



Post Congress Report

IFAC 2023, Yokohama, Japan

IFAC 2023 National Organizing Committee

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Foreword

The International Federation of Automatic Control (IFAC) has a history of over 60 years to hold the World Congress every three years. The international automatic control community meets to exchange and discuss the newest research findings in the broad field of systems, control, and automation. The IFAC World Congress is the largest event in the field with several thousand attendees from all over the world. It has been 42 years since the last World Congress in Japan was held in Kyoto in 1981, and it was a great pleasure for the Japanese automatic control community to host the IFAC World Congress in Yokohama in an in-person format in 2023.

The preparation turned out to be challenging for us due to the COVID-19 pandemic, which made the Berlin Congress in 2020 to be fully virtual. In the early stage of our preparations, the pandemic situation was completely unpredictable, so we had to explore different possibilities. Assessing the pandemic situation at the time of the congress, determining the appropriate event format, and calculating the expected number of participants proved to be difficult tasks. Approximately one year ago, we officially decided on a hybrid format with a focus on in-person participation.

For IFAC 2023, we have proposed the vision of "Wa (Harmony)". In a broad sense, it represents the design of the large harmonious control loop to solve societal problems and to create societal values. From the Japanese perspective, it also means harmony of traditional culture and innovative technology. To promote the congress vision "Wa", which may have various implications, we identified five important subthemes from different perspectives and assigned one per day for the week: Decarbonized Society for Monday, Aging Society for Tuesday, Post-COVID Resilience for Wednesday, Digital Society for Thursday, and Impact of AI on Our Society for Friday. We tried to place the plenaries and other sessions according to these subthemes.

One of the major highlights of the congress program was the strengthened collaboration with the industry. We established the Industry Group within the Organizing Committee, consisting of a total of 137 members from the academia and the industry with participation from about 50 Japanese companies in 17 technical fields. In collaboration with the IFAC Industry Committee, the Industry Group successfully organized a wide range of events, including forums, organized sessions, technical tours, exhibitions, and so on. We strongly hope that these activities and efforts can lead us to a start of further collaborations with industrial companies engaged in automatic control.

Another highlight was that under the initiative of President Hajime Asama, we have introduced a new format of sessions called Forums. There were in total of 22 forums covering different aspects and themes related to the Congress Vision "Wa", Industry, Education, Funding, Diversity and Inclusion, and Citizens. In addition to the standard technical sessions with oral presentations, emphases were placed on interactive sessions, where presenters gave shotgun talks prior to the sessions with large monitors. Other special events included 5 competitions, exhibitors with over 25 booths, and social events planned by students who were part of the IFAC 2023 Organizing Committee. Moreover, the Night Festival of Underwater Robots attracted about 1000 people at the waterfront of Yokohama.

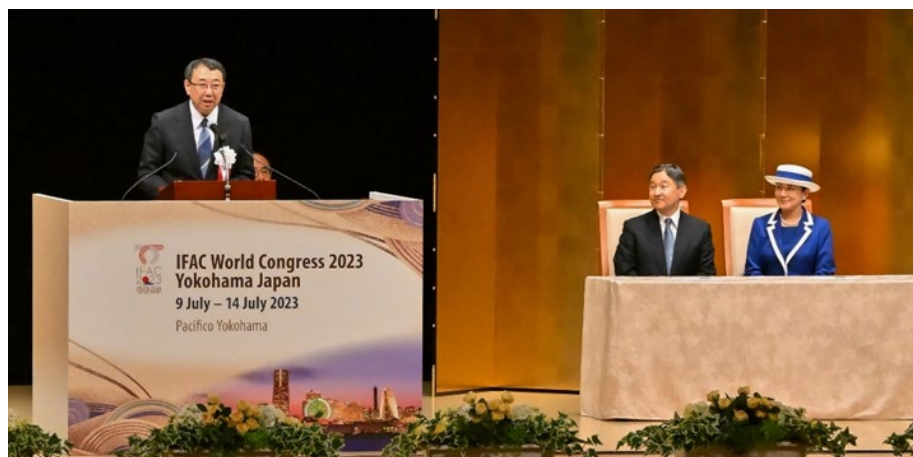
Executive Summary

IFAC 2023 Program Highlights

- 5 Plenaries, 6 Semi-Plenaries, 1 Panel Session
- 1 Public Lecture (IFAC Foundation Kwon Award)
- Forums on various topics
 - 3 by the IFAC Industry Committee
 - 7 by the IFAC 2023 Industry Group
 - 4 events by the IFAC Diversity and Inclusion Committee
 - 5 Special Forums on “Wa”, funding for international collaboration, and so on
 - 2 Control Education Lunch Sessions
- Citizens' Forums
 - 3 events for Yokohama Citizens including Girls in Control workshop
 - 1 Public Lecture (IFAC Foundation Kwon Award)
 - 1 Marine Robots Night Festival
- 305 Regular oral sessions in 24 parallel sessions over five days
- 24 Interactive sessions using electronic posters with 8 Shotgun Talk sessions
- 18 Workshops and Tutorials
- 5 Competitions
- 4 Technical Tours and 8 Social Tours
- Social Events including Opening Ceremony, Welcome Reception, Marine Robots Night Festival, Congress Banquet, Closing Ceremony, and Farewell Reception with Korean Evening
- Live performance of the IFAC Control Orchestra
- Student Activities including the IFAC Conference Student Task Force Event, Trips to Kamakura, and Next-Gen Faculty Interactive Session

IFAC 2023 Vision: “Wa: Control for Solving Societal Problems and Creating Societal Values”

- Future direction of control science and technology
- Crucial issues related to energy, environment, disasters, pandemics, and SDGs
- Control and new technological trends in Data Science, AI, IoT, and robotics integrated



IFAC 2023 Policy: Diverse and Eco-Friendly

- Over 95 % of participants are on-site
- Options for online participation:
 - For those difficult to travel overseas
 - Plenary and semi-plenary lectures and pre-recorded presentation videos via Virtual Conference Platform (VCP)
 - When authors are not present on-site, the video is for oral and interactive sessions
- Diversity & Inclusion Promotion: D&I Day (on Wed), Support for students
- Congress Program: “Manifesto” via IFAC App

Paper Submissions and Reviews

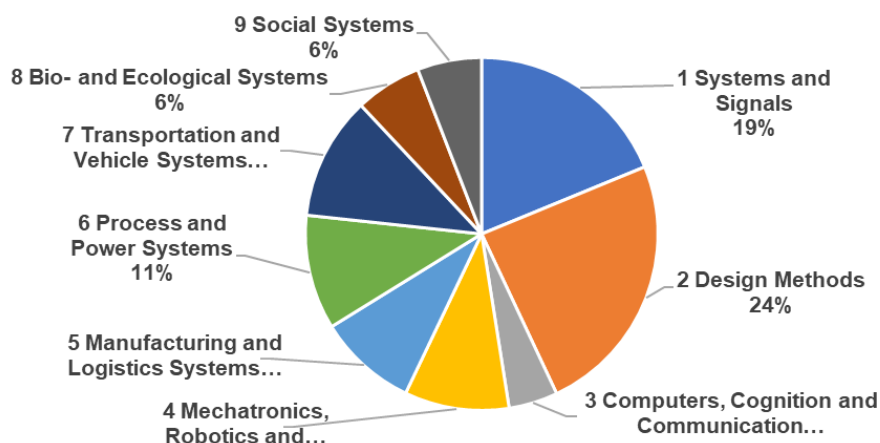
The congress attracted 2945 submissions including 2787 papers and discussion papers, 86 Open Invited Tracks, 44 invited sessions, and 28 workshops. The review process was organized by the IPC team with the help of 9 CC and 39 TC Chairs, who distributed papers to 433 Technical Associate Editors of the International Program Committee. The Technical Associate Editors collected more than 8900 reviews from more than 4700 reviewers to obtain 3 reliable reviews for each contribution on average.

Overall 2319 scientific contributions were accepted with acceptances in the important categories as follows:

- 1293 Contributed papers
- 875 papers in Invited Sessions and Open Invited Tracks
- 8 Demonstrator papers
- 11 Dissemination papers

Areas of Accepted Regular Papers

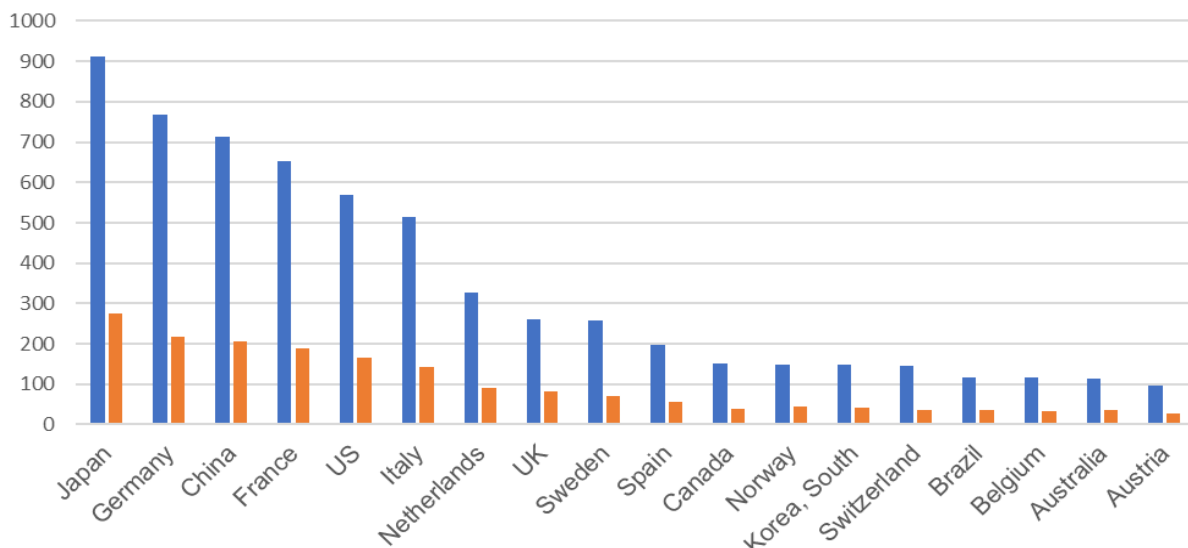
The following chart shows the percentages of the research areas regarding the number of accepted regular papers. The two top areas, systems and signals, and design methods, are related to control theory, whereas others are related to control applications. We can observe that they are almost balanced. The table shows the top 6 keywords used in the accepted papers.



Top 6 Keywords	
1. Machine learning	158
2. Multi-agent systems	106
3. Predictive control	87
4. Control of renewable energy resources	74
5. Lyapunov systems	67
6. Autonomous vehicles	67

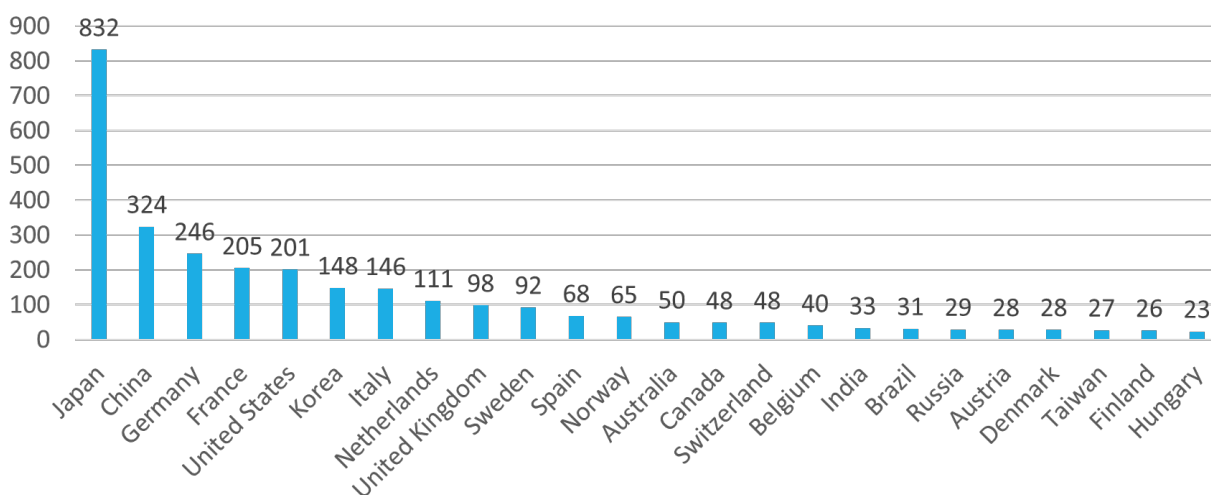
Countries of Corresponding Authors and All Authors

There were a total of 7460 authors of papers in the Congress program from 80 countries/regions. The following graph shows the numbers of all authors and corresponding authors of regular and invited papers in the program.



