IFAC NEWSLETTER

INTERNATIONAL FEDERATION OF AUTOMATIC CONTROL

IFAC Industry Committee Update
Initiative to Increase Industrial Participation in the Control Community

No.2
April 2019

The need for more and better industry engagement has been a common refrain in the control research community for as long as many of us can remember! Numerous initiatives have been launched toward this goal, but, while we can point to occasional successes, the theory/practice gap in our field continues to yawn wide . . . witness indicators such as the (poor) recognition of the importance of advanced control in industry, industry attendance in control conferences, and the participation of industry representatives in IFAC.

At the 2017 World Congress in Toulouse, IFAC took a major step to redress this problem. An amendment to the IFAC Constitution established a permanent Industry Committee, the objectives of which "include increasing industry participation in and impact from IFAC activities". The committee is chaired by a new Vice Chair of the Technical Board, who is an ex officio, nonvoting member of the IFAC Council. For the 2017-2020 triennium, Tariq Samad (US) was appointed the Industry Committee chair by the Council and thus serves on the TB and IFAC Council. It's worth noting that the establishment of the committee was preceded by extensive planning. The process started two triennia ago in response to the strategic planning activity undertaken by Ian Craig (ZA, IFAC President 2011-2017). A task force was established in 2013, which was led by Roger Goodall (UK), and a pilot phase of the Industry Committee was operational from 2014-17.

Industry Committee Membership and Structure

The Industry Committee has now been running for over a year and a half. Our membership roster is about 80 strong. The vast majority of the members are currently in or have spent most of their careers in industry, and all sectors with significant control relevance are represented. Members are nominated by IFAC NMOs, Technical Committees, and current committee members.

Five workstreams have been set up and are active, as follows:

- WS1: *Industry/academia/government collaboration* (Silvia Mastellone (CH), chair)
- WS2: *Industry Engagement in IFAC* TCs and Events (Philippe Goupil (FR), chair)
- WS4: *Gleaning the "Voice of the Industry"* (Alex van Delft (NL), chair)

- WS5: *Educating control engineers for industry roles* (Atanas Serbezov (US), chair)
- WS6: *Industry Committee communication* (Kevin Brooks (ZA), chair)

Another workstream, WS3 on *Industry Engagement in IFAC Publications,* is currently dormant. However, aspects of publications are covered under other WSs.

An Executive Subcommittee (ExCom) has also been established to oversee the workstreams, manage membership, serve as a liaison to the Technical Board and the Council, and provide general direction to the committee. In addition to the WS chairs, the ExCom roster includes Roger Goodall (UK), Steve Kahne (US), Carlos Eduardo Pereira (BR), and Tariq Samad (US).

Tariq Samad,
Industry Committee Chair

Impact of Control on Industry: A Survey

Newsletter readers may be interested in a survey that the Industry Committee conducted last year, to assess the perception of the impact of advanced control in industry. All committee members were asked to indicate, for each of a number of advanced control technologies, whether they thought the impact was (a) high, across multiple sectors; (b) high, in one sector; (c) medium; (d) low; or (e) none. We also asked for a best-guess future assessment, five years down the road. The results are shown in Table 1. The top technology is the PID controller, not an advanced control technology (in fact a short-hand definition of advanced control could be "anything other than PID control"!) but included on the list for calibration purposes. System identification, estimation and filtering, and model-predictive control are recognized as having had high impact by about two-thirds of the respondents.

The IFAC Journals

Automatica
http://www.journals.elsevier.com/automatica

Control Engineering Practice
http://www.journals.elsevier.com/control-engineering-practice

Engineering Applications of Artificial Intelligence
http://www.journals.elsevier.com/engineering-applications-of-artificial-intelligence

Journal of Process Control
http://www.journals.elsevier.com/journal-of-process-control

Annual Reviews in Control
http://www.journals.elsevier.com/annual-reviews-in-control

Journal on Mechatronics
http://www.journals.elsevier.com/mechatronics

Nonlinear Analysis: Hybrid Systems
http://www.journals.elsevier.com/nonlinear-analysis-hybrid-systems

IFAC Journal of Systems & Control
http://www.journals.elsevier.com/ifac-journal-of-systems-and-control

IFAC-PapersOnLine

http://www.journals.elsevier.com/ifac-papersonline

Regrettably, some of the crown jewels of control theory—robust control, nonlinear control, adaptive control—are only seen as having had high impact by about a fourth.

Table 1: Results of a survey by the Industry Committee on the current and future impact of PID and advanced control technologies *

Control Technology	Current Impact		Future Impact	
	% High	Low/No	High	Low/No
PID control	91%	0%	78%	6%
System Identification	65%	5%	72%	5%
Estimation & filtering	64%	11%	63%	3%
Model-predictive control	62%	11%	85%	2%
Process data analytics	51%	15%	70%	8%
Fault detection & identification	48%	17%	8%	8%
Decentralized and/or coordinated control	29%	33%	54%	11%
Robust control	26%	35%	42%	23%
Intelligent control	24%	38%	5 9%	11%
Nonlinear control	21%	44%	42%	15%
Discrete-event systems	24%	45%	39%	27%
Adaptive control	18%	38%	44%	17%
Repetitive control	12%	74%	17%	51%
Other advanced control technology	11%	64%	25%	39%
Hybrid dynamical systems	11%	68%	33%	33%
Game theory	5%	76%	17%	52%

* An earlier version of this survey was published on the IFAC Blog and included some additional information/impact categories that are not included in these figures

Additional questions were also asked in the survey. Some notable findings from responses to these queries are as follows:

Control researchers are broadly unaware of successes of advanced control, especially outside of application domains of their own interest. For example, only about 10% of respondents from the process industries indicated that robust control, adaptive control, and nonlinear control had had high impact, whereas for respondents from aerospace the numbers were 30-35% (still low, of course).

