverstock |
| 1994-95 | Dagfinn Gangsaas | William Perkins | Abe Haddad | Mal Beaverstock |
| 1996-97 | William Perkins | Masayoshi Tomizuka | Abe Haddad | Mal Beaverstock |
| 1998-99 | Masayoshi Tomizuka | Naim Kheir | Abe Haddad | Mal Beaverstock |
| 2000-01 | Naim Kheir | Christos Georgakis | Abe Haddad | Mal Beaverstock |
| 2002-03 | Christos Georgakis | William E. Levine | Abe Haddad | Mal Beaverstock |
| 2004-05 | William E. Levine | A. Galip Ulsoy | Pradeep Misra | Russell Rhinehart |
| 2006-07 | A. Galip Ulsoy | B. Wayne Bequette | Pradeep Misra | Russell Rhinehart |
| 2008-09 | B. Wayne Bequette | Tamer Başar | Pradeep Misra | Russell Rhinehart |
| 2010-11 | Tamer Başar | Russell Rhinehart | Pradeep Misra | Jordan Berg |

Appendix C

# IFAC Award Winners from the United States

The aim of IFAC is to promote the science and technology of control in the broadest possible sense. A significant part of this promotion is the granting of IFAC medals, awards, and prizes to recognize outstanding accomplishments and contributions to the control field. Numerous recipients of the IFAC awards have been from the United States.

## IFAC Major Medals and Awards

IFAC has four major medals,

- **Giorgio Quazza Medal**
- **Nathaniel B. Nichols Medal**
- **Industrial Achievement Award**
- **High Impact Paper Award**

**The Giorgio Quazza Medal:** Presented at IFAC World Congresses to a distinguished control engineer. The recipient is selected by the IFAC Council as a memorial to the late Giorgio Quazza—a leading Italian control engineer. The first Quazza Medal was presented in 1981.

The Quazza Medal winners from the United States are:

Petar Kokotović, 1990
Tamer Başar, 2005

**The Nathaniel B. Nichols Medal:** Recognizes outstanding contributions of an individual to design methods, software tools and instrumentation, or to significant projects resulting in major applications and advancement of control education. The recipient is selected by the IFAC Council in the name of Nathaniel Nichols—one of the pioneers of control engineering. The first Nichols Medal was presented in 1996.

The Nichols Medal winners from the United States are:

Gunter Stein, 1999
Carl Nett, 2002
William Powers, 2005
Siva Banda, 2011





**The Industrial Achievement Award:** The recipient of this award is selected by the IFAC Council to recognize an individual, or a team of individuals, who has made a significant contribution to industrial applications of control. The first Industrial Achievement Award was presented in 2002; only three medals have been made to date—none to any individual or team from the United States.

**The High Impact Paper Award:** Acknowledges the impact of papers published in any of the official IFAC journals on the broad areas of automatic control theory and application. The first High Impact Paper Award will be presented in 2011. Two of the authors of the paper selected for this award are from the United States: James B. Rawlings and Christopher V. Rao. Full citation of the paper is:

D.Q. Mayne, J. B. Rawlings, C. V. Rao, and P. O. Scokaert.
Constrained model predictive control: Stability and optimality.
*Automatica, 36(6)*:789-814, 2000.

## Harold Chestnut Control Engineering Textbook Prize

This award is presented at IFAC World Congresses for the best control engineering textbook in one of the official IFAC languages for which the first edition(s) occurred not later than the Congress just prior to the one at which the award is presented. The award recognizes author(s) of textbook(s) judged to have most contributed to the education of control engineers.

The first Chestnut Control Engineering Textbook Prize was presented in 1987. The winning books with at least one author from the United States are:

**1990:** Gene F. Franklin, J. David Powell, Abbas Emami-Naeini, Feedback Control of Dynamic Systems, Prentice Hall, 1986

**1999:** Christos G. Cassandras, Discrete Event Systems: Modeling and Performance Analysis, R.D. Irwin, Inc. and Aksen Associates, Inc., 1993

**2002:** Hassan K. Khalil, Nonlinear Systems, Prentice Hall, 1996

**2011:** Karl Johan Aström, Richard Murray, Feedback Systems: An Introduction for Scientists and Engineers, Princeton University Press, 2008

## IFAC Fellows

The IFAC Fellow Award is granted to persons who have made outstanding and extraordinary contributions in the field of interest of IFAC— in the role as an Engineer/Scientist, Technical Leader, or Educator. The first IFAC Fellows were elected at the 2005 World Congress in Prague. The next IFAC Fellows will be announced at the 2011 Congress in Milan.

The following are the IFAC Fellows elected from the United States:

**2005**
Tamer Başar
Robert Bitmead
János Gertler
Stephen Kahne
Petar Kokotović
Carl Nett
William F. Powers
Gunter Stein

**2006**
Michael Athans
Davor Hrovat
Petros Ioannou
Michael Masten
Thomas McAvoy

**2007**
Jose B. Cruz, Jr.
Christos Georgakis
Hassan Khalil

**2008**
Richard Braatz
Xi-Ren Cao[1]
Christos Cassandras
Thomas Edgar
Abraham Haddad
Miroslav Krstic
Frank Lewis
Manfred Morari[2]
Michael Safonov

**2009**
Francis Doyle
Tzyh Jong Tarn

**2010**
Panos Antsaklis
Siva Banda
B. Ross Barmish
Chris Byrnes[3]
Tyrone Duncan
Jessy Grizzle
Mustafa Khammash
Andrew Teel
Masayoshi Tomizuka
A. Galip Ulsoy

[1] Xi-Ren Cao now resides in Hong Kong
[2] From the United States, Manfred Morari now resides in Switzerland
[3] Chris Byrnes Fellow Award granted posthumously





## Outstanding Service Award

The Outstanding Service Award is presented to IFAC officials who have served and contributed substantially to IFAC in various capacities, according to criteria set by the IFAC Council. From 1990 to 2008, there have been 17 officials from the United States who have received the award. The next awards will be presented at the World Congress in 2011.

**1990**
John Aseltine
George Axelby
Harold Chestnut
Janos Gertler
Stephen Kahne
John Lozier
William Miller
Andrew Sage
Austin Spang

**1993**
William Levine

**2002**
Robert Bitmead
Michael Masten

**2005**
Tamer Başar
Abraham Haddad

**2008**
Christos Georgakis
Thomas McAvoy
Shimon Nof

Appendix D

# AACC Award Winners

The American Automatic Control Council (AACC) sponsors five awards. These awards are given to recognize excellence in scientific, technological, or educational contributions to automatic control.

## The Richard E. Bellman Control Heritage Award

The Bellman Award is given for distinguished career contributions to the theory or application of automatic control. It is the highest AACC recognition of professional achievement for control systems engineers and scientists. The recipient must have spent a significant part of his/her career in the United States.

Winners of the Bellman Award are:

Hendrik W. Bode, 1979
Nathaniel B. Nichols, 1980
Charles Stark Draper, 1981
Irving Lefkowitz, 1982
John V. Breakwell, 1983
Richard E. Bellman, 1984
Harold Chestnut, 1985
John Zaborszky, 1986
John Lozier, 1987
Walter R. Evans, 1988
Roger W. Brockett, 1989
Arthur E. Bryson, Jr., 1990
John G. Truxal, 1991
Rutherford Aris, 1992
Eliahu I. Jury, 1993
Jose B. Cruz, Jr., 1994
Michael Athans, 1995
Elmer G. Gilbert, 1996
Rudolf E. Kalman, 1997
Lofti A. Zadeh, 1998
Yu-Chi Ho, 1999
W. Harmon Ray, 2000
A. V. Balakrishnan, 2001
Petar V. Kokotović, 2002
Kumpati S. Narenda, 2003
Harold J. Kushner, 2004
Gene F. Franklin, 2005
Tamer Başar, 2006
Sanjoy K. Mitter, 2007
Pravin Varaiya, 2008
George Leitmann, 2009
Dragoslav D. Šiljak, 2010
Manfred Morari, 2011





## The Control Engineering Practice Award

The Control Engineering Practice Award is given to an individual or team for significant contribution to the advancement of control practice. The primary criterion for selection is application and implementation of innovative control concepts, methodology, and technology, or for planning, design, manufacture, and operation of control systems. The contribution must have been made while the individual or at least one member of the team was a resident of the United States.

Winners of the Control Engineering Practice Award are:

Charlie R. Cutler, 1998
Davor D. Hrovat, 1999
F. Greg Shinskey, 2000
Warren A. Thompson, 2001
Dagfinn Gangsaas, 2002
Edgar Bristol, 2003
William F. Powers, 2004
George W. Meyer, 2005
David S. Bayard, 2006
Kevin A. Wise, 2007
Babatunde A. Ogunnaike, 2008
Suresh M. Joshi, 2009
Joseph Z. Lu, 2010
Steven E. Shladover, 2011

## The Donald P. Eckman Award

The Eckman Award recognizes an outstanding young engineer in the field of automatic control. The recipient must be younger than 35 years on January 1 of the year of award. Contributions may be technical or scientific publications, theses, patents, inventions, or combinations of the above in the field of automatic control made while the nominee was a resident of the United States.