Registration Statistics

- 3206 registered delegates from 62 countries including
 - 1012 registered students
 - 172 registered for online participation
- 489 registered for pre-Congress Workshops and Tutorials



Sponsor Statistics

- 29 Sponsors
- 26 Congress Supporters
- 27 Exhibitors

Scientific Program

Program Overview

As the COVID-19 pandemic slowed down since 2022, the organizers aimed to have the Yokohama congress to be an in-person event despite the uncertainties that the epidemic could persist and have placed their efforts into preparing a full program in the traditional IFAC World Congress format. As a result, the program consisted of plenaries, technical sessions covering a broad range of research areas, tutorials and workshops, forums on special topics, and panel discussions. More interactive aspects were introduced through interactive sessions with electronic poster presentations, demonstrators, competitions, and technical tours. We have also put emphases on the involvement of industry and diversity and inclusion by organizing different events. For all participants including those online to fully appreciate the program, the presentations of regular sessions could be viewed via pre-recorded videos during the congress week and afterwards in the Virtual Conference Platform (VCP). The plenaries are permanently available at the IFAC YouTube channel.

The theme of the congress “Wa: Control for Solving Societal Problems and Creating Societal Values” played an important role in the program. Various crucial issues related to the future of control in the domains of energy, environment, disasters, pandemics, and SDGs were discussed together with the integration of control and new technological trends in Data Science, AI, IoT, and robotics. The following five topics were set as the main themes for the different days during the congress week:

- Decarbonized Society
- Aging Society
- Post-COVID Resilience
- Digital Society
- Impact of AI on Our Society

Global Schedule of the IFAC World Congress 2023

	July 8 Sat.	July 9 Sun.	July 10 Mon.	July 11 Tue.	July 12 Wed.	July 13 Thu.	July 14 Fri.
8:30			Plenary Talks				
9:30	Pre-Conference Workshop/Tutorials		Coffee Break				
10:00			Technical Sessions				
12:00			Lunch				
13:30			Technical Sessions				
15:30			Coffee Break				
16:00			Technical Sessions				
18:00		Opening Ceremony	Semi-Plenary Talks				Closing Ceremony
19:00		Welcome Reception	Student Reception		Marine Robots Night Festival	Congress Banquet	Farewell Reception

Submission Categories and Program Elements

The IFAC World Congress is the largest event in the field of control science and technology, attended by a worldwide audience of scientists and engineers from academia and industry. For the program to provide the most up-to-date and complete view of control techniques, the following program elements were introduced:

- **Regular contributions** present theoretical or application driven research with main focus on the theoretical or methodological contribution as well as application papers presenting research with main focus on concrete contributions to industrial, economics, or social fields.
- **Invited contributions** refer to papers to be part of invited sessions, where the contributors are invited by the organizers. Each invited session was limited to consist of six papers and the organizers prepared a proposal in advance.
- **Open invited track contributions** were part of open invited tracks. Such tracks promoted specific research topics and had no limit on the number of papers. The organizers solicited contributions, and the track proposals were listed on the IFAC WC 2023 website leaving open the possibility for anyone to contribute.
- **Demonstrator contributions** were for promoting and showcasing research or education-oriented devices, innovative prototypes and transferring technologies to the enterprise. Presentations were made at the Exhibition Hall as part of the interactive sessions with space and displays to show the devices.
- **Dissemination contributions** provided opportunities to authors whose papers were recently accepted by IFAC journals to showcase their results to a broader audience at the IFAC World Congress.

All papers except for Discussion Papers and Dissemination contributions have been published open access in partnership with Elsevier in the IFAC-PapersOnline series, hosted on the ScienceDirect platform <https://www.sciencedirect.com/journal/ifac-papersonline/vol/56/issue/2>. Discussion papers appeared only in the congress preprints distributed to the congress participants, not in the congress proceedings.

The differences between regular, demonstrator, and survey papers to discussion papers were as follows:

IFAC-standard papers (regular, demonstrator, survey)

- These papers went through the standard review process by the congress Editors, Associated Editors and Technical Associated Editors supervised by the IPC.
- If accepted and included in the program, the paper has been published in IFAC-PapersOnLine.

Discussion Papers

- This category was introduced by the IFAC with the goal of being only presented at the conference, to get feedback and generate discussion with participants. Another goal is to encourage participation especially from industry and from colleagues outside the traditional academic control community.
- These papers are limited to 2 to 4 pages.
- The review process was short, organized by a special committee under the supervision of the IPC.
- A limited number of papers submitted in the regular paper category were accepted as discussion papers.
- Papers have appeared in the congress preprints only.

Submission and Review Statistics

The International Program Committee was responsible for the technical standards of the Congress. The Congress attracted a total number of 2945 contributions, which include:

- 86 Open Invited Tracks with an average of 9.1 papers per track. Seven of these Open Invited Tracks attracted more than 20 contributions.
- 44 Invited Sessions of 6 papers
- 28 Workshops and Tutorials
- 2787 papers

The 2787 submitted papers have the following distributions:

- 2607 Regular papers, 129 Discussion papers, and 26 Survey papers
- 1720 Contributed papers, 784 Open Invited Track papers, 248 Invited Session papers, 10 Demonstrator papers, 12 Dissemination papers, and 13 Plenary and Semi-Plenary papers (with abstracts only).

Reviewing of the contributions was conducted under the supervision of the International Program Committee Chair, Co-Chair, and Vice Chairs, with the help of the 9 IFAC Coordinating Committee Chairs, the 39 Technical Committee Chairs, 433 Technical Associate Editors, and 4791 reviewers. Overall 8913 reviews have been collected in response to 24375 requests for reviews. The statistics of the reviews are shown in the table on the right.

Review Statistics

	Total	Per paper
# requested	24375	8.8
# received	8800	3.2

A total of 2319 submissions were accepted. An overview is provided in the table below. Details of accepted contributions are as follows:

- 1293 Contributed papers
- 875 papers submitted in Invited Sessions or Open Invited Tracks
- 8 Demonstrator papers
- 11 Dissemination papers
- 36 Invited Sessions
- 65 Open Invited Tracks that appeared in the program as Open Invited Sessions with a number of sessions ranging from 1 to 4.
- 18 Workshops and Tutorials

Overview of Accepted Papers and Sessions

Type	Submitted	Accepted
Papers	2787	2319
Open Invited Tracks	86	65
Invited Sessions	44	36
Workshops & Tutorials	28	18

Among the Regular paper submissions, 125 were accepted as Discussion papers. The acceptance rate for Regular and Survey papers is 73%. It goes up to 78% for papers submitted to Open Invited Tracks, and up to 85% for those submitted to Invited Sessions, thus indicating the excellent work done by the organizers of these invitation based sessions. Overall, the acceptance rate of papers appearing in the official Proceedings is 72.4%.

All authors were asked to submit prerecorded video presentations as well as their slides. Videos were played when authors were not present on-site at the congress venue. These were also made available to all registered participants through the VCP during the congress and then until the beginning of September.

The statistics per IFAC areas as represented by the Coordinating Committees (CC) are as indicated in the following table. Column A gives the percentage of papers of a CC among all submitted contributions. Column B gives the percentage of papers of a CC among accepted papers. The IPC made efforts to keep the acceptance rates among different CCs to remain close for fairness.

Coordinating Committees	A	B
1 Systems and Signals	19.1%	18.8%
2 Design Methods	25.2%	24.2%
3 Computers, Cognition and Communication	4.4%	4.5%
4 Mechatronics, Robotics and Components	9.4%	9.6%
5 Manufacturing and Logistics Systems	9.2%	9.1%
6 Process and Power Systems	10.3%	10.5%
7 Transportation and Vehicle Systems	11.2%	11.3%
8 Bio- and Ecological Systems	5.9%	6.1%
9 Social Systems	5.3%	5.9%

The final program included 2133 presentations (some accepted papers were not submitted on time to be included in the program) organized in 337 sessions. Among these, 305 were oral podium sessions, 24 were oral interactive sessions with individual monitor screens for each presentation, and 8 shotgun talk sessions. Demonstrator papers were presented as part of one interactive session.

Among the 337 sessions, 36 were invited sessions and 100 were open invited sessions. No value ranking is implied by the presentation format, all the papers underwent the same review process and appear the same way in the proceedings.

Plenary and Semi-Plenary Lectures

The Congress program included five plenary lectures in the morning from 8:30 to 9:30. Moreover, semi-plenary lectures/sessions took place, organized in pairs during the first four days of the congress in the evening from 18:15 to 19:00; one of them was a panel session on the topic of societal challenges, and another one was a public lecture given by the awardees of the IFAC Foundation Kwon Award.

The plenaries and half of the semi-plenaries were held at the Main Hall, which could host 1000 people. The other half of the semi-plenaries were at Room 501+502, which hosts 500 people. All of these lectures were broadcast through the Virtual Conference Platform (VCP) and are also available on the IFAC YouTube channel.

Plenary Speakers (in alphabetic order)

- Kazuyuki Aihara, Dynamical Network Biomarkers: Data Analysis on Early Warning Signals in Complex Systems and its Application to Early Precision Medicine
- Anuradha Annaswamy, Resilience and Distributed Decision-making in a Renewable-rich Power Grid

- Tamer Basar, Multi-Agent Dynamical Systems: Misaligned Objectives, Equilibria, Learning, and Asymptotics
- Sandra Hirche, Towards Trustworthy Data-driven Control
- Erik Hollnagel, Is Resilience a Quality or a Quantity?

Semi-Plenary speakers (in alphabetic order)

- Avinash Balachandran, Human Interactive Driving: Amplify People for a Safer, More Enjoyable Driving Experience
- Jie Chen, The Blessing and Curse of Feedback: Persistence of Fundamental Limits
- Maria Domenica Di Benedetto, Observability, Diagnosability and Predictability of Hybrid Dynamical Systems
- Mustafa Khammash, The Future is Now: Engineering Advanced Control Systems in Living Cells for Novel Therapies
- Yusuke Kobayashi, Towards the Sustainable Space Environment -- Development of On-Orbit Servicing Technologies
- Rene Vidal, Learning Dynamics of Overparametrized Networks

In addition, two special events were held as part of the Semi-Plenary sessions. One was the panel session on a broad topic of how control systems can meet grand societal-scale challenges that currently the world faces:

- Panel Session on "Control for Societal-Scale Challenges: Road Map 2030"

This was organized by Anuradha M. Annaswamy, Karl H. Johansson, and George J. Pappas, who led a group of researchers from the IEEE Control Systems Society to compile a book of the same title. The panelists were Christos Cassandras, Sandra Hirche, Tariq Samad, and Dawn Tilbury.

Another was the Public Lecture given by the awardees of the IFAC Foundation Kwon Award. This lecture was open to the citizens of Yokohama in a hybrid format with simultaneous translation into Japanese.

- Manuel Berenguel and Juan Diego Gil, Advances in Control and Optimization Techniques in Sustainable Water Desalination using Solar Energy and Application Examples in the Water-Energy-Food Nexus



Forums

IFAC 2023 offered forums on various topics throughout the conference. The involvement of researchers from the industry is particularly notable: 3 forums were organized by the Industry Committee in IFAC, which was established in IFAC 2017 in Toulouse, France, to enhance the value of IFAC to the industry. Moreover, 7 forums were organized by the Industry Group, which was part of the IFAC 2023 Organizing Committee, and 50 companies in Japan participated in this effort.

IFAC as well as this congress place a special emphasis on Diversity and Inclusion. A full program called D&I Day was held on Wednesday, 12 July. The D&I Day events included panels, networking luncheon, and an awardee's speech, jointly organized by the IFAC D&I Committee and the IFAC2023 D&I Committee. Besides these, a number of engaging forums took place such as those related to the Congress Vision "Wa", and control education organized by IFAC TC 9.4 Control Education. In the panel discussion on research funding for international collaboration, representatives of 4 funding agencies participated from Japan, Germany, and the European Union, and the US. Moreover, Citizens' Forums were open to the public, where some of them were for children with games; to attend for lectures and events held in the congress venue, preregistration was required.