For successful industry application, domain knowledge, not just control knowledge, is crucial. Real-world applications are industry-specific, and industries differ in their research-to-practice workflows, value chains, safety criticality, etc. Such issues must be understood if research results are to be applied.

On a related topic, "implementation" aspects cannot be ignored in applied research. These include computational platforms, economic factors, workforce, etc.

A similar survey was also conducted during the pilot phase of the Industry Committee. An article on the survey was published in IEEE Control Systems Magazine (Feb. 2017). The Industry Committee is planning additional surveys as well, through its workstreams.

The IFAC Story E-book is available!
https://www.ifac-control.org/about/the-ifac-story

Current and Future Activities

The Industry Committee continues to forge ahead on several fronts. Our primary objectives for the remainder of this triennium are outlined below.

Collect and promote industry success stories. As noted above, even within the control research community the practical successes of control are not appreciated. We need to be better at patting ourselves on our collective backs!

Better connect control with "hot topic" technologies of industry interest. Control science is a key discipline for furthering the development of emerging technologies such as deep learning, autonomous systems, internet of things, and quantum computing.

Develop recommendations for IFAC Technical Committees and IFAC events. A few TCs are reasonably successful at attracting industry participation, including for their conferences and other events, but most of them (including most of the application-oriented TCs) are not. An important goal of the Industry Committee is to help all TCs enhance industry participation in their activities.

Disseminate the industry perspective to interested control researchers. Why is industry interested in advanced control? What challenges are faced by control researchers in different industry sectors in commercializing control technology? Every industry sector brings its own requirements and intricacies, including regulatory oversight, commissioning processes, supply and value chains, and modeling and identification methodologies.

Increase awareness of "innovation" ecosystems. In addition to targeting positions in academia and established corporations, engineers and scientists are increasingly embarking on entrepreneurial ventures as well. Several control scientists have had notable successes with start-up companies, but many in our community are unaware of opportunities or how best to pursue them.

Develop recommendations for an industry-relevant first course in control for undergraduate students. Most engineering undergraduates are not specializing in control, yet they should all be exposed to the discipline. We are coming up with guidelines for a "first and only" control course (this activity is in collaboration with IFAC TC 9.4, Control Education).

Enhance industry content and relevance for the 2020 IFAC World Congress in Berlin. This event should provide a good target for some of the first outputs of the Industry Committee. We also encourage submission of industrial invited sessions, industry papers, and open industry benchmark problems from the broader IFAC community.

From the IFAC President

Dear IFAC Friends and Colleagues,

IFAC's youngest one is just about two years old by now. That's certainly quite a gap to its seven older siblings. I am of course talking about the newest addition to the IFAC Journal collection: *IFAC Journal of Systems and Control*. After about two years, I wanted to know how our newest addition is doing, and I had the chance to question the Editor in Chief, Bob Bitmead. You might know Bob from conferences, where he often wears a deep red hat when he seeks to be found. A concept he implemented after a first test at the IFAC World Congress in Munich in 1987. No wonder, hence, that the new Journal has this distinct red color (which you can see in the picture with the overview of IFAC Journals). To quote Bob on the question who chose the red color: "I suppose the result is not so much that I had a say in this but that I insisted". But now back to the Journal:

Frank Allgöwer: Bob, you're the first Editor-in-Chief of the Journal, raising and fostering it from the very beginning. So, how is your 'baby' doing?

Bob Bitmead: The "baby" is doing well and growing strongly but is still not sleeping at night and making an occasional mess. We have deliberately chosen a path to establishing the Journal as a place of high repute and good readership. By focusing on the readership first, we have been quite selective and put good effort into identifying the best papers and into trying to improve them during the revision and editing phase. This is a labor-intensive process but reflects in the papers appearing in the Journal.

Frank Allgöwer: Tell me, why should I choose to submit my latest research results in the *Journal of Systems and Control* and not to any of the other IFAC journals?

Bob Bitmead: The Journal has a scope which is as broad as IFAC's. Indeed, it was established to provide the coverage that the other journals in the IFAC stable — turning from baby to horse analogies — could struggle with. The papers that we accept are quite broad and frequently describe integrative aspects of control, where the methodology needs to accommodate the application domain. In the most recent edition, there is a paper dealing with ecosystem analysis and its application for maize production. Papers in medical applications and environmental systems also have appeared. When these broad application domains are coupled with the underlying control theory, we see new possibilities emerge.

So, we are very interested in the latest innovative research. If your latest results fit this mould then we would be eager to see your paper and, assuming it fits, it would benefit from association with this different wide-ranging type of research and application.

FA: Are there - apart from quality - any restrictions on the content of potential articles?