Winners of the Eckman Award are:

Michael Athans, 1964
John Bollinger, 1965
Roger Bakke, 1966
Roger W. Brockett, 1967
Robert E. Larson, 1968
W. Harmon Ray, 1969
John Seinfeld, 1970
Raman Mehra, 1971
Cecil L. Smith, 1972
Edison Tse, 1973
Timothy L. Johnson, 1974
Alan S. Willsky, 1975
Robert W. Atherton, 1976
Nils R. Sandell Jr., 1977
Narendra K. Gupta, 1978
Joe Hong Chow, 1979
Manfred Morari, 1980
Rajan Suri, 1981
Bruce Hajek, 1982
John C. Doyle, 1983
Mark A. Shayman, 1984
P.R. Kumar, 1985
Yaman Arkun, 1986
Rahmatallah Shoureshi, 1987
Bijoy K. Ghosh, 1988
Pramod P. Khargonekar, 1989
S. Shankar Sastry, 1990
Carl N. Nett, 1991
Stephen P. Boyd, 1992
Munther A. Dahleh, 1993
Kameshwar Poola, 1994
Andrew Packard, 1995
Jeff S. Shamma, 1996
Richard M. Murray, 1997
Ioannis Kanellakopoulos, 1998
Andrew R. Teel, 1999
Richard D. Braatz, 2000
Dawn M. Tilbury, 2001
Ilya Kolmanovsky, 2002
Claire J. Tomlin, 2003
Panagiotis D. Christofides, 2004
Pablo A. Parrilo, 2005
Murat Arcak, 2006
Daniel Liberzon, 2007
Asuman E. Ozdaglar, 2008
Paulo Tabuada, 2009
Domitilla Del Vecchio, 2010
Hana El-Samad, 2011





## The John R. Ragazzini Award

The Ragazzini Award is given to recognize outstanding contributions to automatic control education in any form. These contributions can be from any source and in any media, i.e., electronic, publications, courses, or other.

Winners of the Ragazzini Award are:

John R. Ragazzini, 1979
Michael Athans, 1980
Yasundo Takahashi, 1981
Arthur E. Bryson, Jr., 1982
Charles A. Desoer, 1983
Henry M. Paynter, 1984
No Award, 1985
Thomas Kailath, 1986
George J. Thaler, 1987
Wallace E. Vander Velde, 1988
W. Harmon Ray, 1989
Kumpati S.Narendra, 1990
Michael J. Rabins, 1991
Thomas F. Edgar, 1992
Dale E. Seborg, 1993
No Award, 1994
J. Boyd Pearson, 1995
David M. Auslander, 1996
William R. Perkins, 1997
Peter Dorato, 1998
Katsuhiko Ogata, 1999
Hassan K. Khalil, 2000
Dimitri P. Bertsekas, 2001
Robert F. Stengel, 2002
Stephen P. Boyd, 2003
Mark W. Spong, 2004
S. Shankar Sastry, 2005
Masayoshi Tomizuka, 2006
Manfred Morari, 2007
Stephen Yurkovich, 2008
George Stephanopoulos, 2009
Tzyh Jong Tarn, 2010
James B. Rawlings, 2011

## The O. Hugo Schuck Award

The Hugo Schuck Award is given to recognize the best paper(s) presented at the previous American Control Conference (ACC). In some years, two awards are presented; one award is for a paper emphasizing contributions to theory, the other emphasizing significant or innovative applications. Criteria for selection include the quality of the written and oral presentation, the technical contribution, timeliness, and practicality.

Winners of the Schuck Award are:

1980 W. B. Rouse, *"Understanding and Aiding the Human in Fault Diagnosis Tasks"*

1981 T. Westerlund, *"Identification and Control of an Industrial Dry Process Cement Kiln"*

1982 J. Kenneth Salisbury and J. J. Craig, "*Articulated Hands:Force Control and Kinematic Issues"*

1983 H. Johnson, *"Adaptive Control of Nonlinear Self-Oscillating Systems Using MRAS Technique"*

1984 K. Glover and D.J. N. Limebeer, *"Robust Multivariable Controls System Design Using Optimal Reduced Order Plant Models"*

1985 No Awards

1986 H. Asada and K. Youcef-Toumi, *"Analysis and Design of a Direct-Drive Arm with a Five-Bar Link Parallel Drive Mechanism"*

1987 B. Wahlberg, *"On Model Reduction in System Identification"*

1988 E. Kamei, H. Namba, K. Osaki, and M. Ohba, *"Application of Reduced Order Model to Automotive Engine Control System"*

1989 A. Miele, T. Wang, and W.W. Melvin, *"Optimization and Guidance of Penetration Landing Trajectories in a Windshear"*

1990 H. Kazerooni and W.K. Foslien, *"On the Control and Stability of Robots Worn By Human: Theory"*

1991 G. T. Yamaguchi and F. E. Zajac, *"Modeling FES Actuation and Control of Multisegment Limb Movements"*

1992 E. W. Jacobsen and S. Skogestad, *"Control of Unstable Distillation Columns"*

1993 K. Poolla, P. Khargonekar, A. Tikku, J. Krause, and K. Nagpal, *"A Time-Domain Approach to Model Validation"*

1994 H. O. Wang and E. H. Abed, *"Control of Nonlinear Phenomena at the Inception of Voltage Collapse"*
R. J. Furness, A. Galip Ulsoy, and C. L. Wu, *"Supervisory Control of Drilling"*





1995 J. Chai, R. H. Lyon, and J. H. Lang, *"Non-Invasive Diagnostics of Motor-Operated Valves"*
F. Paganini, R. D'Andrea, and J. C. Doyle, *"Behavioral Approach to Robustness Analysis"*

1996 M. Krstic, *"Asymptotic properties of Adaptive Nonlinear Stabilizer"*

1997 No Awards

1998 V. Lioatta, C. Georgakis, and M. S. El-Aasser, *"Real-Time Estimation and Control of Particle Size in Semi-Batch Emulsion Polymerization"*
M. Glaum and G. Zames, *"A function Calculus For Identification and System Analysis"*

1999 S. Tatiraju, M. Soroush, and R. Mutharasan, *"Multi-Rate Nonlinear State and Parameter Estimation in a Bioreactor"*
H. A. Hindi, B. Hassibi, and S. P. Boyd, *"Multiobjective H2/H-Infinity Optimal Control via Finite Dimensional Q-Parametrization and Linear Matrix Inequalities"*

2000 A. Armaou and P. Christofides, *"Wave suppression by Nonlinear Finite-Dimensional Control"*
B. Bamieh and M. Dahleh, *"Disturbance Energy Amplification in Three Dimensional Channel Flows"*

2001 L. Zaccarian, A. R. Teel, and J. J. Marcinkowski, *"Anti-windup for an Active Vibration Isolation Device: Theory and Experiments"*
R. Yedavalli, *"A Necessary and Sufficient Extreme Point Solution for Checking Robust Stability of Polytopes of Matrices"*

2002 J. Mareczek, M. Buss, and M. Spong, *"Invariance Control of Normal Forms with Input Driven Internal Dynamics"*
B-S. Kim, J. Li, and T-C. Tsao, *"Control of a Dual Stage Actuator System for Noncircular Cam Turning Process"*

2003 P. Seiler, A. Pant, and K. Hedrick, *"Disturbance propagation in large interconnected systems"*

2004 B. Yao, *"Integrated Direct/Indirect Adaptive Robust Control of SISO Nonlinear Systems in Semi-Strict Feedback Form"*
D. Ni, Yiming Lou, P. D. Christofides, L. Sha, S. Lao, and J. P. Chang, *"A Method for Real-Time Control of Thin Film Composition Using OES and XPS"*

2005 H.K. Khalil, *"Output Feedback Sampled-Data Stabilization of Nonlinear Systems"*
X. Sun, L. Munoz and R. Horowitz, *"Mixture Kalman Filter Based Highway Congestion Mode and Vehicle Density Estimator and its Application"*

**The O. Hugo Schuck Award** *(continued)*

2006 N.C. Martins and M.A. Dahleh, *"Fundamental Limitations of Performance in the Presence of Finite Capacity Feedback"*
T. Keviczky and G.J. Balas, *"Flight Test of a Receding Horizon Controller for Autonomous UAV Guidance"*

2007 S. Dambreville, Y. Rathi, and A. Tannenbaum, *"Tracking Deformable Objects with Unscented Kalman Filtering and Geometric Active Contours"*
R. Rajamani, D. Piyabongkarn, J. Y. Lew, and J. A. Grogg, *"Algorithms for Real-Time Estimation of Individual Wheel Tire-Road Friction Coefficients"*

2008 N. Motee and A. Jadbabaie, *"Optimal Control of Spatially Distributed Systems"*
L.-Shien Fong and S. Dubljevic, *"Pacing Real-Time Spatiotemporal Control of Cardiac Alternans"*

2009 K. Stegath, N. Sharma, C. M. Gregory, and W. E. Dixon, *"Nonlinear Tracking Control of a Human Limb via Neuromuscular Electrical Stimulation"*
R. D. Gregg and M. W. Spong, *"Reduction-based Control with Application to Three Dimensional Bipedal Walking Robots"*

2010 L. Vu and K. A. Morgansen, *"Stability of Feedback Switched Systems with State and Switching Delays"*
Y. Yan, Q. Zou, and Z. Lin, *"A Control Approach to High-Speed Probe-Based Nanofabrication"*

2011 F. Dörfler and F. Bullo, *"Synchronization and Transient Stability in Power Networks and Non-Uniform Kuramoto Oscillators"*
F. Bu, H-S. Tan, and J. Huang, *"Design and Field Testing of a Cooperative Adaptive Cruise Control System"*



Appendix E

# United States Control Conferences

The United States has a rich and long legacy of control conferences. Planning for these conferences began in the mid-1950s in conjunction with early plans and discussions for the establishment of IFAC. Many of the same leaders who were active in IFAC discussions also planned the early control conferences in the United States.