The following is the list of all forums:

Industry Committee Forums

- IC Forum 1: The Impact of Automatic Control Research on Industrial Innovation
Chaired by Kevin Brooks and Benjamin Sawick with panelists Kevin Brooks, Stefano Di Cairano, Alisa Rupenyan, Benjamin Sawicki, Philippe Goupil, Iven Mareels, and Akira Ohata
- IC Forum 2: The Entrepreneurship Route: From Controls Research to Startup Ventures
Chaired by Tariq Samad with panelists Raffaello D'Andrea, Francesco Borrelli, Ming Ge, Thomas Jones, and Yoshiyuki Sankai
- IC Forum 3: Control Systems for Climate Change Mitigation and Adaptation: An Urgent Call
Chaired by Tariq Samad and Pramod Khargonekar with panelists Masayuki Fujita, Iven Mareels, Lucy Pao, Professor, and Jakob Stoustrup



Control Education Forums

- Control Education 1: What should control education look like in 2030?
Chaired by Christos G. Cassandras and John Anthony Rossiter with speakers Lucy Pao, Stefano Di Cairano, Antonio Visioli, Iven Mareels, and Gireeja Ranade
- Control Education 2: A custom MATLAB toolbox for teaching control 101
Chaired by John Anthony Rossiter and Craig Buhr

Diversity and Inclusion Day Events

- D&I Panel Discussion: Empowering Young Researchers for Career Success in Academia and Industry
Chaired by Mary Doyle-Kent with panelists Takako Hashimoto, Hyoun Jin Kim, Maria Prandini, Noboru Sakamoto, Larry Stapleton, and Dawn Tilbury
- Diversity and Inclusion Event: Luncheon Networking Event
Chaired by Mary Doyle-Kent, Bozena Pasik-Duncan, Patricia Pena, Maria Prandini, and Dawn Tilbury
- Diversity and Inclusion Foundation Award speech by Bozena Pasik-Duncan: Four Decades of Transformation: Pioneering Diversity, Equity, and Inclusion in the IFAC Community
Chaired by Dawn Tilbury
- Panel Discussion: Proposals for Future IFAC Diversity and Inclusion Initiatives
Chaired by Keiko Shimizu and Mary Doyle-Kent with speaker Patricia Pena



Special Forums

- Panel Discussion: Societal Harmony through "Wa"
Chaired by Shinji Hara and Tetsuo Sawaragi with panelists Anuradha Annaswamy, Larry Stapleton, Tariq Samad, Tetsuo Sawaragi, Keiko Takahashi, and Michinaga Kohno
- Forum on Funding for International Cooperations towards Solving Societal Problems
Chaired by Frank Allgower and Keiko Takahashi with panelists Hajime Asama, Yuko Harayama, Eva Kanso, Saiki Hase, Masaki Sato, Tom Kuczynski, Pramod Khargonekar, Shuzhi Sam Ge, and Hyungbo Shim
- HCMI Forum: Human-Machine Collaboration for Manufacturing of the Future
Chaired by Tamio Tanikawa and Masayo Iwai
- Competition Session: Aerospace Industrial Bench-mark on Fault Detection and Fault Tolerant Control
Chaired by Philippe Goupil, Japie Engelbrecht, and Simon Oudin
- Competition Session: ECCV Control Benchmark for Sustainable Transport
Chaired by Lars Eriksson and Robin Holmbom

IFAC2023 Industry Group Forums

- IG Forum (SG16): Current Progress in AI Technology Application
Chaired by Kazuhiro Nakadai, Ikuko Nishikawa, Tadahiro Taniguchi, Reiji Suzuki, and Masato Togami
- IG Forum (SG13): Artificial Intelligence in Biological and Medical Systems
Chaired by Kenji Kawashima and Koichi Hashimoto
- IG Forum (SG08): Technologies and Initiatives in Smart Agriculture and Smart Agricultural Machines in the Japanese Market
Chaired by Shigemi Hidaka
- IG Forum (SG14): Co-creative Systems Approach for Sustainable Society
Chaired by Toshiya Kaihara
- IG Forum (SG07): Automatic Control for Smart Cities: Can people accelerate control of urban systems?
Chaired by Michinaga Kohno and Kenji Hirata
- IG & IC Forum: Industry 4.0: Examples, Challenges and the Way Forward for Human AI Collaboration
Chaired by Hideaki Tanaka
- IG Forum (SG02+12): State-of-the-Art Technology and Future Vision for Environment, Energy, and Power Systems
Chaired by Yutaka Iino and Yoshihiko Susuki

Citizens' Forums

At the Yokohama Congress, several lectures and events were open to the public, and many citizens of Yokohama and Tokyo area took the chance to learn about automatic control.

There was an open call for participation in the Citizens' Forum on July 9th Sunday. Three events were held in Japanese as part of outreach activities for the local citizens.

- The World of Control in Aerospace Technology (in Japanese)
Speakers: Naoko Yamazaki and Hisashi Sano
- Girls in Control (Basic and Advanced Courses, in Japanese)
Speaker: Yuki Minami
- Cutting-Edge Technologies to Improve Productivity in the Construction Industry (in Japanese)
Speaker: Ryota Ieiri

It was great to see many children at the venue. At the aerospace technology event, a former astronaut Ms Naoko Yamazaki gave a lecture on her experience; this was followed by an event with games for the children, where a lot of excitement took place.



The IFAC Foundation Kwon Award recognizes how automatic control science and technology can contribute to significant advances in the broad area of "sustainable development". The winners gave a public lecture where the award was presented by Ian Craig, the Chair of the IFAC Foundation.

- IFAC Foundation Kwon Award Public Lecture: Advances in Control and Optimization Techniques in Sustainable Water Desalination Using Solar Energy and Application Examples in the Water-Energy-Food Nexus

Speakers: Manuel Berenguel and Juan Diego Gil



One highlight of the congress was the Marine Robots Night Festival held in the evening of July 12th. It is estimated that over 800 people came to the park near the venue to watch the marine robots diving into the sea water with colorful lights. Exhibitions of professional marine robots as well as food stands were arranged by the event organizers.

- Marine Robots Night Festival at the Nippon Maru Memorial Park
Organized by IFAC 2023 Industrial Group (Marine System Subgroup)



Pre-Congress Workshops and Tutorials

The pre-congress Workshops and Tutorials took place on July 8-9. Most of them were selected by the IPC for their tutorial features. Among the 18 Workshops and Tutorials, 12 were held full-day and 6 half-day. These high-quality events were extremely well received with 489 participants.

Workshops - Full Day

- Modeling and Data Integration for Control and Optimization of Chemical and Biological Systems
Organized by Nirav Pravinbhai Bhatt, Hyun-Seob Song, Sridharakumar Narasimhan, Manokaran V.
- Advanced Topics in PID Control System Design, Automatic Tuning and Applications
Organized by Liuping Wang, Toru Yamamoto, and Julio Elias Normey-Rico
- Workshop on Port-Hamiltonian Systems and Applications
Organized by Joel Ferguson
- Emerging Trends in Resilient Control of Networked Systems
Organized by Luca Ballotta, Ruggero Carli
- Workshop on Quantum Systems Theory
Organized by Ian R. Petersen, Valery Ugrinovskii
- Gaussian Process Learning for Systems and Control
Organized by Rolf Findeisen, Thomas Beckers, Sandra Hirche, Maik Pfefferkorn, Colin Jones, and Karl Berntorp,
- A Showcase of LMI-Based Methods for Analysis, Control and Estimation of PDEs
Organized by Amritam Das and Matthew Peet
- Data-Driven Verification and Control of Cyber-Physical Systems
Organized by Abolfazl Lavaei, Sadegh Soudjani, and Majid Zamani
- Distributed Control, Optimization and Learning for Network Systems
Organized by Tengfei Liu and Zhong-Ping Jiang
- Data-driven Predictive Control: Whence and Whither?
Organized by Timm Faulwasser and Karl Worthmann
- Robust and Resilient Autonomy: Progress and Challenges
Organized by Melkior Ornik, Sheng Cheng, Pan Zhao, Hyung-Jin Yoon, Naira Hovakimyan, Sayan Mitra, and Aditya Gahlawat
- Encrypted Control Workshop
Organized by Kiminao Kogiso and Kenji Sawada

Workshops - Half day

- Grid at the Edge (GATE): Towards the Net-Zero Carbon Grid with Improved Resilience
Organized by Mladen Kezunovic and Hiroshi Okamoto
- Data Analytics, Causality Inference, and Deep Learning Techniques for Intelligent Alarm Monitoring
Organized by Wenkai Hu, Jiandong Wang, Masaru Noda, and Tongwen Chen

Tutorials - Half Day

- Estimation of Noise Parameters in State Space Models
Organized by Ondrej Straka and Jindrich Dunik
- Mechatronics and Robotics for Manipulation: Design and Control
Organized by Micky Rakotondrabe and Huichan Zhao
- Control Systems in Synthetic Biology
Organized by Mustafa Khammash and Yutaka Hori
- Ecologically-Inspired Multi-Robot Systems
Organized by Logan E. Beaver and Gennaro Notomista

Competitions

During IFAC 2023, five competitions were held. While some started well in advance of the congress, all of them had onsite components in the form of the actual competitions using drones and robots, video streaming from drones crossing the Tokyo Bay, and presentations by the competitors of their control methods.

- MathWorks Minidrone Competition, sponsored by MathWorks
- WRS Future Convenience Store Challenge, organized by Kazuyoshi Wada and Kenichi Ohara, sponsored by Seven & i Holdings Co., Ltd.
- World Drone Competition, organized by Kenzo Nonami and Sora Tanoue, sponsored by Advanced Robotics Foundation
- Aerospace Industrial Benchmark on Fault Detection and Fault Tolerant Control, organized by Philippe Goupil, Japie Engelbrecht, Simon Oudin, Masayuki Sato, and Daisuke Karikawa, sponsored by Airbus
- ECCV Control Benchmark for Sustainable Transport, organized by Lars Eriksson, Robin Holmbom, and Max Johansson from CC7



Technical Tours

- Honda R&D Ltd.: Experience of intelligent mobility using automated driving and human-machine communication technologies
- Hitachi R&D "Kyoso-no-Mori": Explore Hitachi R&D's co-creation activities at the Open Innovation Site established under the Kyoso-no-Mori initiative

- Hino Motors Ltd.: Heavy-duty vehicle test ride at Hino Motors
- Field Robotics in Japan: Robotics to be deployed in Smart Agriculture in Japan. The demonstrators in alphabetical order: ISEKI & CO., LTD., KUBOTA Corporation, National Agriculture and Food Research Organization (NARO), Suzuki Motor Corporation, and YANMAR AGRIBUSINESS CO., LTD.

Authors and Delegates

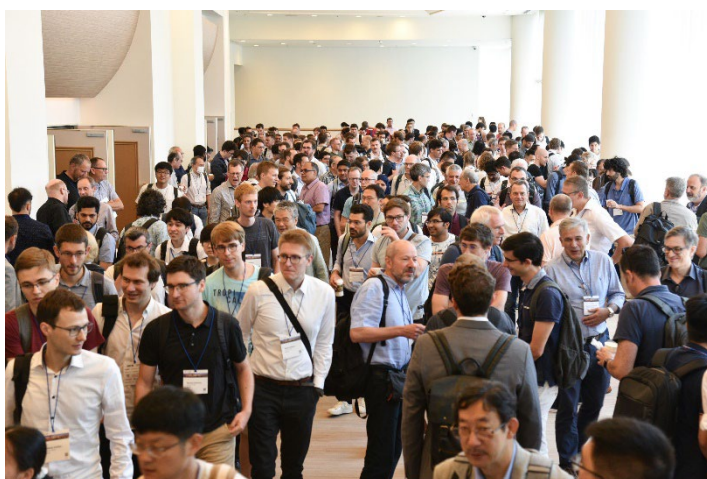
There were a total of 7460 authors of papers in the Congress program from 80 countries/regions. The total number of delegates was 3206 from 62 countries/regions. Over 95% of the participants were on-site. Those who registered for online participation had access to the Plenary and Semi-Plenary lectures and pre-recorded presentation videos via the VCP. To promote an eco-friendly conference experience, the congress program was distributed through the IFAC Conference App.

The following table indicates in column A, the number of corresponding authors of submitted contributions; in column B, the number of corresponding authors of papers in the program; in column C, the number of authors of papers in the program; in column D, the number of delegates.