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Bob: Clearly relevance is critical and should be included under the umbrella of quality. In the scope of the Journal, I was careful to articulate its reliance on papers providing "generalizable, extensible and transferable innovations" in control theory and applications.

Frank Allgöwer: Well, this certainly sounds very interesting. I will keep following the Journal with its broad spectrum of topics, looking for high quality papers in different fields, curiously waiting what the next interesting article I stumble upon in *JSC* is about. And thanks, Bob, for your answers, and your overall commitment to *JSC*!

With best regards from Stuttgart,

Frank Allgöwer

Editor's Note: Links to the IFAC Journals and IFAC-PapersOnLine can be found on page 1 of this Newsletter and are published in each IFAC Newsletter issue.

Get Involved

If you're interested in updates from the Industry Committee, you can "friend" us on Facebook (https://www.facebook.com/IFACIndComm) or follow us on Twitter (https://twitter.com/CommIfac).

We are also interested in comments from the IFAC community on all matters that fall under the committee's purview. If you know of exciting success stories, or have seen events where control researchers have been rubbing shoulders with practitioners, or have theories to propound to explain the theory/practice divide (and, better yet, how to bridge it), we'd like to hear from you.

Finally, the Industry Committee is always looking for additional members from among IFAC Affiliates who have a strong background in industry.

For all of the above, interested readers can contact the committee chair, Tariq Samad, directly at tsamad@umn.edu.

Submitted by: Tariq Samad (US),
Industry Committee Chair/Ex officio
IFAC Council Member 2017-2020

To register as an IFAC affiliate or to update your information please use the IFAC affiliate registration form.
https://www.ifac-control.org/about/ifac-affiliate-registration

IFAC is on social media!
Direct links to IFAC's presence on Facebook, LinkedIn, and Twitter can be found on the IFAC website.

In addition check out the IFAC Blog at
http://blog.ifac-control.org/

IFAC Journals:
An Overview

IFAC promotes the development of control science and technology through various publications, including the IFAC journals. Under the terms of an agreement between Elsevier Ltd. and IFAC, Elsevier is the official, sole publisher of IFAC publications, with the exception of the Newsletter and IFAC Reports.

In this issue of the IFAC Newsletter readers have the opportunity to read descriptions of the IFAC Journals that have been provided by each publication's Editor-in-Chief. A complete list of titles and thier links is provided on the first page of this Newsletter.

Automatica
Andrew Teel (US), Editor-in-Chief

Automatica, which was founded in 1963 and became an IFAC journal in 1969, is a leading archival publication in the field of systems and control. It helps to drive the trends in the field, which encompasses a broad set of areas and topics, and is thriving not only within itself but also in terms of its impact on other fields, such as communications, computers, biology, energy and economics.

It features a characteristic blend of theoretical and applied papers of archival, lasting value, reporting cutting edge research results by authors across the globe. It features articles in distinct categories, including regular, brief and survey papers, technical communiqués, correspondence items, as well as reviews on published books of interest to the readership. It occasionally publishes special issues on emerging new topics or established mature topics of interest to a broad audience.

Control Engineering Practice
Biao Huang (CA), Editor-in-Chief

Control Engineering Practice strives to meet the needs of industrial practitioners, academics and researchers with an inclination towards industries. It publishes papers which illustrate the direct application of profound control theory and its supporting tools in all possible areas of automation. As a result, the journal portrays a unique proposition towards publishing significant contributions made towards the application of advanced control strategies. It is a pre-

mier venue for control engineering researchers and practitioners to access practicing control engineering publications of the highest calibre and contribute back with their results. With high standards in its processing time and broad reach, Control Engineering Practice has become a preferred platform for leading research publications. Papers from traditional areas of control engineering to emerging fields of new interest to the control engineering community are all welcome.

Engineering Applications of Artificial Intelligence
Ajith Abraham (US), Editor-in-Chief

EAAI is a premier journal publishing high-quality innovative knowledge in the field of artificial intelligence and interdisciplinary engineering fields. Over the last few years, EAAI has grown from an application-oriented journal to a more formal platform in accordance to the current needs of engineers, scientists, research students and attracting new communities. EAAI provides an international forum for rapid publication of review papers, contributed papers, case studies etc. discussing the experience gained and lessons learnt from using or developing novel AI systems for real world engineering applications.

Focal points of the journal include but are not limited to: innovative algorithms and techniques for AI methodologies; Intelligent fault detection; Web intelligence; Big data analysis; social networks; Internet-of-Things, Cyber-physical systems and Industrial applications. For authors, EAAI supports contents innovations such as AudioSlides and Interactive MATLAB Figure Viewer that would help readers to understand the concepts very quickly and also access the underlying data.

Journal of Process Control
Denis Dochain (BE), Editor-in-Chief

The *Journal of Process Control*'s first issue was published in 1990 and it became an IFAC journal in 2002. The journal topics cover the application of control theory, operations research, computer science and engineering principles to the solution of process control problems. In addition to the traditional chemical processing and manufacturing applications, the scope of process control problems involves a wide range of applications that includes energy processes, nano-technology,

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systems biology, bio-medical engineering, pharmaceutical processing technology, energy storage and conversion, smart grid, and data analytics among others. Papers concerning theory in these areas will also be accepted, provided that the theoretical contribution is aimed at the application and the development of process control techniques. Advanced design methods exclude well-established and widely studied traditional design techniques such as PID tuning and its many variants.