## Joint American Control Conference (JACC)

Informal discussions regarding establishment of IFAC—and the National Member Organizations (NMOs)—began as early as 1956. Holding conferences was a major goal of IFAC and the NMOs from the very beginning.

Following several planning meetings, the American Automatic Control Council (AACC)—the United States NMO—held its first organizational meeting in 1957. The first major control conference in the United States, the *National Automatic Control Conference* (NACC), was then held in Dallas, Texas in 1959—one year before the first IFAC Congress. The next year (1960), AACC coordinated another conference at MIT in Cambridge; the name was changed to *Joint Automatic Control Conference* (JACC).

The name JACC was used for the next 22 years while the JACC experienced a steady increase in participation from control engineers. Nevertheless, in those early years, IFAC, AACC, and the JACCs were only informally linked, and each entity operated more or less independently.

From the beginning, the JACC was conducted on an annual basis; the following are the locations of the first 22 major United States control conferences—typically held at a suitable university:

1959 (NACC) Dallas, TX
1960 Cambridge, MA
1961 Boulder, CO
1962 New York City, NY
1963 Minneapolis, MN
1964 Palo Alto, CA
1965 Cambridge, MA
1966 Seattle, WA
1967 Philadelphia, PA
1968 Ann Arbor, MI
1969 Boulder, CO
1970 Atlanta, GA
1971 St. Louis, MO
1972 Palo Alto, CA
1973 Columbus, OH
1974 Austin, TX
1975 No JACC—Boston IFAC '75
1976 West Lafayette, IN
1977 San Francisco, CA
1978 Philadelphia, PA
1979 Denver, CO
1980 San Francisco, CA
1981 Charlottesville, VA

## American Control Conference (ACC)

In the early1980s the link between IFAC, the AACC, and the annual control conference was greatly strengthened. Beginning in 1982, the name JACC was changed to become the *American Control Conference* (ACC) and AACC became the official sponsor of the ACC. Since that time, the ACCs have experienced even stronger attendance growth and an ever increasing prestige. Today, the annual ACC is one of the most recognized control conferences in the United States.

The ACC has been held on an annual basis, except for the year (1996) in which AACC sponsored the IFAC Congress. Therefore, as of 2011, the AACC has organized and sponsored 29 successful ACC conferences. These conferences have been held in numerous locations throughout the United States—in hotel or commercial conference venues—and have involved thousands of volunteers.

The locations for the 1982-2011 ACC were:

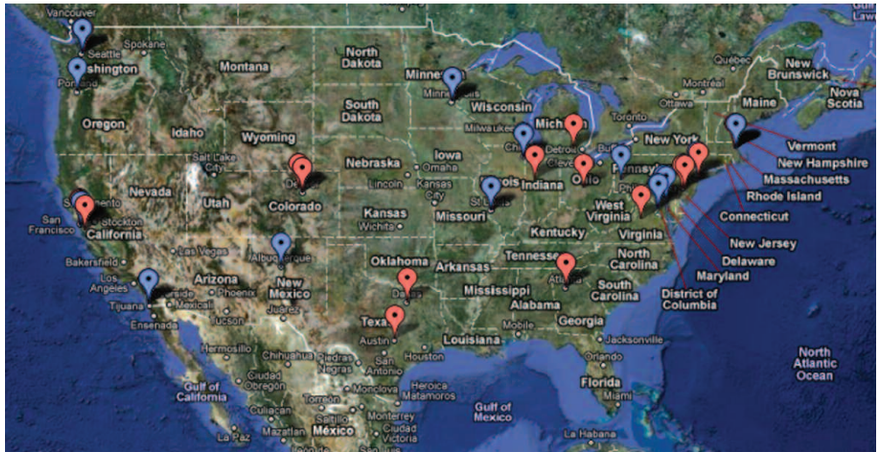
1982 Arlington, VA
1983 San Francisco, CA
1984 San Diego, CA
1985 Boston, MA
1986 Seattle, WA
1987 Minneapolis, MN
1988 Atlanta, GA
1989 Pittsburgh, PA
1990 San Diego, CA
1991 Boston, MA
1992 Chicago, IL
1993 San Francisco, CA
1994 Baltimore, MD
1995 Seattle, WA
1996 No ACC—San Francisco IFAC '96
1997 Albuquerque, NM
1998 Philadelphia, PA
1999 San Diego, CA
2000 Chicago, IL
2001 Arlington, VA
2002 Anchorage, AK
2003 Denver, CO
2004 Boston, MA
2005 Portland, OR
2006 Minneapolis, MN
2007 New York City, NY
2008 Seattle, WA
2009 St. Louis, MO
2010 Baltimore, MD
2011 San Francisco, CA





Although all of the ACCs have been sponsored by the AACC, the relationship between the early ACCs and IFAC was still unofficial. However, since 1991, all of the ACCs have been organized "in cooperation with IFAC". Thus the annual ACC has now been a fully recognized IFAC conference for twenty years.

The following map highlights the locations of the 1959 NACC as well as the 21 JACCs and 29 ACCs.




*Locations of NACC (1959), JACCs (1960-1981), and ACCs (1982-2011)*
*(Not shown: 2002 ACC Anchorage, Alaska)*

Over the years, the AACC has hosted the IFAC Council meetings at several of the United States conferences, including,

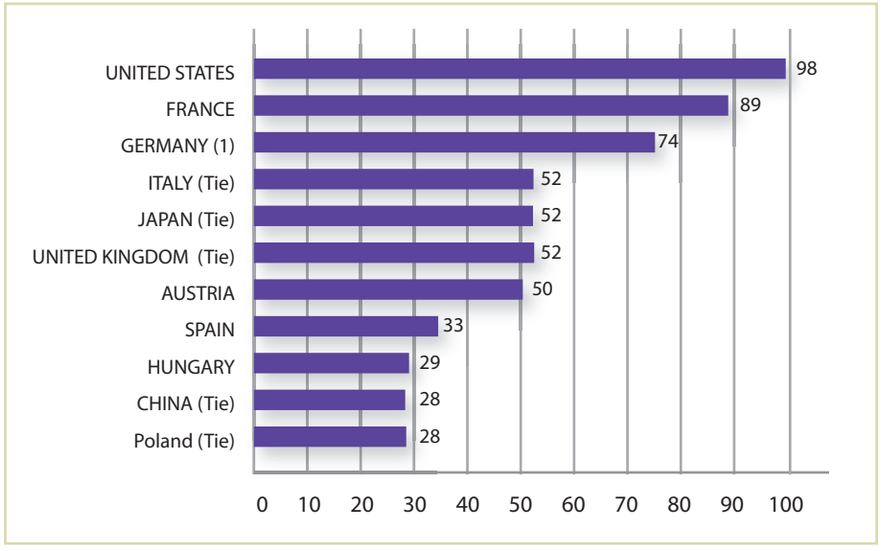
1968 JACC in Ann Arbor, MI
1975 IFAC Congress in Boston, MA
1985 ACC in Boston, MA
1996 IFAC Congress in San Francisco, CA
2001 ACC in Arlington, VA
2010 ACC in Baltimore, MD

## IFAC Events in United States

In addition to the 29 annual ACCs—and the preceding 22 NACC/JACCs—the AACC has also sponsored a significant number of additional IFAC events. In fact, AACC has sponsored more IFAC events than any other IFAC NMO. Between 1962 and 2011, the USA sponsored 98 IFAC events—over 10% of all IFAC events in history.

Over 60% of the total number of IFAC events has been sponsored by the top eleven IFAC NMO's.