	A	B	C	D
Japan	327	276	912	848
China	293	205	714	324
Germany	262	217	769	246
France	245	188	653	205
USA	196	165	568	201
Italy	172	143	515	146
Netherlands	105	90	327	111
UK	99	83	261	98
Sweden	78	70	257	92
Spain	76	57	196	68
Norway	61	45	149	65
India	59	32	86	33
Canada	56	39	152	48
Korea, South	54	43	147	148
Russia	53	29	94	29
Australia	46	36	114	50
Brazil	45	35	117	31
Switzerland	42	37	144	48
Belgium	39	34	116	40
Mexico	37	21	67	20
Austria	32	27	97	28
Taiwan	29	23	52	27
Denmark	28	19	73	28
Hungary	26	20	80	23
Portugal	26	16	59	15
Poland	23	17	47	16



Finland	22	16	52	26
New Zealand	22	15	82	11
South Africa	21	12	33	20
Israel	17	10	31	14
Ireland	16	14	42	10
Saudi Arabia	14	10	26	8
Turkey	14	4	10	10
Slovenia	13	9	31	6
Colombia	12	6	29	8
Romania	12	8	28	9
Singapore	12	8	28	9
Slovakia	12	9	32	15
Chile	11	7	32	9
Indonesia	11	4	10	4
Czech Republic	10	8	30	9
United Arab Emirates	9	6	18	4
Pakistan	8	4	13	5
Malaysia	7	2	8	2
Argentina	6	4	17	1
Greece	6	4	20	5
Croatia	5	5	21	12
Morocco	5	3	19	2
Iran	4	2	7	1
Bulgaria	3	1	2	1
Ecuador	3	0	0	2
Kosovo	3	1	1	1
Sri Lanka	3	2	6	1
Algeria	2	1	4	0
Cameroon	2	1	2	0
Egypt	2	1	7	1
Nigeria	2	0	0	0
Peru	2	2	7	3
Ukraine	2	1	5	1
Venezuela	2	0	0	0
Vietnam	2	1	6	1
Costa Rica	1	1	6	2
Cuba	1	1	3	0
Cyprus	1	1	7	2
Estonia	1	0	2	0
Georgia	1	0	0	0
Jordan	1	0	0	0
Lebanon	1	0	2	0
Qatar	1	1	1	0
Uruguay	1	0	0	1
Congo	0	0	1	0



Honduras	0	0	2	0
Luxembourg	0	0	3	1
Monaco	0	0	1	0
Panama	0	0	1	1
Philippines	0	0	1	0
Serbia	0	0	1	0
Tonga	0	0	1	0
Tunisia	0	0	2	0
Yugoslavia	0	0	1	0

Deadlines and Milestones

2021

August 20 Call for papers

October 1 PaperPlaza configuration tests

November 1 PaperPlaza submission site opens

2022

May 15 PaperPlaza opens for submissions

September 15 Open invited track proposals submission deadline

October 15 Invited session proposals submission deadline

October 31 Regular and invited session papers submission deadline

Start of the review process of regular and invited session papers

November 30 Workshop/tutorial proposals and discussion papers submission deadline

Start of review process of workshop proposals and extended abstracts

2023

January 31 End of the reviewing process

February 1 Discussion papers submission deadline

March 1 Notification of acceptance

March 31 Final paper submission deadline

April 15 Early registration rates expires

May 15 Notification for workshops/tutorials

July 8-9 Tutorials and workshops

July 9-14 World Congress

IFAC Council and Related Meetings

The IFAC World Congress also served the role as a meeting place for various Technical Committees, Boards, and the Council. These meetings took place in parallel with the congress at the venue PACIFICO Yokohama. All these meetings were organized and handled by the IFAC Secretariat.

SATURDAY						
2023/7/8	Executive Officers' meeting (H. Asama)	09:00 - 12:00		20	511	
	Foundation Board of Trustees (I. Craig)		12:00 - 14:00	10	512	
President's dinner (attendance by invitation only)						
SUNDAY						
2023/7/9	Outgoing Council meeting (H. Asama)	09:00 - 16:00		60	503	
	Opening Ceremony/Welcome Reception					
MONDAY						
2023/7/10	TC 8.2. Biological and Medical Systems (T. Desaive)	10:00 - 11:00		30	423	
	TC 2.4. Optimal Control (E. Kerrigan)	11:00 - 12:00		30	423	
	TC 1.4. Stochastic Systems (Y. Mo)	10:00 - 11:00		10	514	
	TC 7.1. Automotive Control (P. Tunestal)	10:00 - 11:00		30	317	
	TC 5.1. Manufacturing Plant Control (M. Macchi)	10:00 - 11:30		25	318	
	TC 3.1. Computers for Control (B. Vogel-Heuser)	10:00 - 11:30		30	503	
	TC 3.3. Telematics: Control via Communication Networks (L. Ma)	11:00 - 12:30		20	317	
	TC 9.3. Control for Smart Cities (S. Jia)	11:00 - 12:00		20	514	
	JPC Editorial Board Meeting (K. Tancock + M. Guay)	10:00 - 11:00		20	316	
	CEP Editorial Board Meeting (K. Tancock + B. Huang)	11:00 - 12:00		20	316	
	GENERAL ASSEMBLY		13:30 - 16:00	120	503	
	TC 9.1 Economic, Business, and Financial Systems (FY Wang)		16:00 - 17:00	10	513	
	TC 9.5. Technology, Culture and International Stability (TECIS B. Ibrahimov)		16:00 - 17:00	20	316	
2nd IFAC Advisor meeting (D. Cho) 18:30 - 20:30						
TUESDAY						
2023/7/11	TC 1.3. Discrete Event and Hybrid Systems (C. Seatzu)	10:00 - 11:00		20	317	
	Industry Committee meeting (joint: T. Samad + K. Brooks)	09:00 - 11:00		20	511	
	Distinguished Lecture Committee meeting (joint: I. Petersen + H. Ishii)	10:00 - 12:00		15	514	
	PUMB meeting (T. Basar)	10:00 - 14:00		12	316	
	Activity Funds Committee meeting (joint: M. Bauer + T. Samad)	11:00 - 13:00		15	317	
	Education Activities Committee meeting (NEW S. Knorn)	11:00 - 13:00		15	318	
	TC/CC Chair Training session (C.E. Pereira)		13:00 - 15:00	80	511 + 512	
	Awards Committee meeting (joint: J. Zaytoon + F. Allgöwer)		13:00 - 15:00	20	318	
	Membership Committee meeting (joint: F. Allgöwer + H. Asama)		15:00 - 17:00	15	316	
	TC 2.5. Robust Control (M. Sznaiér)		15:00 - 16:30	20-30	317	
	TC 2.1. Control Design (S. Galeani)		15:00 - 17:00	40	512	
	TC 8.1. Control in Agriculture (M. Karkee)		16:00 - 17:00	20	318	
	TC 6.3. Power and Energy Systems (Y. Majanne)		16:00 - 18:00	30-40	511	
	TC 5.4. Large Scale Complex Systems (Wei Ren)		16:00 - 17:00	20	514	
	TC 7.2. Marine Systems (R. Galeazzi)		16:30 - 18:00	20	317	
	TC 6.2. Mining, Mineral and Metal Processing (C. Aldrich)		17:00 - 18:00	30	512	
	Friendship reception (attendance by invitation only) Room 503					
	WEDNESDAY					
	2023/7/12	Technical Board meeting (joint: C.E. Pereira)	10:00 - 17:00		65	512
TC 1.2. Adaptive and Learning Systems (T. Roux)		10:00 - 11:00		40	316	
TC 7.3. Aerospace (A. Tsourdos)		10:00 - 11:30		45	511	
TC 5.3. Integration and Interoperability of Enterprise Systems (Qing Li)		10:30 - 12:00		20	317	
Mechatronics Journal Editorial Board (K. Tancock + T.C. Tsao)			13:00 - 14:00	20	317	
TC 6.4. SAFEPROCESS (V. Puig)			13:00 - 15:00	40	511	
TC 4.5. Human Machine Systems (J. Zhang)			14:00 - 15:30	35	316	
Diversity and Inclusion Committee meeting (joint: MD Kent)			16:00 - 18:00	15	514	
TC 9.2. Systems and Control for Societal Impact (M. Netto)			16:00 - 17:30	25	317	
TC 3.2. Computational Intelligence in Control (K. Guelton)			16:00 - 17:00	40	511	
TC 5.2. Management and Control in Manufacturing and Logistics (D. Ivanov)			16:00 - 18:00	25	316	
TC 2.6. Distributed Parameter Systems (Y. Le Gorrec)			16:00 - 17:00	25	318	
TC 1.5. Networked Systems (M. Heemels)			17:00 - 18:00	30	512	
THURSDAY						
2023/7/13	Conference Board meeting (joint M. Prandini + R. Braatz)	10:00 - 14:00		45	512	
	TC 4.3. Robotics (I. Petrovic)	10:00 - 11:00		40	317	
	TC 2.3. Non-Linear Control Systems (C. Prieur)	10:00 - 12:00		40	511	
	TC 1.1. Modelling, Identification and Signal Processing (A. Chiuso)		13:00 - 15:00	30	317	
	TC 9.4. Control Education (A. Visoli)		13:00 - 15:00	30	316	
	TC 4.2. Mechatronic Systems (W. Kemmetmüller)		13:00 - 14:30	35	511	
	TC 8.4. Biosystems and Bioprocesses (A. Vargas)		13:00 - 15:00	30	318	
	Publications Board meeting (joint: S. Spurgeon)		14:00 - 17:00	40	512	
	TC 6.1. Chemical Process Control (R. Findeisen)		15:00 - 17:00	30	511	
	TC 7.4. Transportation Systems (T. Acarman)		16:00 - 17:00	30	317	
	TC 2.2. Linear Control Systems (S. Niculescu)		16:00 - 17:00	30	316	
	Banquet					
FRIDAY						
2023/7/14	Incoming Council meeting (D. Cho)	10:00 - 13:00		40	511 + 512	
	Executive Officers' meeting (D.Cho)		14:00 - 16:00	20	316	
Closing Ceremony/Farewell Reception/Korean Friendship evening (IFAC2026)						

Social Events

Ceremonies and Receptions

President's Dinner: Saturday, 8th July

The following personalities and their accompanying persons were invited to the President's Dinner:

- IFAC Officers, Council Members, and Advisors
- IFAC TB and EB members
- IFAC 2023 Plenary speakers
- IFAC Award winners and new IFAC Fellows
- Major Sponsors and local institutions representatives
- Japan NMO guests
- NOC guests

Prior to the dinner, an Award Ceremony was held at the Congress venue. The IFAC President handed certificates to the new IFAC Fellows as well as the awardees of the Chestnut Textbook Award and the IFAC Outstanding Service Award.

Opening Ceremony and Welcome Reception: Sunday, 9th July

The World Congress started with a memorable Opening Ceremony held at the National Convention Hall of Yokohama from 18:00 to 20:00. The ceremony was honored with the presence of Their Majesties the Emperor and Empress of Japan, whose speech addressed the increasing importance of automatic control technology in all aspects of our lives. All attendees had to go through security check and sit inside the Hall by 17:35 when the doors were closed. The ceremony was organized as follows:

- Video on Yokohama City, different applications from the area of automatic control, and speeches on the period of COVID19 by past IFAC Presidents and Congress Organizers
- Opening addresses
 - Hajime Asama, IFAC President
 - Mitsuji Sampei, President of the Japan Association of Automatic Control
 - Takaaki Kajita, President of the Science Council of Japan
- Speech by His Majesty the Emperor
- Guest congratulatory speeches
 - Shigeyuki Goto, Minister of the State for Economic and Fiscal Policy
 - Yuji Kuroiwa, Governor of Kanagawa Prefecture
 - Takeharu Yamanaka, Mayor of the City of Yokohama
- Message from Fumio Kishida, Prime Minister
- Traditional Japanese dance Awa Odori performance by Asuka-ren
- Calligraphy performance, featuring the vision of the congress "Wa" by Kouka Awazu and Kousho Awazu
- Japanese transverse bamboo flute by Kouji Kishida and "Wadaiko" drums by Kenichi Koizumi and Shingo

- Welcome speeches
 - Jun-ichi Imura, General Chair of the IFAC 2023
 - Hideaki Ishii and Yoshio Ebihara, IPC Chair and Co-Chair of the IFAC 2023
- Award Ceremony: Announcements by Janan Zaytoon, Chair of the IFAC Award Committee, certificates presented by Hajime Asama (IFAC Major Awards (Three Medals, Industrial Achievement Award, High Impact Paper Award) and the Appointment of new Advisors)

After the Opening Ceremony, the Welcome Reception was held at the Exhibition Hall B from 20:30 to 22:00. Buffet food and beverages were served.



Congress Banquet: Thursday, 13th July

Following the tradition of the IFAC World Congresses, the Congress Banquet was held in the evening of the Thursday from 19:30 to 22:00 at the Exhibition Hall B/C of PACIFICO Yokohama. It was a seated style dinner with French menu, and approximately 2000 people attended. Prior to the dinner, a traditional Japanese “Noh” dance was performed by the group EVISION with virtual reality technology.