Annual Reviews in Control
Francoise Lamnabhi-Lagarrigue (FR), Editor-in-Chief

Annual Reviews in Control is dedicated to provide comprehensive and visionary views of the field of Systems and Control, by publishing either survey articles (review papers on main methodologies or technical advances), or vision articles (cutting-edge and emerging topics with visionary perspective on the future of the field or how it will bridge multiple disciplines), or tutorial articles (fundamental guides for future studies). Guest edited special sections gathering the main results and challenges on hot topics are also carefully selected.

Journal on Mechatronics
Reza Moheimani (US), Editor-in-Chief

Mechatronics is the synergistic combination of precision mechanical engineering, electronic control and systems thinking in the design of products and manufacturing processes. It relates to the design of systems, devices and products aimed at achieving an optimal balance between basic mechanical structure and its overall control. The purpose of this journal is to provide rapid publication of topical papers featuring practical developments in mechatronics. It covers a wide range of application areas including consumer product design, instrumentation, manufacturing methods, computer integration and process and device control, and attracts a readership from across the industrial and academic research spectrum. Particular importance is attached to aspects of innovation in mechatronics design philosophy which illustrate the benefits obtainable by an a priori integration of functionality with embedded control. A major item is the design of machines, devices and systems possessing a degree of computer based intelligence. The journal seeks to publish research progress in this field with an emphasis on the application and application driven theory.

Nonlinear Analysis: Hybrid Systems
Alessandro Giua (IT), Editor-in-Chief
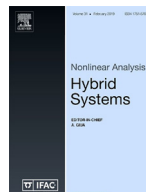
Nonlinear Analysis: Hybrid Systems was created in 2007, and publishes four issues each year. It is the main international journal devoted to hybrid dynamical systems and represents an aggregation point for all researchers in this multidisciplinary domain. It became an IFAC Journal in January 2015 (it had previously been an IFAC-affiliated journal) and has close ties with IFAC TC 1.3 on Discrete Event and Hybrid Systems. In 2018, 390 papers were submitted to the journal and 86 papers were published. The journal ranks in the top quartile (Q1) in all Subjects or Categories it belongs to on both ISI Web of Knowledge and Scopus.

IFAC Journal of Systems & Control
Robert (Bob) Bitmead (US), Editor-in-Chief

Having opened its submission site in January 2017, the *IFAC Journal of Systems and Control* is the new kid on the block in the IFAC publications portfolio. Its remit is to explore the breadth of theory and application of control with a breadth reflecting that of the IFAC Technical Board. In practical terms this means that IFACSC - to give the Journal its Elsevier handle - is dedicated to publishing generalizable, transferable and extensible results in theory and applications from across the gamut of control systems. The emphasis here should be clear that we are seeking novel theory and practice of broad interest to others. That is, the editorial policy is focused on the readers of papers and we deliberately seek innovative applications areas and approaches provided there is a capacity to draw conclusions from the work; theory should be new and applicable and applications should be thorough and provide insight into solutions approaches. Scanning the subject matter of the papers shows that we are exploring control in medicine, agriculture, transport, energy, all the while preserving good theoretical papers and bringing in new areas such as control education. Does this mean that IFACSC overlaps with other IFAC journals? Of course, but our focus is on breadth

and communications along with novelty in technique, application domain, and subjects of interest.

IFAC-PapersOnLine
Juan de la Puente (ES), Editor-in-Chief

The *IFAC-PapersOnLine* series, hosted at the ScienceDirect web service, includes proceedings from IFAC technical meetings: congresses, symposia, conferences, and most workshops. As required by IFAC rules, all papers published in IFAC-PapersOnline have undergone a peer review selection process. The series is open access in nature: papers are accessible to everybody without the need for registering or paying any fee. The copyright of all papers belongs to IFAC, and must be referenced if derivative journal papers are produced from the conference papers. *IFAC-PapersOnline* is indexed by Scopus, WoS, and EI, among others.

21st IFAC World Congress Special Program Features Update
12-17 July 2020
Berlin, DE

PREPARE YOUR SUBMISSIONS TO THE IFAC 2020 WORLD CONGRESS IN BERLIN!

There are only 15 months left now until we can welcome you to Berlin for the 21st IFAC World Congress, which is scheduled to take place from 12-17 July 2020. The 2nd Call for Papers has been issued recently with six months left to submit your contributions to the world's automation and control society meeting in Germany's vibrant capital. So now is the perfect time to provide the IFAC community with an update about the IFAC 2020 special program features and helping you in the planning and preparing of your submissions.

Following the positive experiences of IFAC 2017 in Toulouse we will continue the **Open Invited Tracks** series, complementing the well-established **Invited Sessions** on focused topics. Also the **Interactive Sessions** substituting former poster sessions by presentation of papers using interactive presentation screens in parallel will be continued. We are currently planning four parallel sessions with twelve screens per session. The aim of this session type, which was successfully introduced at IFAC 2017, is to offer optimized presentation means for promotion of research results, rather than giving the floor to "second class" contributions.