**TOP 60.8% IFAC LOCATIONS**
**1962 – 2011**




[1] Includes both East & West Germany before unification



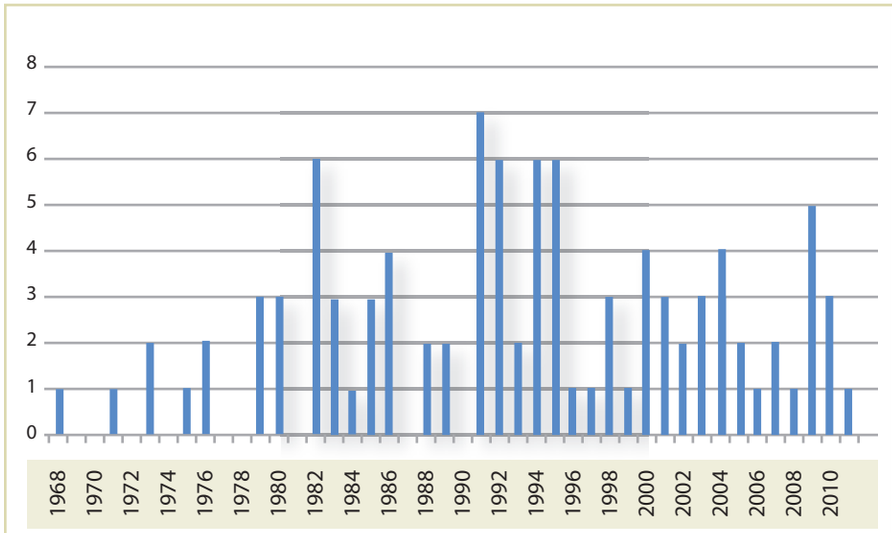


The 98 IFAC events sponsored by the AACC have included two major IFAC Congresses and an almost equal distribution of all other types of IFAC meetings,

- Two IFAC Congresses (1975, 1996)
- One Society of Automotive Engineers (SAE) Congress (1995)
- 31 IFAC Symposia
- 31 IFAC Conferences
- 33 IFAC Workshops

The first IFAC event in the United States was held in 1968. During the subsequent 44 years, there has been an overall average 2.2 IFAC events in the United States each year. The average has been three IFAC events per year for the last two decades.

**United States IFAC Events**
**1962 – 2011**



## United States IFAC Events

The first IFAC event in the United States was held in Cleveland. Since that time, the locations have been quite diverse:

| | | |
|---|---|---|
| **1968** | Optimal Systems Planning (S) | Cleveland, OH |
| **1971** | Interfaces with the Process Control Computer (S) | Lafayette, IN |
| **1973** | Regulation and Control in Physiological Systems (C) | Rochester, NY |
| | Automatic Control in Glass (S) | Lafayette, IN |
| **1975** | Control Technology in the Service of Man (Congress) | Boston, MA |
| **1976** | Control in Transportation Systems (S) | Columbus, OH |
| | Ship Operation Automation (S) | Washington, DC |
| **1979** | PROLAMAT (C) | Ann Arbor, MI |
| | Control Applications of Nonlinear Programming (W) | Denver, CO |
| | Distributed Computer Control Systems (S) | Tampa, FL |
| **1980** | Water and Related Land Resource Systems (S) | Cleveland, OH |
| | Spacecraft System Reconfiguration in Orbit (W) | Cambridge, MA |
| | Spacecraft System Reconfiguration in Orbit (W) | Cambridge, MA |
| | Systems Engineering Applications for Industrial Energy Generation and Processes (W) | Houston, TX |
| **1982** | Control Aspects of Prosthetics and Orthotics (S) | Columbus, OH |
| | Identification and System Parameter Estimation SYSID 82 (S) | Arlington, VA |
| | IFIP Computer Applications in the Automation of Shipyard Operation and Ship Design (C) | Annapolis, MD |
| | Computer Aided Design of Multivariable Technological Systems (S) | W. Lafayette, IN |
| | Safety of Computer Control Systems SAFECOMP '82 (W) | W. Lafayette, IN |
| | IFAC/ Information Control Problems in Manufacturing Systems (S) | Gaithersburg, MD |
| **1983** | Dynamic Modeling and Control of National Economies (C) | Washington D.C. |
| | Adaptive Systems in Control and Signal Processing (W) | San Francisco, CA |
| | Applications of Nonlinear Programming to Optimization and Control (W) | San Francisco, CA |
| **1984** | Reconfigurable Spacecraft Systems Autonomous and Non Autonomous (W) | Cambridge, MA |
| **1985** | Distributed Computer Control Systems—DCCS 85 (W) | Monterey, CA |
| | Model Error Concepts and Compensation (Workshop) | Boston, MA |
| | Real Time Programming (W) | W. Lafayette, IN |
| | Contributions of Technology to International Conflict Resolution (SWIIS) (W) | Cleveland, OH |





| | | |
|---|---|---|
| **1986** | Control of Distributed Parameter Systems (S) | Pasadena, CA |
| | Modeling and Control of Electric Power Plants (W) | Philadelphia, PA |
| | Instrumentation and Automation in Paper, Rubber, Plastics and Polymerization Industries (C) | Akron, OH |
| **1988** | Model Based Process Control (W) | Atlanta, GA |
| | Spacecraft Autonomy: Present and Future Capabilities (W) | Pasadena, CA |
| **1989** | Singular Perturbations and Asymptotic Methods in Systems and Control (W) | Boston, MA |
| | Experience with the Management of Software Projects (W) | W. Lafayette, IN |
| **1991** | Modeling and Experimental Verification of Dynamics and Control of Flexible Aerospace Structures (W) | Huntsville, AL |
| | Real Time Programming (W) | Atlanta, GA |
| | Advances in Control Education ACE 91 (C) | Boston, MA |
| | American Control Conference ACC 1991 (C) | Boston, MA |
| | Distributed Intelligence Systems DIS '91 (S) | Washington, DC |
| | Artificial Intelligence in Real-Time Control (W) | Napa, CA |
| | New Frontiers of Biomedical Engineering—Innovations from Nuclear to Space Technology (C) | Orlando, FL |
| **1992** | Modeling and Control of Biotechnical Processes (C) | Keystone, CO |
| | On-Line Fault Detection and Supervision in the Chemical Process Industries (S) | Newark, DE |
| | Dynamics and Control of Chemical Reactors, Distillation Columns and Batch Processes (S) | College Park, MD |
| | American Control Conference ACC 1992 (C) | Chicago, IL |
| | Automated Systems Based on Human Skill (and Intelligence) (S) | Madison, WI |
| | Intelligent Manufacturing Systems IMS 92 (W) | Dearborn, MI |
| **1993** | American Control Conference ACC 1993 (C) | San Francisco, CA |
| | AI in Economics and Management Workshop | Portland, OR |
| **1994** | Computer Aided Design in Control Systems CADCS '94 (S) | Tucson, AZ |
| | Modeling and Control of Biomedical Systems (S) | Galveston, TX |
| | Integration of Process Design and Control—IPDC '94 (W) | Baltimore, MD |
| | American Control Conference ACC 1994 (C) | Baltimore, MD |
| | Automatic Control in Aerospace (S) | Palo Alto, CA |
| | Trends in Hydraulic and Pneumatic Components and Systems (W) | Chicago, IL |
| **1995** | SAE (Soc. of Automotive Engineers) (Congress) | Detroit, MI |
| | American Control Conference ACC 1995 (C) | Seattle, WA |
| | Nonlinear Control Systems Design NOLCOS-95(S) | Lake Tahoe, CA |
| | Analysis, Design and Evaluation of Man-Machine ystems (S) | Cambridge, MA |
| | Safety and Reliability in Emerging Control Technologies (W) | Daytona Beach, FL |
| | Real Time Programming (20th) (W) | Lauderdale, FL |
| **1996** | IFAC Congress (Congress) | San Francisco, CA |

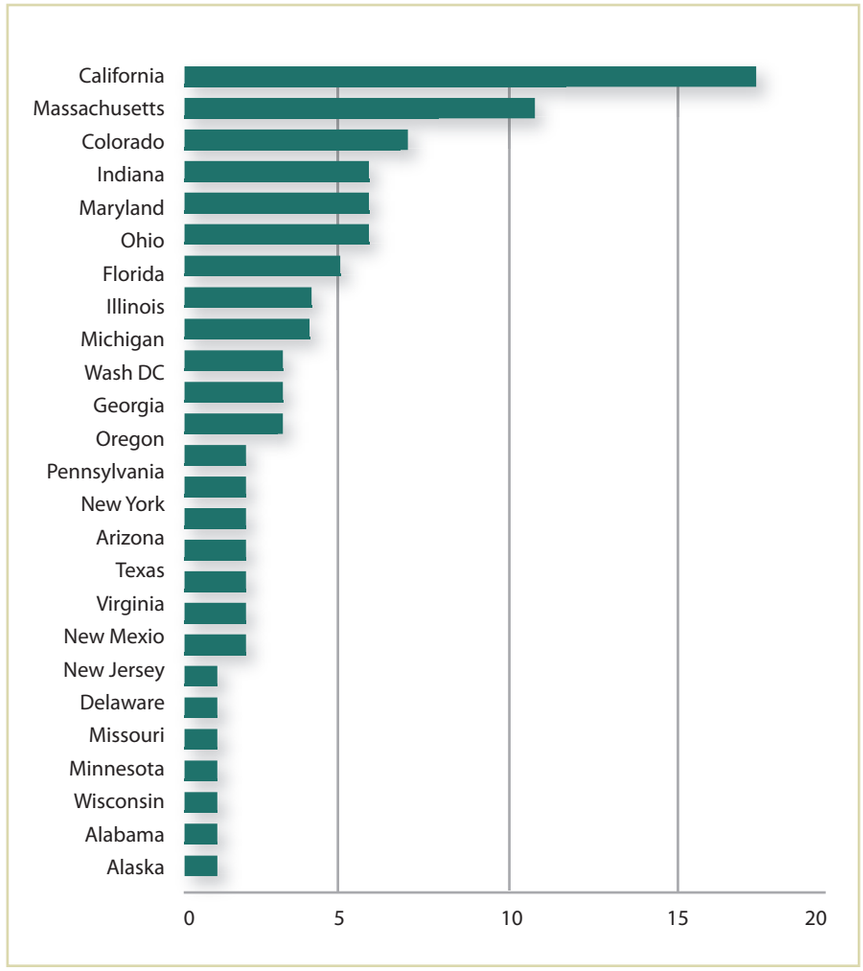
## United States IFAC Events *(continued)*