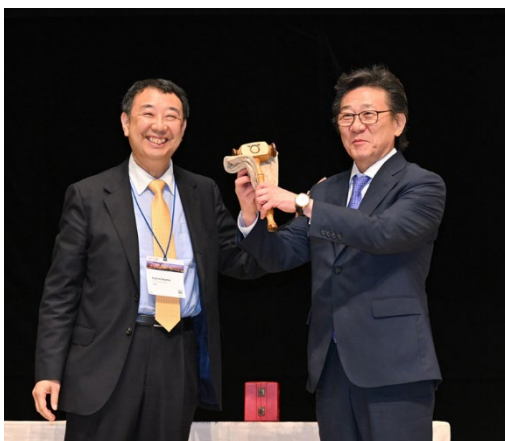


Closing Ceremony and Farewell Reception (with Korean Evening): Friday, 14th July

On the last day of the Congress, the Closing Ceremony was held from 16:00 to 18:00 at the National Convention Hall of Yokohama. This was the last official event of the Congress. It featured the announcement of Congress Prizes and IFAC Journal Awards, as well as the official transmittal of IFAC presidency to Korea.

- Slideshow of pictures from the Congress
- Performance by IFAC Control Orchestra: “You Raise Me Up”, “Blinding Lights”, and “Don’t Stop Believin”
- Award Ceremony: Announcements by Dimitri Peuchelle, Vice President of the IFAC (on behalf of Janan Zaytoon, Chair of the IFAC Award Committee)
 - Journal Awards Ceremony: Presenter, Kay Tancok, Elsevier representative
 - Congress Awards: Presenters, Chairs of the Selection Committees of the respective Prizes
 - Competition Winners
- Last words on the Congress by the General Chair, Jun-ichi Imura, and the IPC Chair, Hideaki Ishii
- Last words by the outgoing IFAC President, Hajime Asama
- First speech by the incoming IFAC President, Dongil “Dan” Cho
- Introduction of the IFAC 2026 by the General Chair, Hyingbo Shim

The Farewell Reception took place immediately after the Closing Ceremony at the Marine Lobby of the Convention Hall from 18:00 to 20:00. This was also an occasion for the attendees to enjoy Korean food and beverages provided by the Korean colleagues organizing the next Congress to be held in Pusan in 2026.



IFAC Control Orchestra

A special event at the beginning of the Closing Ceremony was first live performance by the IFAC Control Orchestra. It was organized by 37 music-loving colleagues from 15 countries, conducted by Jochen Rieber. The Orchestra was formed in 2020 for the Berlin Congress, where the performance was virtually made.



Student Activities

IFAC Conference Student Task Force Event

In the evening of the first day of the congress, about 250 attendees gathered for this social event organized by the IFAC Conference Student Task Force and were provided with snacks and drinks. Dimitri Peaucelle gave a talk to welcome the students and to introduce the IFAC activities to the new comers. The talk was followed by games.

Student Social Trip to Kamakura

Two social trips were organized by students who worked with the IFAC Conference Student Task Force. The destination was Kamakura, which is an ancient capital of Japan, only 30 minutes away by train.

Next-Gen Faculty Interactive Session

At the Exhibition Hall, an Interactive Session was held for students and postdocs to meet faculty members, search committees, and recruiters. There were about 60 attendees.



Social Tours

The Congress offered special social visits for the participants and their accompanying persons to get to know and enjoy the Yokohama Minato-Mirai area and the surroundings to the fullest. All participants for the following tours were required to register on the Technical/Social Tours registration site in advance.

- S1 Walking tour 1
- S2 Walking tour 2
- S3 Yokohama Sankeien Garden
- S4 Kamakura Pilgrimage
- S5 Hakone one-day tour
- S6 Tokyo Skytree & Senso-ji Temple

Yokohama Special Tours

- Bar hopping tour in NOGE
- Half day Walking Tour: Study old and modern "MinatoMirai21" with visiting local historical sites



Organization

National Organizing Committee

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General Vice-Chairs	Tetsuo Sawaragi Keiko Takahashi	Kyoto University Waseda University
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	Naoki Hayashi Ryosuke Adachi	Osaka University Yamaguchi University
Observer	Masaaki Nagahara	Hiroshima University
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		Yoshihiro Maeda	Nagoya Institute of Technology
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Organizers and Co-Organizers

The IFAC 2023 was organized by the following three organizations jointly: International Federation of Automatic Control (IFAC), Science Council of Japan (SCJ), and Japan Association of Automatic Control (JAAC). The SCJ is the Japan National Member Organization of IFAC.



As Co-Organizers, the following two academic societies supported the IFAC 2023: The Society of Instrument and Control Engineers (SICE) and The Institute of Systems, Control Information Engineers (ISCIE).



Registration

To take part in the IFAC World Congress 2023, all participants were required to complete registration and pay the registration fee. Participants were eligible to take advantage of early registration discounts by completing online registration by 15 April 2023, at the registration site (IFAC PaperCept).

IFAC 2023 was best structured for on-site attendance to enjoy the full benefits of the events such as workshops, tutorials, competitions, forums, poster sessions, and a variety of social activities. Considering the worldwide COVID-19 situation, on-line attendance was also possible, but the benefits were unavoidably limited compared to the on-site attendance. Specifically, real-time attendance was mainly restricted to the plenary/semi-plenary sessions and the opening/closing ceremonies.

Registration Fees for IFAC Affiliates

(Tax inclusive)

	On-site attendance		On-line attendance	
	Early (until April 15)	Late (from April 16)	Early (until April 15)	Late (from April 16)
Full Registration	JPY108,000	JPY135,000	JPY90,000	JPY112,500
Student Registration	JPY60,000	JPY81,000	JPY54,000	JPY72,900
Half-Period Industry Registration* (Mon., Tue., Wed.)	JPY70,000	JPY94,500	-	-
Half-Period Industry Registration* (Wed., Thu., Fri.)	JPY70,000	JPY94,500	-	-
Accompanying Person Registration**	JPY35,000	JPY47,250	-	-
Workshops (Full)	JPY20,000	JPY25,000	-	-
Workshops (Student)	JPY12,000	JPY15,000	-	-

Registration Fees for NON IFAC Affiliates

(Tax inclusive)

	On-site attendance		On-line attendance	
	Early (until April 15)	Late (from April 16)	Early (until April 15)	Late (from April 16)
Full Registration	JPY110,000	JPY137,000	JPY92,000	JPY114,500
Student Registration	JPY62,000	JPY83,000	JPY56,000	JPY74,900
Half-Period Industry Registration (Mon., Tue., Wed.)	JPY72,000	JPY96,500	-	-
Half-Period Industry Registration (Wed., Thu., Fri.)	JPY72,000	JPY96,500	-	-
Accompanying Person Registration*	JPY35,000	JPY47,250	-	-
Workshops (Full)	JPY20,000	JPY25,000	-	-
Workshops (Student)	JPY12,000	JPY15,000	-	-

* This registration category is for those whose affiliations are commercial organizations and are unable to attend the entire period of the Congress in order to encourage participation in IFAC 2023.

** This registration category is for the accompanying persons (e.g., partners or significant others) of the original registrant.

Benefits for On-site Attendance*

	Opening Ceremony/ Welcome Reception	Banquet	Closing Ceremony/ Farewell Reception	Social Tours	Sessions	Paper Uploads**
Full Registration	Included	Included	Included	-	Included	2
Student Registration	Included	-	Included	-	Included	1
Half-Period Industry Registration (Mon,Tue,Wed)	Included	-	-	-	3 days included	0
Half-Period Industry Registration (Wed,Thu,Fri)	-	-	Included	-	3 days included	0
Accompanying Person Registration	Included	Included	Included	Included	-	

*All benefits of the on-line attendance described below are included in this on-site attendance categories.

**One (1) paper upload allows 6 pages per paper. Maximum 2 extra pages are allowed at additional cost.

Benefits for On-line Attendance

	Opening Ceremony/ Welcome Reception	Banquet	Closing Ceremony/ Farewell Reception	Social Tours	Sessions	Paper Uploads*
Full Registration	-	-	-	-	Limited**	2
Student Registration	-	-	-	-	Limited**	1

* One (1) paper upload allows 6 pages per paper. Maximum 2 extra pages are allowed at additional cost.

** On-line attendees have real-time access ONLY to the plenary/semi-plenary sessions, the opening/closing ceremonies, and the limited number of special sessions. The pre-recorded presentation videos of the technical sessions will be available on an on-demand basis (for one month since the beginning of the Congress). If none of the authors of a paper is on the site, the pre-recorded presentation video of the paper is shown to the audience at the site for interactive and poster sessions. All the Q&As for the video presentations in the oral and the interactive sessions are expected to be done through a virtual platform (off the session).

Additional Fees

- Cost per paper for extra paper upload: JPY30,000.
- Excess Page Charges (Maximum of two excess pages beyond normal page limit, only for regular paper and survey paper categories): JPY15,000/page.
- Additional Banquet Ticket: JPY10,000

Payment

- Payment must be made in Japanese yen.
- The only accepted means of payment is by credit cards (Visa, MasterCard, JCB, American Express, and Diners Club).

Cancellation: All fees paid are not refundable.

Sponsors and Supporters

Sponsors

Sponsors of the World Congress were the following 20 organizations and companies:

Platinum Sponsors:

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- Hitachi, Ltd.

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- Azbil Corporation
- Fujita Corporation
- Kumagai Gumi Co., Ltd.
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- AISIN CORPORATION,
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- Sumitomo Chemical Co., Ltd.

Competitions were supported by the following 3 organizations and companies:

Platinum Sponsors:

- The Advanced Robotics Foundation
- The MathWorks, Inc.
- Seven & i Holdings Co., Ltd.

Special events such as Technical Tours and Forums were sponsored by 6 companies.

Platinum Sponsor:

- Honda R&D Co., Ltd.

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- HINO MOTORS, LTD.
- Japan Manned Space Systems Corporation (JAMSS)

Silver Sponsors:

- Iseki & Co., Ltd.
- KUBOTA Corporation
- YANMAR AGRIBUSINESS CO., LTD.

Congress Supporters

The congress had 9 supporters in the following:

- City of Yokohama
- Yokohama Convention & Visitors Bureau
- Japan National Tourism Organization
- Kanagawa Prefecture
- Tateisi Science and Technology Foundation
- The Telecommunications Advancement Foundation
- Mitutoyo Association for Science and Technology (MAST)
- The Precise Measurement Technology Promotion Foundation
- Machine Tool Engineering Foundation.

Moreover, 17 academic and industrial organizations cooperated to realize the IFAC WC 2023:

- Japan Joint Automatic Control Conference
- Robotics Society of Japan
- The Japan Society of Mechanical Engineers
- The Japan Society for Precision Engineering
- The Japan Society for Aeronautical and Space Sciences
- Society for Chemical Engineers, Japan,
- The Institute of Electrical Engineers of Japan
- Transdisciplinary Federation of Science and Technology
- The Japan Federation of Engineering Societies
- The Iron and Steel Institute of Japan
- Society of Automotive Engineers of Japan, Inc.
- Japan Robot Association
- Japan Machinery Federation
- The Virtual Reality Society of Japan
- Japan Society of Civil Engineers
- The Japanese Society for Artificial Intelligence
- Atomic Energy Society of Japan

Exhibitors

During the congress week, a corporate exhibition was held at the Exhibition Hall and the following 27 companies and groups participated.