Check out IFAC's YouTube channel for new and historical IFAC video materials!

https://www.ifac-control.org/

The key role of automation and control for successfully meeting societal challenges of today and tomorrow will be addressed by **Topical Days** on Mobility and Transportation, Digitalization, Industry 4.0 and the changing working world, Sustainable green energy and resource supply, Quality of life & health care, complemented by a special topical day on Artificial Intelligence and Control.

Industry presentations at different levels organized in **Industrial Evening Sessions** will offer an open and lively get together between academia, research and industry. **Late Breaking Results** and **Extended Abstract** submissions aim at application-oriented contributions to industrial, economic or social fields, and research from other scientific communities.

IFAC 2020 will feature also a submission category for **Demonstrator Papers** to promote research or educational oriented devices, innovative prototypes and attractive transfer of technologies towards high-tech enterprises. The demonstrators will be presented at special sessions.

Video submissions accompanied by abstract papers will demonstrate automatic control contributions to industrial, economic and social fields and will be showcased at special sessions and during the session breaks. The best video submission will be awarded by a price. The **IFAC/IEEE Video Clip Contest** is soliciting videos that promote the field of control theory to a broader audience, and is jointly organized with IEEE Control Systems Society. The video clip shall present a subject related to control theory or automatic control. Winners will be determined by a jury and officially announced during the IFAC World Congress.

Special attention is directed towards the IFAC 2020 **Competitions**, challenging the participating teams to solve a given problem by teamwork before the IFAC WC. At the IFAC WC the solutions will be presented and evaluated at a public competition (hardware or software). Competition projects will be announced soon.

Please also note the very special cultural component of IFAC 2020: The first **"IFAC Control Orchestra"**. The idea is to form an orchestra

consisting solely of musicians from the control community, to practice and entertain on-site during the world congress and to present a live performance during the congress. Enrollments for this orchestra are very welcome at any time, as well as proposals for the indispensable pre-congress **Workshops and Tutorials** at the congress website www.ifac2020.org

A more detailed preview is planned for the June 2019 issue of the this Newsletter. Get ready for IFAC 2020 in Berlin!

**Please note the following
IFAC 2020 key dates:**

15 May 2019: PaperCept opens for submission
15 Sep 2019: Open invited track proposals
15 Oct 2019: Invited sessions proposals
31 Oct 2019: Draft manuscript submission
28 Feb 2020: Late-breaking results submission

Submitted by: Klaus Janschek (DE), Coordinating/General Chair, IFAC 2020

2nd IFAC Conference on Cyber-Physical & Human Systems (CPHS 2018)
14-15 December 2018
Miami, FL, US

The 2nd IFAC Conference on Cyber-Physical & Human Systems (CPHS 2018) took place in Miami, FL, US from 14-15 December 2018. The conference was sponsored by the International Federation of Automatic Control (IFAC), financially sponsored by the American Automatic Control Council (AACC, which is the US IFAC National Member Organization), and technically co-sponsored by the IEEE Control Systems Society (CSS).

CPHS is a newly established conference series, with a focus on the interactions between cyber physical systems and humans, bringing together researchers and practitioners from academia and industry to share scientific and technological advances, and examining the underlying multidisciplinary dimensions from the perspectives of engineering, human-factors, and the social sciences.

Anuradha Annaswamy (MIT, USA) and Dawn Tilbury (University of Michigan, USA) served as the General Chairs of CPHS 2018. The Program Chair was Sandra Hirche (TU Muenchen, DE) and the Conference Editor was Berenice Mettler (ICSI, Berkeley, US). Goldie Nejat (University of Toronto, CA), Tariq Samad (University of Minnesota, US), served as Vice Chairs for invited sessions and industry, respectively. Finance, Publicity and Registration Chairs were Rifat Sipahi (Northeastern University, USA), Yue Wang (Clemson U, USA) and Yildiray Yildiz (Bilkent U, Turkey), respectively. Local Arrangements and Special Session Chairs were Tansel Yucelen (USFlorida, USA) and Neera Jain (Purdue University, US), respectively. Advisory Board members included Mariana Netto (IFSTTAR, FR), Francoise Lamnabhi-Lagarrigue (CNRS, UParis-Saclay, FR) and Pramod

Khargonekar (UC Irvine, US). The IPC consisted of 34 members from 16 countries.

Following the successful inaugural CPHS conference in 2016, CPHS 2018 made a significant contribution to the goal of breaking down the silos that separate disciplines and creating a meeting venue to cultivate innovation and collaboration. The conference received 107 submissions, of which 81 were accepted, resulting in a 76% acceptance rate. (These numbers show an increase in both quantity and quality, considering 43 accepted papers with an 84% acceptance rate in the first conference.) There were a total of 141 registrations with 34 students. Among the 16 countries represented in the conference, the highest number of registrations came from US (80), France (18), Germany (13) and Japan (13). There were two parallel tracks of oral sessions on each day and a poster session at the end of the first day.

The U.S. National Science Foundation (NSF) sponsored the travel of 13 US students to Miami to attend CPHS 2018. Philipp Jonathan Schleer, a PhD student at Helmholtz-Institute for Biomedical Engineering, RWTH Aachen University (Aachen, DE), received the Young Author Award for his work *Evaluation of Different Modes of Haptic Guidance for Robotic Surgery*.