| | | |
|---|---|---|
| **1997** | American Control Conference ACC 1997 (C) | Albuquerque, NM |
| **1998** | Advances in Automotive Control (W) | Mich. State, MI |
| | American Control Conference ACC 1998 (C) | Philadelphia, PA |
| | Artificial Intelligence in Real-Time Control—AIRTC (S) | Grand Canyon, AZ |
| **1999** | American Control Conference ACC 1999 (C) | San Diego, CA |
| **2000** | Aerospace Applications of the Global Positioning System (W) | Breckenridge, CO |
| | Lagrangian and Hamiltonian Methods for Nonlinear Control (W) | Princeton, NJ |
| | Identification and System Parameter Estimation SYSID 2000 (S) | Santa Barbara, CA |
| | American Control Conference ACC 2000 (C) | Chicago, IL |
| **2001** | American Control Conference ACC 2001 (C) | Arlington, VA |
| | Accelerator and Large Experimental Physics Control Systems (C) | San Jose, CA |
| | Time Delay Systems (W) | Santa Fe, NM |
| **2002** | American Control Conference (C) | Anchorage, AK |
| | Mechatronic Systems Symposium December (C) | Berkeley, CA |
| **2003** | Control of Optical Systems (W) | Breckenridge, CO |
| | American Control Conference ACC 2003 (C) | Denver, CO |
| | Fault Detection, Supervision and Safety of Technical Processes- SAFEPROCESS (S) | Washington |
| | American Control Conference ACC 2004 (C) | Boston, MA |
| **2004** | Dynamics and Control of Process Systems DYCOPS7 (S) | Cambridge, MA |
| | Modeling and Control of National Economies (S) | Redlands, CA |
| | Analysis, Design, and Evaluation of Human-Machine Systems (S) | Atlanta, GA |
| **2005** | American Control Conference ACC 2005 (C) | Portland, OR |
| | Foundations of Systems Biology in Engineering (C) | Santa Barbara, CA |
| **2006** | American Control Conference ACC 2006 (C) | Minneapolis, MN |
| **2007** | American Control Conference ACC 2007 (C) | New York, NY |
| | Advances in Automotive Control (S) | Aptos, CA |
| **2008** | American Control Conference ACC 2008 (C) | Seattle, WA |
| **2009** | American Control Conference ACC 2009 (C) | St. Louis, MO |
| | Foundations of Systems Biology in Engineering (C) | Denver, CO |
| | Control in Transportation Systems—CTS 09 (S) | Redondo Beach, CA |
| | Bio-Robotics, Information Technology and Intelligent Control for Bioproduction Systems (W) | Champaign, IL |
| | Networked Robotics (W) | Golden, CO |
| **2010** | Internet Based Control Education (IBCE 10) (W) | Orlando, FL |
| | American Control Conference ACC 2010 (C) | Baltimore, MD |
| | Mechatronic Systems (S) | Boston, MA |
| **2011** | American Control Conference ACC 2011 (C) | San Francisco, CA |





The IFAC events held in the United States have occurred in 26 of the 50 states. The number of IFAC events held in each state is:



Appendix F

# United States Residents Serving IFAC

There were several Americans among the original founders of IFAC, and since the formation of IFAC, numerous United States residents have served as significant leaders and volunteers during every triennium of IFAC history. In the current 2008-2011 triennium, there are over 100 United States residents serving in various IFAC positions.

## IFAC Leaders

Dedicated service from willing and eager volunteers is one of the key reasons that IFAC has become such a successful organization. Unfortunately, records are not available to tabulate the several thousands of people—of all nations—who have served as members of International Program Committees (IPCs) for the many technical meetings within IFAC's history. Statistics likewise do not identify the numerous people who have served as members of the various IFAC Technical Committees.

However, records have been maintained for the leaders of the IFAC Technical Committees and the IFAC Administrative Committees as well as the editors of the various IFAC journals. Service of these specific leaders can be separated into several distinct categories:

- Technical Committee Leader: Chair or Vice Chair of an IFAC Technical Committee
- Editor: Editor or Editor-in-Chief of an IFAC Journal
- Administrative Committee Member/Leader: Member, Chair, or Vice Chair of an IFAC Administrative Committee
- IFAC Officers and Advisors: IFAC President, IFAC Vice President, IFAC Council Member, or IFAC Advisor

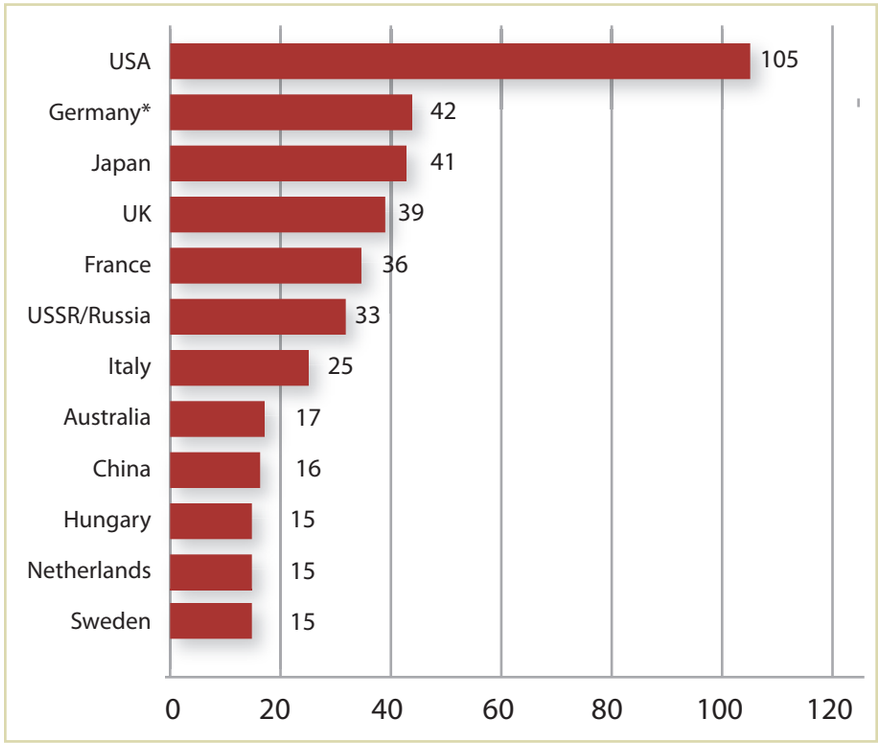
During IFAC's history, all of the NMOs have provided such leaders; from the United States, there have been over 100 different volunteers who have served in these leadership positions.





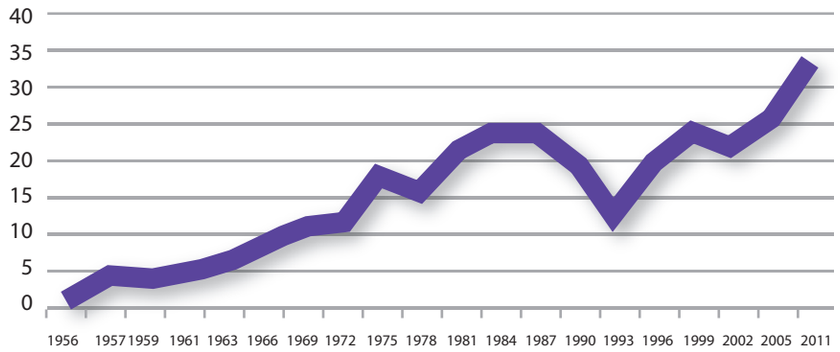
## TOTAL NUMBER OF INDIVIDUALS SERVING AS IFAC LEADERS 1957 – 2011

The number of residents serving from any country at any given time obviously varies from triennium to triennium. Nevertheless, the total number of Americans who have served IFAC generally increased in every triennium following IFAC's formation up until the late 1980s. After a brief dip in the early 1990s, the growth resumed, and during the last two decades, the number of leaders from the United States has averaged 22.9 volunteers each triennium.