- Azbil Corporation
- CYBERNET SYSTEMS CO., LTD.
- ELSEVIER
- Fujita Corporation
- HOKUYO AUTOMATIC CO., LTD.
- IFAC 2023 Industry Group Exhibition: Aerospace Technology
- IFAC 2023 Industry Group Exhibition: Automotive Control
- IFAC 2023 Industry Group Exhibition: Control in Construction
- IFAC 2023 Industry Group Exhibition: Power & Energy Systems and Environmental Systems
- IFAC 2023 Industry Group Exhibition: Marine Systems
- IFAC 2026 Busan
- ispace, inc.
- Kajima Technical Research Institute
- Kumagai Gumi Co.,Ltd.
- MathWorks
- MIS Corporation
- nac Image Technology
- NOKOV Motion Capture
- RITECS INC.
- Shimizu Corporation
- Springer Nature
- TAISEI Corporation
- TAKENAKA Corporation
- SICE (The Society of Instrument and Control Engineers) & ISCIE (The Institute of Systems, Control and Information Engineers)
- Yokogawa Electric Corporation & Yokogawa Digital Corporation
- Yokohama Companies Joint Exhibition
- Zhejiang University

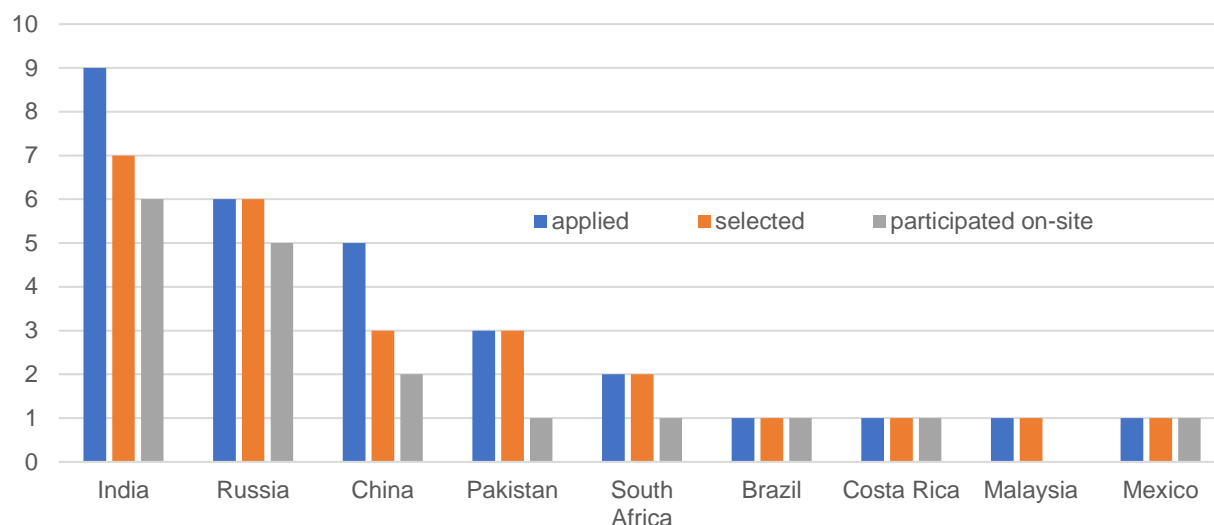
IFAC Foundation: Developing Countries Young Author Support and D&I Travel Support

The IFAC Foundation recognizes the values that diverse participants bring to the World Congress. It also acknowledges that many candidates from various groups have financial difficulties in attending the Congress. To promote diversity and inclusion, the IFAC Foundation and the Organizing Committee of the IFAC WC 2023 provided financial support in the following two categories.

Developing Countries Young Author Support (DC-YAS)

This category supported young authors under 30 years old from developing countries. The full registration fee, including the banquet, was waived for the awardees. We received 29 applications from 9 countries, from which 25 young authors (16 males and 9 females) were awarded. Unfortunately, 3 awardees did not respond to the notification and 1 awardee withdrew the application. After the congress, we confirmed that 3 awardees did not pick up their congress badges, indicating that 18 awardees attended the congress in person. The following chart summarizes the above figures by country.

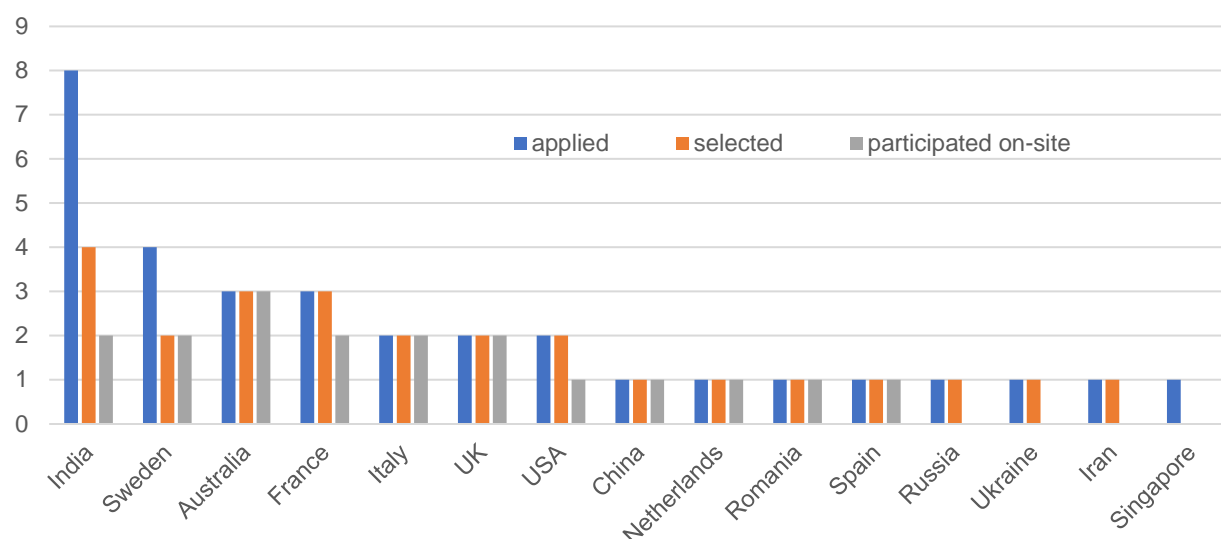
DC-YAS



Diversity and Inclusion (D&I) Travel Support

This category supported authors from “under-represented” groups within IFAC community and/or within their home countries. We received 32 applications from 15 countries, from which 25 applicants (genders not investigated) were awarded in two different subcategories: full-fee waiver and student-fee waiver. Among the 7 rejected applicants, 2 applicants also applied to DC-YAS and were selected in that category. Full-fee waiver was granted to 20 awardees, which consisted of a waiver of the full registration fee including the banquet. The remaining 5 awardees were granted student-fee waivers, which did not include banquet support. However, 3 awardees among the 25 did not respond to the notification. After the congress, we confirmed that 4 awardees did not pick up their congress badges, indicating that 18 awardees attended the congress in person. The following chart summarizes the above figures by country of affiliation.

D&I Travel Support



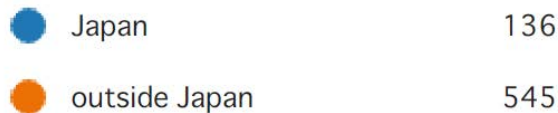
Post Congress Evaluation

As part of our post congress evaluation, we conducted a survey for the congress participants. The request was made during the Congress via email, and we received 681 responses by September 2023. The following is a summary of the responses. Thank you to those of you who took part in the survey!

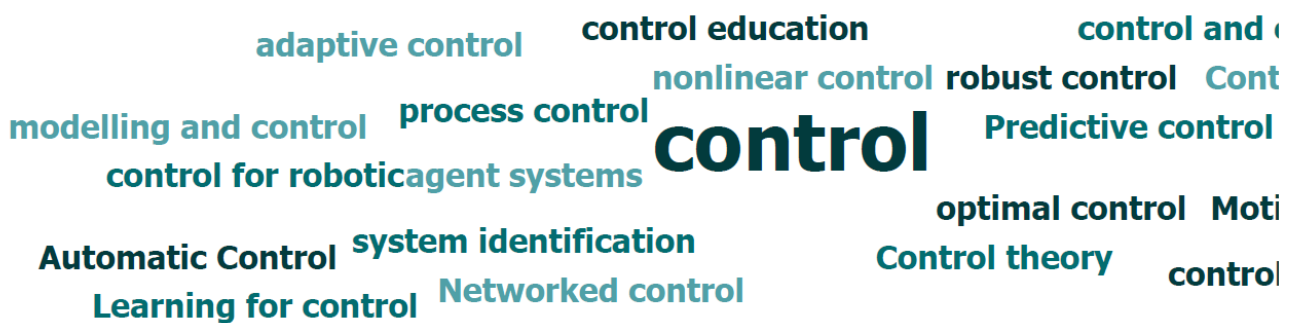
1. Did you participate in IFAC 2023 on-site or on-line?



2. Did you come from Japan?

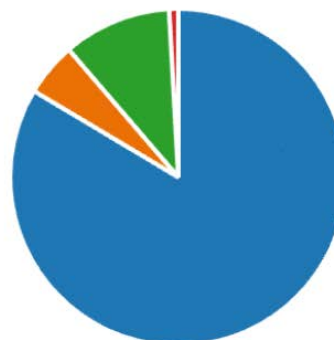


3. What topics are you most interested in?



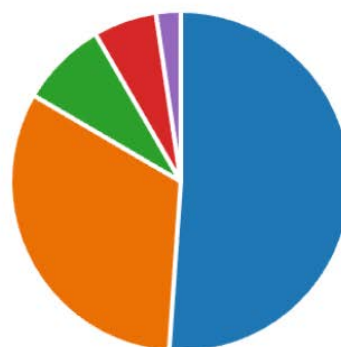
4. Which do you recognize you belong to?

● Academia	569
● Industry	35
● Both	71
● Neither applies	6



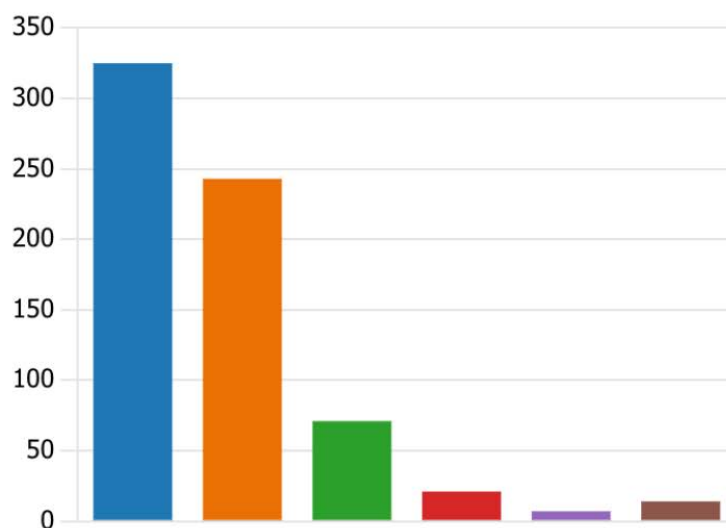
5. Please rate your overall experience in IFAC 2023.

● Satisfied	348
● Somewhat satisfied	220
● Neutral	56
● Somewhat dissatisfied	41
● Dissatisfied	16

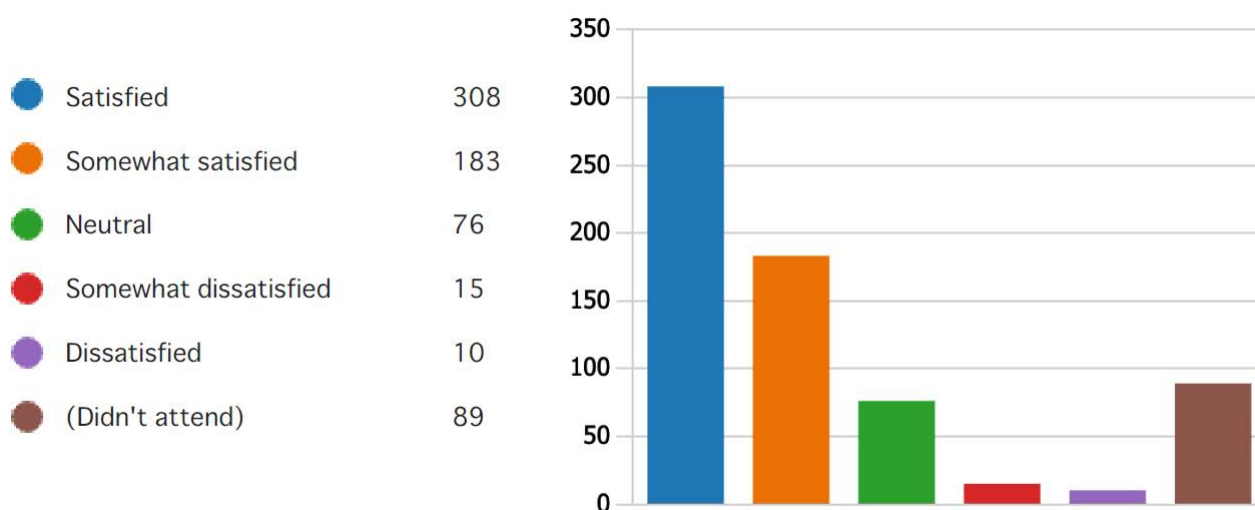


6. Please rate the quality of the technical sessions.

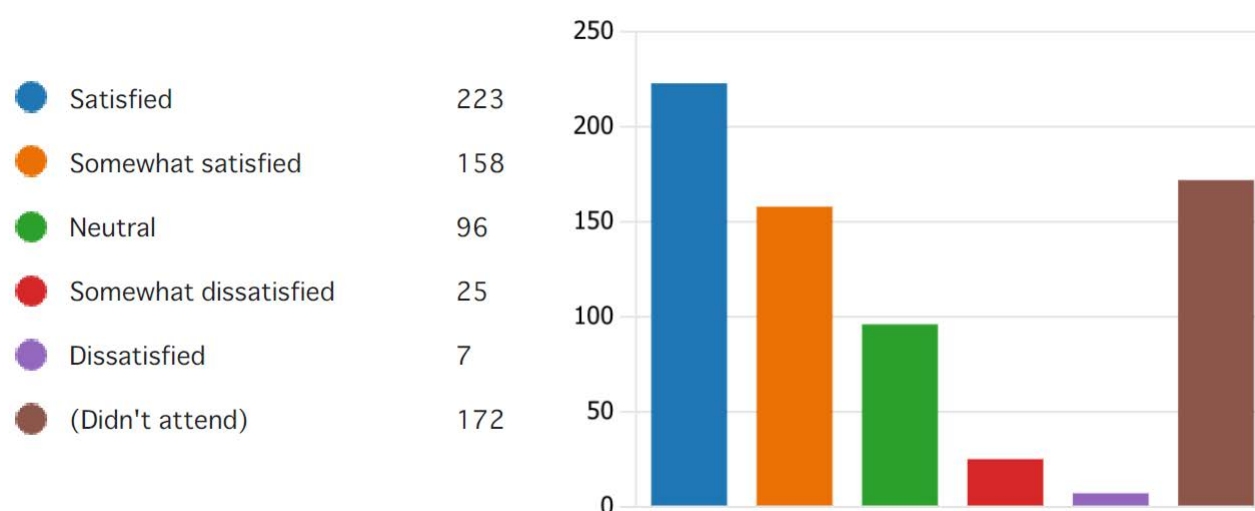
● Satisfied	325
● Somewhat satisfied	243
● Neutral	71
● Somewhat dissatisfied	21
● Dissatisfied	7
● (Didn't attend)	14