Two plenary sessions were held: *Adaptation and Complexity in Layered Networks: How New Technological Capabilities Are Hijacked By People Seeking Advantage,* by David Woods (Ohio State University, US) and *Robotics is a System Science: Educational Implications*, by Ruzena Bajcsy (University of California- Berkeley, US).

Left to right: David Woods (US), plenary speaker, with session chair Anuradha Annaswamy (US)

CPHS 2018 included a few special sessions. The first of these was organized on Thursday, 13 December in parallel with the opening reception, with its focus on research demonstrations, using both software and hardware. A total of nine demos ranging from the use of a human wearable device for controlling robotic swarms to interactive software games aimed at understanding how people invest in security.

The second special session was a panel organized to emphasize the importance, and discuss the research challenges at the interface between engineering and social sciences. The title of the panel was *Interface Between Engineers and Social Scientists: Low-hanging Fruits, Language Barriers, and Synergy* and was moderated by Dawn Tilbury (University of Michigan, Ann Arbor, MI, US) and David Woods (Ohio State University, USA). The panelists were Je-

rome Busemeyer (Department of Psychological & Brain Sciences, Indiana University – Bloomington, US), Frédéric Dehais (head of neuro-ergonomics and human factors, The Institut Supérieur de l'Aéronautique et de l'Espace, FR), Pramod Khargonekar (UC Irvine), and A. Michael Froomkin (University of Miami, Law School, Coral Gables, FL, US). Panel discussions revolved around computational modeling of human decision making, neuroergonomics, human factors, risk-, trust- and legal aspects of autonomous transportation technologies as well as the engineering side of cyber-physical systems.

The third special session was a mini workshop on *Cross-disciplinary Communication and Collaboration in CPHS Research*, whose speakers included Ruzena Bajcsy (University of California- Berkeley, US) and Robert Gregg (University of Texas- Dallas, US), followed by a moderated panel discussion with panelists Yue (Sophie) Wang (Clemson University, Clemson, SC, US), Richard Hull (UTC Aerospace Systems, Kissimmee, FL, US), Jason Siegel (University of Michigan, Ann Arbor, MI, US) and Cedric Langbort (University of Illinois, Urbana-Champaign, IL, US).

Four invited sessions were organized on the following topics: *Estimation, Learning, and Control of Human-Machine Systems*, *Advances in Control and Automation of Wearable Robots and FES-Driven Systems to Support Human Movement*, *Shared Pilot-Autopilot Interactions* and *Human-Machine Interactions in Autonomous Driving*. In addition, four regular sessions were held on *Human Behavior Modeling*, *Interaction with Semi-Autonomous Robots*, *Smart Cities, Mobility, and Infrastructure* and *Decision-Support for Human Operators*.

A few social programs were arranged in the Hyatt Regency Hotel including an opening reception, a conference banquet lunch and a mini-workshop with brown-bag lunches. With a relatively large variety of food, drinks and music, these activities provided a fun and pleasant environment for the CPHS 2018 participants to enjoy their time in Miami. Overall, 2018 CPHS can be considered a success with the gathering of engineers and social scientists from all over the world in an engaging, professional and friendly environment. The success of the conference is verified by the overwhelmingly positive feedback we have received from the attendees. The feedback becomes even more valuable when it comes from upcoming leaders of the field, the graduate students. Here are the two comments they shared with us: "CPHS 2018 was a wonderful experience for a Ph.D. student like myself. It made me more confident about my own research, which considers the intersection of human cognition and engineering design, in domains of creativity and intelligence." (Hristina Milojevic); "Having a background in traditional chemical process control, CPHS 2018 was an excellent eye-opener to the variety of inter-disciplinary research that is possible." (Sambit Ghosh)

The organizers wish to thank all the sponsoring organizations for their valuable support that enabled the conference to accomplish all of its goals. We also thank all of our colleagues for their help in making CPHS 2018 a success. We expect CPHS to be a recurring biennial conference.

An email list has been created for researchers interested in CPHS activities such as organizing workshops, invited sessions, or the next edition of the CPHS conference series. Anyone who is willing to join the list can send an email to C-P-H-S+subscribe@googlegroups.com.

Submitted by: Anuradha Annaswamy (US), Dawn Tilbury (US), Sandra Hirche (DE), Berenice Mettler (US), and Yildiray Yildiz (TR)

2018 Australian & New Zealand Control Conference (ANZCC 2018)
7-8 December 2018
Melbourne, AU

The 2018 Australian & New Zealand Control Conference (ANZCC 2018) was held at Swinburne University in Melbourne, Australia from 7-8 December 2018. The ANZCC conference series has grown to become an internationally recognised scientific event. The ANZCC 2018 hosted 92 participants from 17 countries who made ANZCC 2018 the scientific conference of their choice and, thus, further upscaled the international distinction of the ANZCC series.