* Includes both East & West Germany before unification

## UNITED STATES IFAC LEADERS



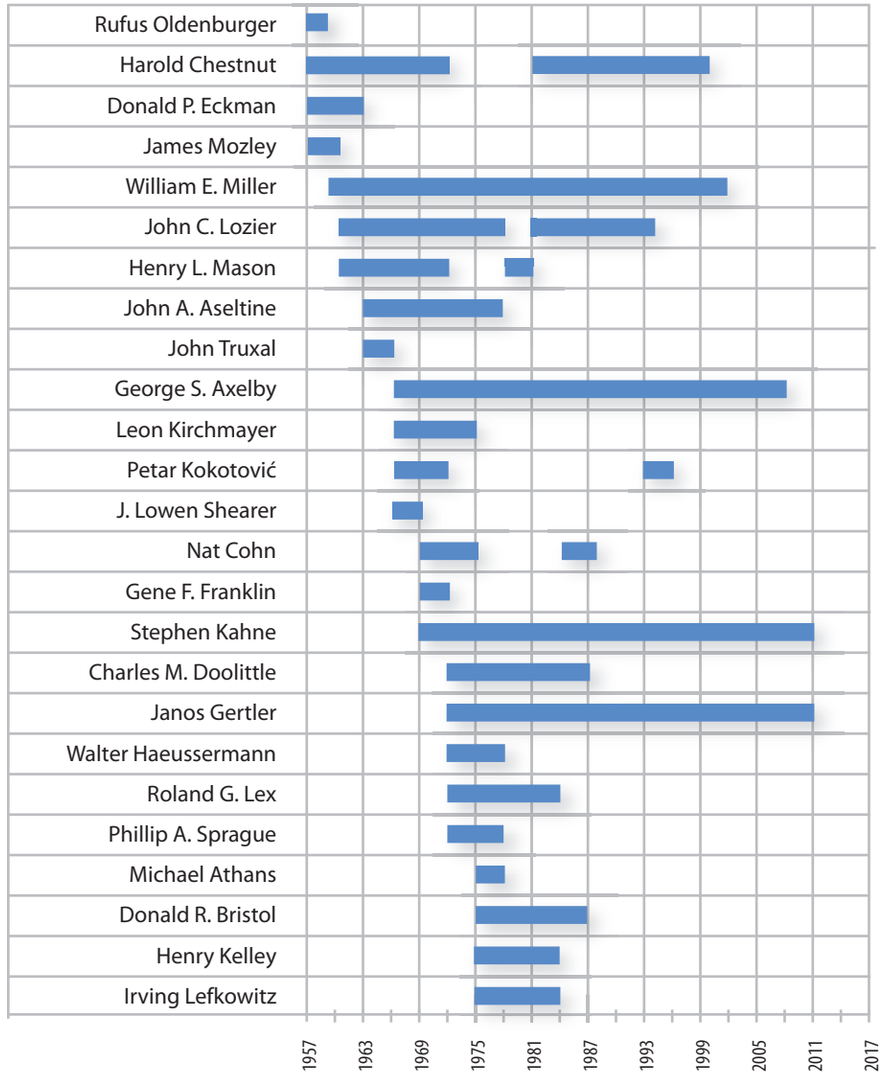

Number of United States Residents Serving in IFAC Leadership Positions



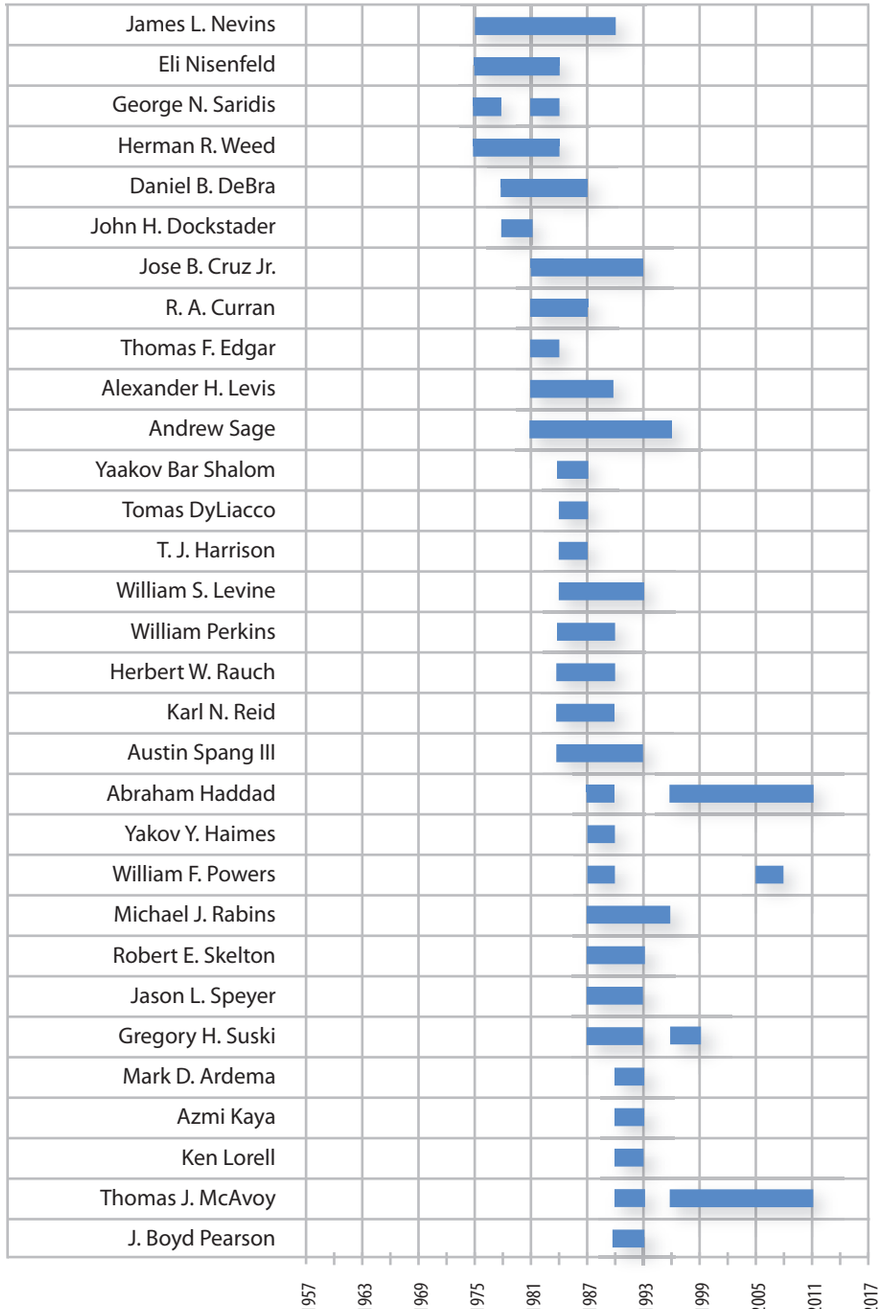


## United States Resident Leaders

Most United States residents who have served in IFAC leadership roles have individually served for a significant numbers of years. The following charts identify the time span for each of the 105 USA residents who have served as an IFAC leader during the last half century. Many of the individuals are readily recognized as significant scientists, authors, and innovators within the automatic control field.