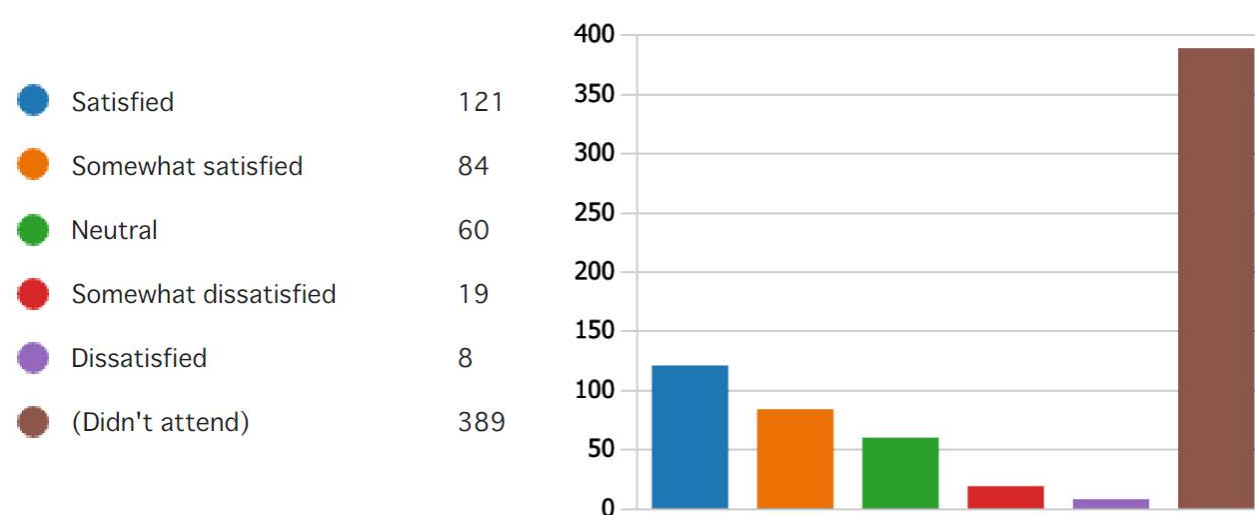
7. Please rate the quality of plenary/semi-plenary sessions.



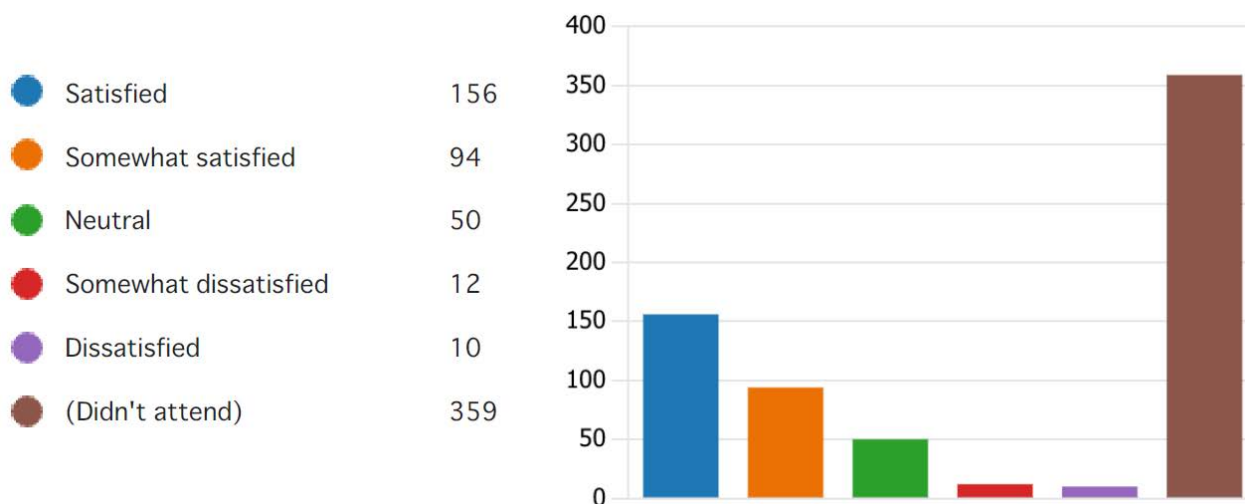
8. Please rate the quality of the technical sessions.



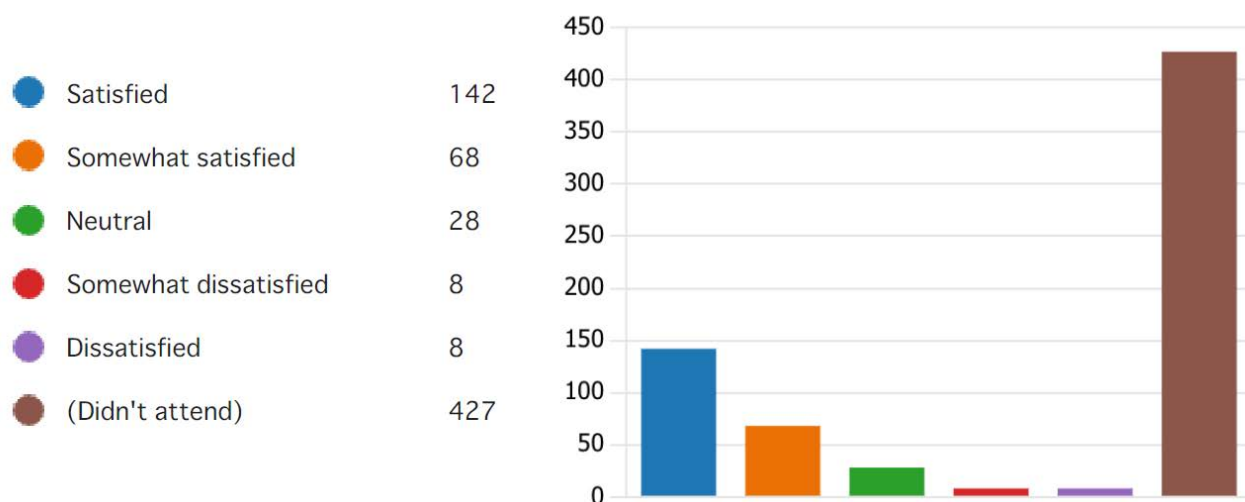
9. Please rate the quality of the competitions.



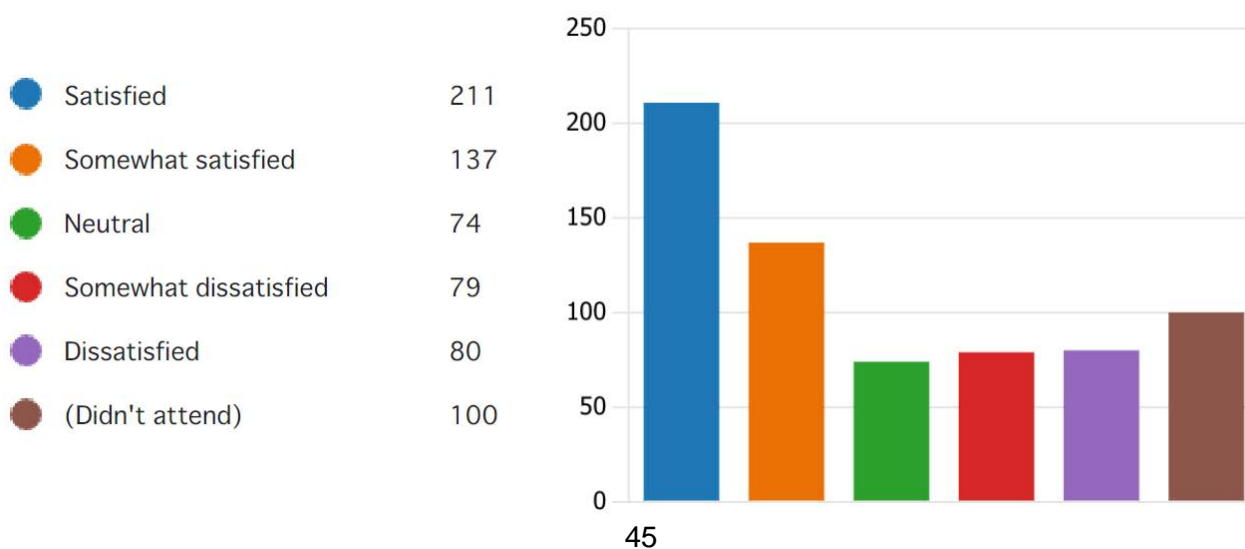
10. Please rate the quality of the Forums.



11. Please rate the quality of the workshops and tutorials.

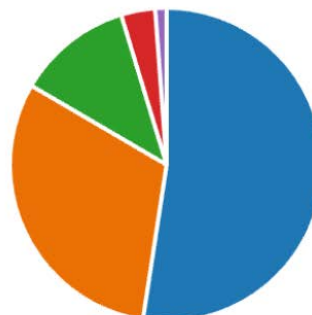


12. Please rate the quality of the Social Programs (Ceremonies, Receptions, Banquet).



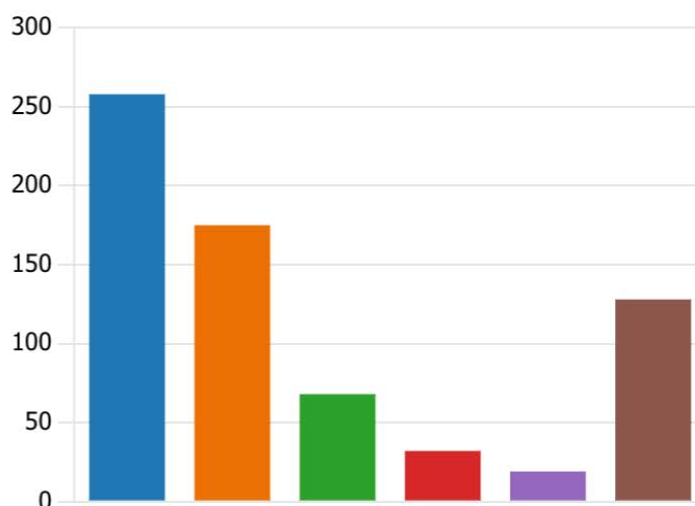
13. Please rate the quality of the IFAC2023 website.

● Satisfied	357
● Somewhat satisfied	211
● Neutral	81
● Somewhat dissatisfied	24
● Dissatisfied	8



14. Please rate the quality of the IFAC App.




● Satisfied	258
● Somewhat satisfied	175
● Neutral	68
● Somewhat dissatisfied	32
● Dissatisfied	19
● (Didn't use it)	128

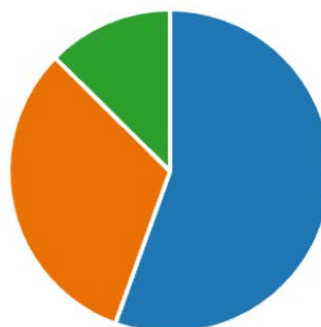


15. What was the most memorable event in IFAC2023.



16. How likely will you participate in IFAC2026 in Busan?

	Likely	378
	Neither likely nor unlikely	217
	Unlikely	86



Appendix 1 Welcome Addresses

Welcome from the IFAC President



Dear IFAC friends and Colleagues,

Since 1957, the International Federation of Automatic Control (IFAC) has contributed greatly to promoting scientific activities and technological developments in the field of automatic control. The IFAC World Congress is the largest event in the field, held every three years. I am extremely excited that the World Congress in 2023 will be hosted in Yokohama, Japan.