The ANZCC 2018 keynote talks were delivered by three world leading control system scientists:

- Jun Wang of City University of Hong Kong (Hong Kong, CN), *Intelligent Control Based on Neurdynamic Optimization*
- Xinghuo Yu of Royal Melbourne Institute of Technology/RMIT University, Australia, *Switching in Complex Network Systems: A Control Engineering Perspective*
- Ian R. Petersen (IFAC Council member) of the Research School of Engineering, the Australian National University, Australia, *A Survey of Quantum Control Engineering*

Ian Petersen,
ANZCC 2018 Keynote speaker and
IFAC Council Member

All submitted manuscripts were subject to a rigorous two-stage peer review process. The planning for ANZCC 2018 took 18 months and required a great deal of effort from the ANZCC 2018 Organising Committee. Technical sponsorship was obtained from both IFAC and IEEE. Thanks to corporate sponsorship, the ANZCC

2018 was able to offer lower registration fees, especially the student fees.

The Manuscript Review process was skillfully conducted by Fuwen Yang, who is also the architect behind the conference's final program. The conference's website was designed and, enthusiastically & timely, maintained by Clinton McKinnon. The ANZCC 2018 is thankful to GriffithPAY and Sandra Quinell for setting up the ANZCC online registration page and overseeing the registration fee payment process. We are grateful to the great assistance received from Jinxing Zhang and Mangqiu Tao at Swinburne University of Technology, including their skillful management of the local arrangements. All other remaining tasks were unreservedly carried out by us general co-chairs and, thus, we accept the responsibility for any shortcomings.

Our deepest thank-you goes to all of the paper co-authors and paper reviewers. Without their dedication and commitment to the ANZCC conference series, the ANZCC 2018 would not have happened. Numerous testimonials received have confirmed that ANZCC 2018 participants enjoyed a rewarding experience and are committed to participating in future ANZCC conferences and to nurturing the ANZCC conference series in years to come.

Submitted by: Qing-Long Han (AU) and Ljubo Vlacic (AU), ANZCC 2018 General Co-Chairs

Reminder:
IFAC Council &
Related Meetings 2019

The 2019 IFAC Council & Related Meetings 2019 are scheduled to take place in Vienna, Austria from 7-9 September 2019. If you will be attending please submit your reply form, which is available at:

https://www.ifac-control.org/AdminMeeting-Form

The meetings are being held in conjunction with NOLCOS and Mechatronics 2019.

Our Council- and Related Meetings are scheduled to take place at the Fleming's Selection Hotel Wien City.

Fleming's Selection Wien-City (event rate link, for booking):
https://be.synxis.com/?adult=1&arrive=2019-09-03&chain=21125&child=0&currency=EUR&depart=2019-09-06&group=NOLCOS1&hotel=3742&lang=1&level=hotel&locale=en-US&rooms=1&sbe_ri=0
Josefstädter Straße 10-12
1080 Vienna
Austria
Phone: (43) 1 20599-0

Please check to see what the requirements are to enter Austria, and allow sufficient time for your visa application https://www.bmeia.gv.at/en/travel-stay/entry-and-residence-in-austria/entry-and-visa/

IFAC
INTERNATIONAL FEDERATION OF AUTOMATIC CONTROL

Calendar of IFAC Events

Title	2019	Place	Further information
3rd IFAC Workshop on Control of Systems Governed by Partial Differential Equations, CPDE 2019	May 22 – 24	Oaxaca Mexico	http://www.smm.org.mx/eventos/cdps-cpde/ smm@smm.org.mx
15th IFAC Symposium on Large Scale Complex Systems LSS 2019	May 26 – 28	Delft Netherlands	https://sites.google.com/view/ifaclss19 M.W.Otte@tudelft.nl
SICE, ISCIE, JSME, IEEE, IFAC Conference on Asian Control Conference (in cooperation with IFAC) ASCC 2019	June 09 – 11	Kitakyushu, Fukuoka Japan	www.ascc2019.org/ ascc2019@ascc2019.org
IFAC Workshop on Control of Smart Grid and Renewable Energy Systems CSGRES 2019	June 10 – 12	Jeju Republic of Korea	http://csgres2019.com/ yilee@seoultech.ac.kr
9th IFAC Symposium on Advances in Automotive Control AAC 2019	June 24 – 27	Orléans France	https://aac19.sciencesconf.org/ aac2019@univ-orleans.fr
Conference on European Control Conference (in cooperation with IFAC) ECC 2019	June 25 – 28	Naples Italy	http://ecc19.eu/ technical@ecc19.eu
1st IFAC Workshop on Control of Transportation Systems WCTS 2019	June – July 30 – 01	Haifa Israel	https://wcts2019.net.technion.ac.il/ wcts2019@technion.ac.il
10th IFAC Symposium on Intelligent Autonomous Vehicles IAV 2019	July 03 – 05	Gdansk Poland	http://www.konsulting.gda.pl/iav2019/ iav2019@konsulting.gda.pl
3rd IFAC Workshop on Thermodynamic Foundations for a Mathematical Systems Theory, TFMST 2019	July 03 – 05	Louvain-la-Neuve Belgium	https://sites.uclouvain.be/tfmst2019/ denis.dochain@uclouvain.be
12th IFAC Symposium on Advances in Control Education ACE 2019	July 07 – 09	Philadelphia, PA USA	https://ifac-ace2019.org/ e-mail: not yet available
12th International Workshop on Robot Motion and Control RoMoCo 2019	July 08 – 10	Poznan Poland	http://romoco.put.poznan.pl/ piotr.mieszala@put.poznan.pl
Conference on American Control Conference (in cooperation with IFAC) ACC 2019	July 10 – 12	Philadelphia, PA USA	http://acc2019.a2c2.org/ e-mail: not yet available
2nd Asian Pacific Conference of the Prognostics and Health Management Society PHM AP 2019	July 23 – 26	Beijing China	https://www.phmsociety.org/events/ conference/phm/asiapacific/19 e-mail: not yet available
16th INSTICC et. all Conference on Informatics in Control, Automation and Robotics ICINCO 2019	July 29 – 31	Prague Czech Republic	http://www.icinco.org/ icinco.secretariat@insticc.org
13th IFAC Workshop on Intelligent Manufacturing Systems IMS 2019	August 12 – 14	Oshawa Canada	http://www.ifacims2019.com/ Contact@IFACIMS2019.com
5th IFAC Conference on Intelligent Control and Automation Sciences ICONS 2019	August 21 – 23	Belfast United Kingdom	http://www.qub.ac.uk/icons2019/ icons2019@qub.ac.uk