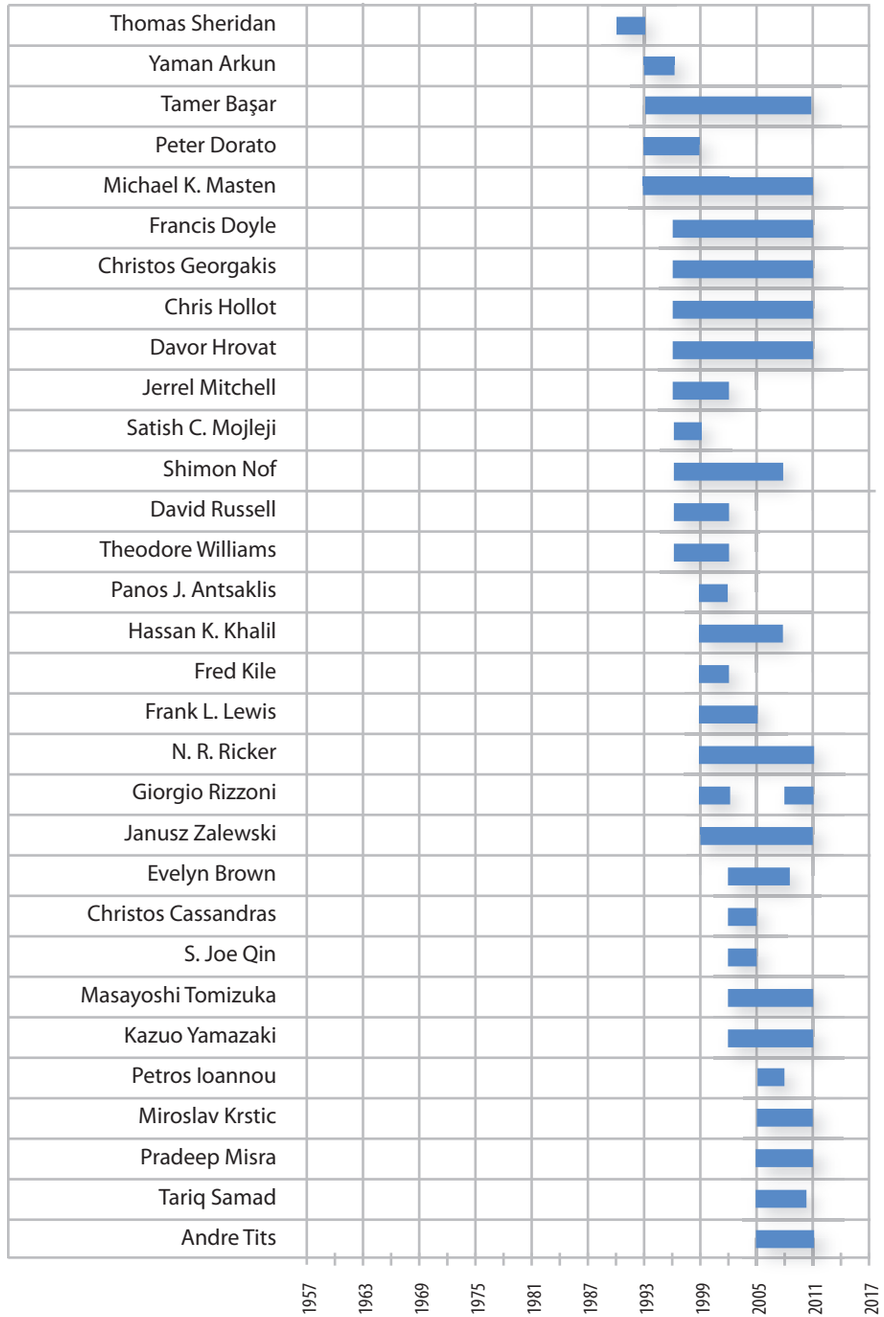


## United States Resident Leaders *(continued)*

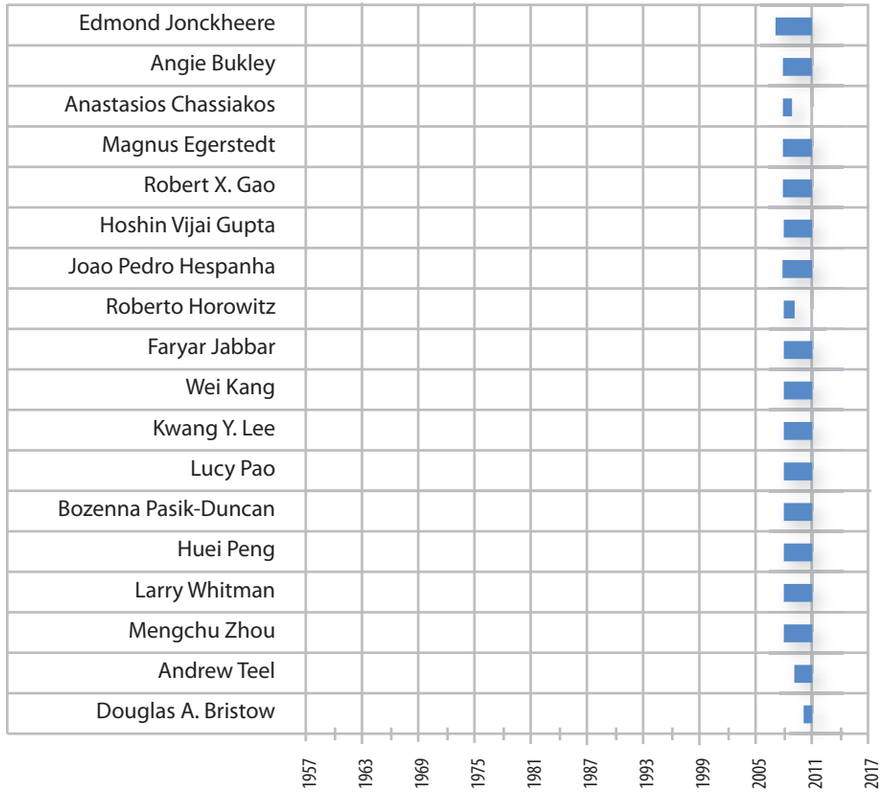






**United States Resident Leaders** *(continued)*








Not only have United States volunteers individually served for lengthy tenures, but many have served in multiple IFAC leadership roles.

**Technical Committee Leader:** 76% of the 105 United States residents who have served IFAC have held leadership positions (chair, vice chair) in IFAC Technical Committees:

Panos J. Antsaklis
Mark D. Ardema
John A. Aseltine
Michael Athans
Yaakov Bar Shalom
Donald R. Bristol
Angie Bukley
Anastasios Chassiakos
Christos Cassandras
Harold Chestnut
Nat Cohn
Jose B. Cruz Jr.
R. A. Curran
Daniel B. DeBra
J. Dockstader
Charles M. Doolittle
Francis Doyle
Tomas DyLiacco
Thomas F. Edgar
Magnus Egerstedt
Gene F. Franklin
Christos Georgakis
Janos Gertler
Hoshin Vijai Gupta
Abraham Haddad
Yakov Y. Haimes
Walter Haeussermann
T. J. Harrison
Joao Pedro Hespanha
Chris Hollot
Roberto Horowitz
Petros Ioannou
Faryar Jabbari
Stephen Kahne
Wei Kang
Azmi Kaya
Henry Kelley
Fred Kile
Leon Kirchmayer
Petar Kokotović
Kwang Y. Lee
Irving Lefkowitz
William S. Levine
Alexander H. Levis
Roland G. Lex
Ken Lorell
Henry L. Mason
Thomas J. McAvoy
William E. Miller
Jerrel Mitchell
Satish C. Mojleji
James Mozley
James L. Nevins
Eli Nisenfeld
Shimon Nof
Rufus Oldenburger
Bozenna Pasik-Duncan
J. Boyd Pearson
Huei Peng
William Perkins
William F. Powers
Michael J. Rabins
Herbert W. Rauch
Karl N. Reid
Giorgio Rizzoni
Andrew Sage
George N. Saridis
J. Lowen Shearer
Thomas Sheridan
Robert E. Skelton
Jason L. Speyer
P. S. Sprague
Gregory H. Suski
Masayoshi Tomizuka
John Truxal
Herman R. Weed
Larry Whitman
Theodore Williams
Janusz Zalewski
Mengchu Zhou

**Editor:** 31% of the United States residents have served as editor or editor-in-chief for IFAC Journals,

| | | |
|---|---|---|
| Yaman Arkun | Davor Hrovat | N. L. Ricker |
| George S. Axelby | Edmond Jonckheere | David Russell |
| Tamer Başar | Stephen Kahne | Andrew Sage |
| Douglas A. Bristow | Hassan K. Khalil | Tariq Samad |
| Evelyn Brown | Miroslav Krstic | George N. Saridis |
| Peter Dorato | William S. Levine | Austin Spang III |
| Francis Doyle | Alexander H. Levis | Andrew Teel |
| Robert X. Gao | Frank L. Lewis | Andre Tits |
| Christos Georgakis | Michael K. Masten | Theodore Williams |
| Janos Gertler | Thomas J. McAvoy | Kazuo Yamazaki |
| Chris Hollot | S. Joe Qin | Janusz Zalewski |

**Administrative Committee Member/Leader:** 28% of the United States resident leaders have served in the IFAC Administrative Committees,

| | | |
|---|---|---|
| John A. Aseltine | Abraham Haddad | James L. Nevins |
| Tamer Başar | Stephen Kahne | Shimon Nof |
| Donald R. Bristol | Petar Kokotović | Rufus Oldenburger |
| Harold Chestnut | Irving Lefkowitz | Lucy Pao |
| Nat Cohn | Roland G. Lex | Bozenna Pasik-Duncan |
| Jose B. Cruz Jr. | John C. Lozier | William F. Powers |
| Charles M. Doolittle | Michael K. Masten | Michael J. Rabins |
| Donald P. Eckman | Thomas J. McAvoy | Herbert W. Rauch |
| Christos Georgakis | William E. Miller | Masayoshi Tomizuka |
| Janos Gertler | Pradeep Misra | |

**IFAC Officers and Advisors:** 9% of the United States volunteers have served as IFAC Officers and/or IFAC Advisors,

| | | |
|---|---|---|
| Harold Chestnut | Abraham Haddad | Michael K. Masten |
| Nat Cohn | Stephen Kahne | William E. Miller |
| Janos Gertler | John C. Lozier | Rufus Oldenburger |





## Current United States Resident Volunteers

Whereas there have been 105 United States residents who have served in leadership positions during the history of IFAC, there have been an undetermined number of additional individuals from the United States who have volunteered in lesser, but nevertheless significant IFAC service positions—such as members of the IFAC Technical Committees or members of numerous International Program Committees (IPCs).

We have no count for the number of people serving in IPCs. However, in the current 2008-2011 triennium, there are over one hundred United States residents serving in various other volunteer IFAC positions. These positions impact virtually every IFAC activity,

- Executive Boards and Committees
- Technical Board and Committees
- IFAC Journal Editors

All of the current IFAC Boards – and all but one of the current IFAC Committees—contain members from the United States.

**Executive Boards and Committees:** Ten United States residents currently serve on the various executive boards and committees. Many of the residents serve in multiple board and committee responsibilities. With the exception of the Policy Committee, all current IFAC executive committees have United States members.

**IFAC Council**

| | |
|---|---|
| Ordinary Member | Abraham Haddad |
| Advisor | Janos Gertler |
| Advisor | Stephen J. Kahne |
| Advisor | Michael K. Masten |

**Executive Board**

| | |
|---|---|
| Ex Officio | Masayoshi Tomizuka |

**Publications Management Board**

| | |
|---|---|
| Chair | Stephen J. Kahne |
| Elsevier Representative | Janos Gertler |
| Ex Officio | Masayoshi Tomizuka |

**Executive Committees**

***Administrative & Finance Committee***

| | |
|---|---|
| Vice Chair | Abraham Haddad |

***Awards Committee***

| | |
|---|---|
| Textbook Prize | Bozenna Pasik-Duncan |
| Quazza Medal | Tamer Başar |
| Young Author Prize | Lucy Pao |

***Publications Committee***

| | |
|---|---|
| Chair | Masayoshi Tomizuka |
| Vice Chair | Thomas J. McAvoy |
| Member | Pradeep Misra |
| Young Author Prize | Lucy Pao |

***Publications Committee***

| | |
|---|---|
| Chair | Masayoshi Tomizuka |
| Vice Chair | Thomas J. McAvoy |
| Member | Pradeep Misra |
| Member | Bozena Pasik-Duncan |
| Ex Officio | Tamer Başar |
| Ex Officio | Janos Gertler |
| Ex Officio | Stephen J. Kahne |





**Technical Board and Technical Committees:** The IFAC Technical Board consists of nine Coordinating Committees and 40 Technical Committees organized within the Coordinating Committees. United States residents serve as members or leaders within all nine Coordinating Committees. In addition, United States residents hold membership in 29 of the 40 Technical Committees (72.5%). In total, there are 86 United States individuals currently serving as members of the IFAC Technical Committees. Some of the 86 individuals are members of multiple Technical Committees—such that the United States accounts for 101 membership positions within the committees. Four of the Technical Committee Chairs, and ten of the Technical Committee Vice-Chairs, are United States residents.

**Technical Board**

| | |
|---|---|
| Member | Thomas J. McAvoy |

**Technical Coordinating Committees & Technical Committees**

**CC 1 - Systems & Signals**

**TC 1.1 Modeling, Identification & Signal Processing**

Er Wei Bai
Jie Chen
Tyrone Duncan
Guoxiang Gu
Robert Kosut
Daniel Rivera
Roy Smith
Le Yi Wang

**TC 1.2 Adaptive and Learning Systems**

S.N. Balakrishnan
Bozenna Pasik-Duncan
Tyrone Duncan

**TC 1.3 Discrete Event and Hybrid Systems**

Magnus Egerstedt *TC Vice Chair*
Calin Belta
Spyros Reveliotis
Paulo Tabuada
Bert Tanner
Yorai Wardi
Mengchu Zhou

**TC 1.5 Networked Systems**

Joao Pedro Hespanha *TC Vice Chair*
P.R. Kumar
Sanjoy Mitter
Kameshwar Poolla

**Technical Board and Technical Committees** *(continued)*

**CC 2 - Design Methods**

**TC 2.1 Control Design**

Oscar D. Crisalle

**TC 2.2 Linear Control Systems**

Jie Chen

**TC 2.3 Non-Linear Control Systems**

Wei Kang TC Vice Chair
John Hauser
Zhong-Ping Jiang
Nikolaos K. Kazantzis
Miroslav Krstic
Eduardo A. Misawa
Karl Hedrick

**TC 2.5 Robust Control**

Faryar Jabbari TC Chair
Karl Hedrick
Daniel Liberzon

**CC 3 - Computers, Cognition and Communication**

**TC 3.1 Computers for Control**

Janusz Zalewski

**TC 3.3 Telematics: Control via Communication Networks**

Kevin L. Moore
Steve Rock
Paul Schenker

**CC 4 - Mechatronics, Robotics and Components**

**TC 4.1 Components and Technologies for Control**

Roberto Horowitz
Masayoshi Tomizuka

**TC 4.2 Mechatronic Systems**

Masayoshi Tomizuka *TC Chair*
Huei Peng *TC Vice Chair*
George T.C. Chiu
Pieter Mosterman

**TC 4.3 Robotics**

Mo-Yuen Chow
Masayoshi Tomizuka

**TC 4.5 Human Machine Systems**

Alex Kirlik
Alexander Levis
Amy Pritchett
Daniel Repperger
Andrew P. Sage





**CC 5 - Manufacturing and Logistics Systems**

**TC 5.1 Manufacturing Plant Control**

Timothy Johnson
Jay Lee
Yuming Zhang
Jeff Stein

**TC 5.2 Manufacturing Modeling for Management and Control**

Jeff Stein

**TC 5.3 Enterprise Integration and Networking**

Larry Whitman *TC Vice Chair*

**TC 5.4 Large Scale Complex Systems**

Andrew P. Sage

**CC 6 - Process and Power Systems**

**TC 6.1 Chemical Process Control**

Francis J. Doyle III *TC Chair*
Panagiotis Christofides
Prodromos Daoutidis
Michael A. Henson
Jay H. Lee
Michael J. Piovoso
David R. Vinson

**TC 6.3 Power Plants and Power Systems**

Kwang Y. Lee *TC Vice Chair*
Atif Debs
Glenn Masada

**TC 6.4 Fault Detection,Supervision & Safety of Technical Processes-SAFEPROCESS**

Janos Gertler
Pieter Mosterman
Giorgio Rizzoni

**CC 7 - Transportation and Vehicle Systems**

**TC 7.1 Automotive Control**

Giorgio Rizzoni *TC Vice Chair*
Karl Hedrick
Nazli Kahveci
Annalisa Scaccioli
Hongtei Eric Tsent
John Wagner
Yue-Yun Wang
Huei Peng

**Technical Board and Technical Committees** *(continued)*

**TC 7.3 Aerospace**
Angie Bukley *TC Vice Chair*
Mark Balas
Daniel B. Debra
Rees Fullmer
Walter Haeussermann
Jonathan P. How
John W. Hursh
Sungwam Kim
Jerrel R. Mitchell
Brett Newman
Fitz-Coy Norman
John D. Schierman
David K. Schmidt
Sherman M. Seltzer

**TC 7.4 Transportation Systems**
Anastasios Chassiakos

**CC 8 - Bio- and Ecological Systems**

**TC 8.2 Biological and Medical Systems**
Francis J. Doyle III
B. Wayne Bequette

**TC 8.3 Modeling and Control of Environmental Systems**
Hoshin Vijai Gupta TC *Vice Chair*
Aris Georgakakos

**TC 8.4 Biosystems and Bioprocesses**
Francis J. Doyle III

**CC 9 - Social Systems**

**TC 9.1. Economic and Business Systems**
Mengchu Zhou *TC Vice Chair*

**TC 9.4. Control Education**
Bozenna Pasik-Duncan *TC Chair*





**IFAC Editorial Boards:** IFAC publishes six journals, and there are United States residents currently serving on each of the editorial boards. In total, there are 16 United States residents on the boards. The editor-in-chief of two of the boards is a United States resident, as is one of the deputy editors-in-chief.

**Automatica**

| | |
|---|---|
| Editor-in-Chief | Tamer Başar |
| Editor | Andrew R. Teel |
| Editor | Andre Tits |
| Editor | Miroslav Krstic |
| Editor | Edmond Jonckheere |
| Editor | Manfred Morari (through April 2011) |
| Editor | John Baillieul (from May 2011) |
| Ex Officio | Stephen J. Kahne |

**Control Engineering Practice**

| | |
|---|---|
| Editor | Davor Hrovat |
| Editor | Tariq Samad (through 2010) |
| Ex Officio | Stephen J. Kahne |

**Annual Reviews in Control**

| | |
|---|---|
| Editor-in-Chief | Janos Gertler |
| Deputy Editor-in-Chief | Janusz Zalewski |
| Editor | Christos Georgakis |
| Editor | Chris Hollot |
| Ex Officio | Stephen J. Kahne |

**Engineering Applications of Artificial Intelligence**

| | |
|---|---|
| Editor | Evelyn Brown (through 2009) |
| Ex Officio | Stephen J. Kahne |

**Journal of Process Control**

| | |
|---|---|
| Regional Editor | N. L. Ricker |
| Regional Editor | Francis J. Doyle III (through 2009) |
| Ex Officio | Stephen J. Kahne |

**Mechatronics**

| | |
|---|---|
| Associate Editor | Douglas A. Bristow |
| Associate Editor | Robert X. Gao |
| Associate Editor | Kazuo Yamazaki |