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IFAC NEWSLETTER

INTERNATIONAL FEDERATION OF AUTOMATIC CONTROL

Calendar of IFAC Events

Title	2019	Place	Further information
21st IFAC Symposium on Automatic Control in Aerospace ACA 2019	August 27 – 30	Cranfield United Kingdom	https://www.cranfield.ac.uk/events/events-2019/ifac-conference IFAC.Symposium@cranfield.ac.uk
9th IFAC IEEE IFIP IFORS et al. Conference on Manufacturing Modelling, Management and Control MIM 2019	August 28 – 30	Berlin Germany	https://blog.hwr-berlin.de/mim2019/ mim2019@hwr-berlin.de
18th IFAC Symposium on Control, Optimization and Automation in Mining, Mineral and Metal Processing MMM 2019	August 28 – 30	Stellenbosch South Africa	https://www.ifacmmm2019.org/ info@ifacmmm2019.org
11th IFAC Symposium on Nonlinear Control Systems NOLCOS 2019	September 04 – 06	Vienna Austria	http://www.mechatronicsnolcos2019.org/ contact@mechatronicsnolcos2019.org
8th IFAC Symposium on Mechatronic Systems MECHATRONICS 2019	September 04 – 06	Vienna Austria	http://www.mechatronicsnolcos2019.org/ contact@mechatronicsnolcos2019.org
7th IFAC Symposium on System Structure and Control SSSC 2019	September 09 – 11	Sinaia Romania	http://www.ace.ucv.ro/sssc2019 sssc-tds@automation.ucv.ro
15th IFAC Workshop on Time Delay Systems TDS 2019	September 09 – 11	Sinaia Romania	http://www.ace.ucv.ro/tds2019 sssc-tds@automation.ucv.ro
14th IFAC Sympsium on Analysis Design and Evaluation of Human Machine Systems, HMS 2019	September 16 – 19	Tallinn Estonia	https://cs.ttu.ee/hms2019/ secretariat-IFACHMS2019@ttu.ee
8th IFAC Workshop on Distributed Estimation and Control in Networked Systems, NECSYS 2019	September 16 – 17	Chicago, IL (Wintrust Hall) USA	http://necsys2019.csl.illinois.edu/ e-mail: not yet available
12th IFAC Conference on Control Applications in Marine Systems, Robotics, and Vehicles, CAMS 2019	September 18 – 20	Daejeon Republic of Korea	http://cams-wroco.org/ e-mail: not yet available
1st IFAC Workshop on Robot Control WROCO 2019	September 18 – 20	Daejeon Republic of Korea	http://cams-wroco.org/ e-mail: not yet available
1st IFAC Workshop on Control Methods for Water Resource Systems CMWRS 2019	September 19 – 20	Delft Netherlands	http://www.cmwrs2019.org/ e-mail: not yet available
5th IFAC Symposium on Telematics Application TA 2019	September 25 – 27	Chengdu China	https://ifactelematics2019.swjtu.edu.cn/index.htm ifacta2019@swjtu.edu.cn
19th IFAC Conference on Technology, Culture and International Stability TECIS 2019	September 26 – 28	Sozopol Bulgaria	http://www.tecis19.tu-plovdiv.bg/ tecis@tu-plovdiv.bg
8th IFAC/CACHE Conference on Foundations of Systems Biology in Engineering FOSBE 2019	October 14 – 19	Valencia Spain	http://fosbe2019.ai2.upv.es/ e-mail: not yet available
16th IFAC/IEEE (Czechoslovakia Section) Conference on Programmable Devices and Embedded Systems PDES 2019	October 29 – 31	High Tatras Slovakia	http://pdes-conference.eu/19/index.php?page=home&lang=en alena.kozakova@stuba.sk
3rd IFAC Workshop on Linear Parameter Varying Systems LPVS 2019	November 04 – 06	Eindhoven Netherlands	https://lpvs2019.tue.nl lpvs2019@tue.nl
15th European Workshop on Advanced Control and Diagnosis ACD 2019	November 21 – 22	Bologna Italy	https://eventi.unibo.it/acd2019 acd2019@unibo.it

The IFAC Calendar of Events is constantly updated as adddditional technical events (Workshops, Symposia, and Conferences) are approved. The online complete version of the IFAC Calendar of Events is available at:
https://www.ifac-control.org/events/