On behalf of IFAC, I would like to thank you for your participation in the IFAC World Congress 2023. It has been 42 years since the last World Congress was held in Kyoto, Japan in 1981. It has been the long-cherished wish of Japanese researchers in the field of automatic control to hold the IFAC World Congress again in Japan. For IFAC 2023, we have proposed the vision of "Wa (Harmony)". In a broad sense, it represents the design of the large harmonious control loop to solve societal problems and to create societal values. From the Japanese perspective, it also means harmony of traditional culture and innovative technology.

I would like to express my gratitude to all those who have worked hard to invite it again in Japan. Thanks to the cooperation of Prof. Shinji Hara, Prof. Tetsuo Sawaragi, Prof. Keiko Takahashi, and many others, it was decided at the IFAC Council Meeting in 2016 that the 2023 IFAC World Congress would be held in Yokohama. Since then, we have been making preparations for the conference for the past seven years under the leadership of Prof. Jun-ichi Imura, the General chair, and Prof. Hideaki Ishii, the IPC chair. During that time, various unexpected events happened such as COVID-19, and it was not easy to prepare it. I would like to express my sincere appreciation to the members of the National Organizing Committee, industrial partners, Japan National Tourism Organization (JNTO), Yokohama Convention & Visitors Bureau (YCVB), Pacific Convention Plaza Yokohama, and Congrès Inc. for the tremendous efforts, and to Science Council of Japan, The Society of Instrument and Control Engineers (SICE), The Institute of Systems, Control and Information Engineers (ISCIE), Kanagawa Prefecture, the City of Yokohama, and all the sponsors for their generous support.

As revealed by the COVID-19 pandemic, many societal issues have emerged for scientists and engineers. To tackle societal problems for sustainable developments in the future, cooperation is especially important. This is the first in-person IFAC World Congress in six years after the pandemic of COVID-19. I am extremely happy to know that many participants have registered for the congress as on-site attendees. This is an indication of the high expectations of many people to come to Yokohama, and to participate and discuss face-to-face. I am honored to be able to offer such an opportunity and hope to make it a success. I hope that all the on-site participants will spend a precious time at the congress and enjoy Yokohama and the surrounding tourist attractions by participating in the technical sessions, workshops, tutorials, and many other events.

The social and global environment in which we live is rapidly changing, and it is not easy to predict what will happen in future. However, I hope that the concepts and technologies of automatic control will be utilized to enhance people wellbeing and to build a sustainable, peaceful society, and that this IFAC WC 2023 will be the trigger. We will make every effort for IFAC 2023 to be enjoyable both technically and socially and very much

hope that many of you will join us in Yokohama from all over the world.

Hajime Asama

IFAC President (2020-2023)



Welcome from the IFAC 2023 General Chair



Dear Congress Attendees and Colleagues,

On behalf of the Organizing Committee of the IFAC World Congress 2023, I would like to express our deep gratitude for your participation in this world congress.

After a long preparation period under challenging circumstances due to the COVID-19 pandemic, which began in July 2020 after the conclusion of the Berlin Congress in 2020, we are now delighted to meet you in person and hold the IFAC World Congress in Yokohama. In the early stage of our preparations, the pandemic situation was completely unpredictable, so we had to explore possibilities of three event formats: in-person, fully online, and hybrid. Assessing the pandemic situation at the time of the congress, determining the appropriate event format, and calculating the expected number of participants proved to be difficult tasks. Approximately one year ago, we officially decided on a hybrid format with a focus on in-person participation. It is a great pleasure for us to see that at last, the event is taking place under the circumstances that we had envisioned.

One of the major highlights of the congress program is the strengthened collaboration with the industry. We established the Industry Group within the Organizing Committee, consisting of a total of 137 members from the academia and the industry with participation from about 50 Japanese companies in 17 technical fields. In collaboration with the IFAC Industry Committee, the Industry Group has successfully organized a wide range of events, including forums, organized sessions, technical tours, exhibitions, and so on. We strongly hope that these activities and efforts can lead us to a start of further collaborations with industrial companies engaged in automatic control. Another highlight is that under the initiative of President Hajime Asama, we have introduced a new format of sessions called Forums. There are in total of 23 forums covering themes related to Industry, Education, Funding, Diversity and Inclusion, and Citizens. In addition to the standard technical sessions, emphases are placed on interactive sessions, where presentations will be using large monitors and are accompanied with shotgun talks. Moreover, we have five competitions including a long-distance drone competition spanning approximately 16 kilometers across the Tokyo Bay, over 20 exhibition booths, events planned by students who are part of the IFAC 2023 Organizing Committee, and the Night Festival of Underwater Robots.

This success is thanks to all of you: authors, reviewers, participants, members of the International Program Committee, IFAC stakeholders, and the entire IFAC community. I would like to express my gratitude for your contributions that have made this world congress a fulfilling experience.

Yokohama has a population of approximately 3.7 million, making it the most populous city in Japan, next to Tokyo. It is a city that has developed in terms of transportation and industry and is one of the leading commercial and industrial cities driving Japan's economy. Furthermore, to the southwest of Yokohama lies Kamakura, a

historic city that served as the seat of the shogunate in the 1200s, offering the opportunity to experience Japan's traditional culture. Yokohama, with its remarkable blend of traditional Japanese and Western cultures, is also a highly popular tourist destination centered around its port. The congress venue, PACIFICO Yokohama is in the central part of the city and a convenient point to start your exploration. Alongside the technical exchanges at the congress, please enjoy the scenic beauty, history, and cuisine filled with the charm of Yokohama.

Finally, I would like to take this opportunity to express my gratitude to the members of the Organizing Committee who volunteered their valuable time to prepare for this congress, and to the Industry Group members who organized numerous events. I would also like to thank the organizers, the Science Council of Japan (SCJ) and the Japan Association of Automatic Control (JAAC), the co-organizers, the Society of Instrument and Control Engineers (SICE) and the Institute of Systems, Control and Information Engineers (ISCIE), as well as the companies and foundations as sponsors, and Congrès Inc., which has managed the overall planning and operation as the official PCO.

I would like to express our gratitude to all those involved in IFAC 2023.

General Chair IFAC 2023

Jun-ichi Imura

Appendix 2 Call for Papers



First Call for Papers
www.IFAC2023.org
22nd IFAC World Congress 2023
July 9 – 14, 2023, Yokohama, Japan

The IFAC World Congress Since 1957, the International Federation of Automatic Control (IFAC) has contributed greatly to promoting scientific activities and technological developments in the field of automatic control. The IFAC World Congress is the largest event in the field of control science and technology, held every three years. It offers the most up-to-date and complete view of control techniques, with the widest coverage of application fields, and is attended by a worldwide audience of scientists and engineers from academia and industry. This is the second congress hosted in Japan with the first being IFAC 1982 in Kyoto.

YOKOHAMA – Japan's First Port of Call The IFAC 2023 will be held in Yokohama, the historical gateway to Japan since the nation opened up to the outside world in 1859. Today, while it has evolved into a leading metropolis, Yokohama retains an easy-going atmosphere that is unique in Japan. Less congested than other cities, it enjoys breezes off the Pacific Ocean and visitors can experience its unrivaled outdoor way of life. Yokohama is the location of choice for hundreds of internationally minded companies and is a hub of academia and research. Organizations and businesses choose to be based in Yokohama because it is a place where ideas come together, where alliances can be forged, and where innovation is happening every day. Those same attributes have made this city the ideal location for global conferences.



Important Dates

PaperCept site opens	May 2022
Open Invited Track proposals	Sep. 2022
Invited Session proposals	Oct. 2022
Regular / Invited papers submission	Oct. 2022
Tutorials / Workshops / Extended Abstracts submission	Nov. 2022
Notification of acceptance	Feb. 2023
Final Paper submission	Mar. 2023

Submission Categories

Regular papers (6 to 8 pages)
 Extended abstracts (2 to 4 pages)
 Discussion papers (2 to 4 pages)
 Survey papers (up to 12 pages)
 Dissemination papers
 Demonstration papers
 Tutorials / Workshops

Organizers

Organizers

IFAC Japan NMO (Science Council of Japan)
 Japan Association of Automatic Control (JAAC)

Co-Organizers

The Society of Instrument and Control Engineers (SICE)
 The Institute of Systems, Control and Information Engineers (ISCIE)

JAAC SICE ISCIE

Contact

Secretariat of the IFAC 2023 (c/o Congrès Inc.)
 E-mail: ifac2023@congre.co.jp
 Phone: +81-3-3510-3701



Conference Highlights

Special technical events at IFAC2023 will include plenary/semi-plenary lectures, panel discussions, forums on focused topics, competitions, demonstrations, and tutorials/workshops on the state of the art in the general area of control science and technology. Collaboration between academia and industry will be highlighted by events organized by the IFAC Industry Committee and the IFAC2023 Industry Group.

Different options will be available for presentations and paper categories. In addition to regular and invited contributions, papers can be submitted to open invited tracks focusing on specific research topics (to be specified in the congress webpage). One may also present their works in shorter formats as extended abstracts and discussion papers. Moreover, under the new category of dissemination contributions, papers recently accepted by IFAC journals may be presented. The papers will be published both in the IFAC2023 proceedings and IFAC PapersOnLine.

Vision of IFAC2023 “WA: Control for Solving Societal Problems and Creating Societal Values”

Today, application domains in our society to which control engineers can contribute are vast, including transportation, power systems, smart cities, and medical and social services. At IFAC 2023, we have proposed the vision of “Wa” (Harmony in Japanese) as one of the future directions of control science and technology. In a broad sense, it represents the design of large harmonious control loops to solve societal problems in these domains. To this end, our efforts would require close cooperation with experts not only those in specific application domains, but also those with whom we can share methodologies for tackling emerging problems.

We may envision that “control” will be integrated with the new technological trends in Artificial Intelligence, Internet of Things, and Data Science. At IFAC 2023, we plan to have various events related to this vision in the form of forums and panel discussions.



Technical Areas

Systems & Signals
 Design Methods
 Computers, Cognition & Communication
 Mechatronics, Robotics & Components
 Manufacturing and Logistics Systems
 Process and Power Systems
 Transportation & Vehicles Systems
 Bio- & Ecological Systems
 Social Systems

IFAC2023 Industry Group (Chair: Kazuya Asano)

Mechatronic Systems	Aerospace Technology
Power & Energy Systems	Marine Systems
Machinery and Robotics	Environmental Systems
Steel Manufacturing Processes	Biological & Medical Systems
Chemical Processes	Systems Science & Technology
Automotive Control	Internet of Things
Smart Cities	Artificial Intelligence
Smart Agriculture	Measurement & Instrumentation
Control in Construction	

National Organizing Committee

IFAC President:	Hajime Asama
General Chair:	Jun-ichi Imura
General Vice-Chairs :	Tetsuo Sawaragi
	Keiko Takahashi
Advisory Board Chair:	Shinji Hara

International Program Committee

IPC Chair:	Hideaki Ishii (JP)
IPC Co-Chair:	Yoshio Ebihara (JP)
IPC Vice-Chairs:	Carlos Eduardo Pereira (BR)
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	Tariq Samad (US)
IPC Editors:	
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Hideaki Ishii (JP)	Benoit lung (FR)
Andreas Kugi (AT)	Jay H. Lee (KR)
Laura Menini (IT)	Lawrence Stapleton (IE)
Ronald van Nooijen (NL)	

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Accepted papers that have been presented at an IFAC meeting will be published in the proceedings of the event using the open-access IFAC-PapersOnLine series hosted on ScienceDirect (<https://sciencedirect.com/>). To this end, the author(s) must grant exclusive publishing rights to IFAC under a Creative Commons license when they submit the final version of the paper. The copyright belongs to the authors, who have the right to share the paper in the same terms allowed by the end user license, and retain all patent, trademark and other intellectual property rights (including research data).





Second Call for Papers

www.IFAC2023.org



The 22nd World Congress of the International Federation of Automatic Control
July 9 – 14, 2023, Yokohama, Japan

The IFAC World Congress is the largest event in the field of control science and technology, held every three years since 1960. It offers the most up-to-date and complete view of control techniques, with the widest coverage of application fields, and is attended by a worldwide audience of scientists and engineers from academia and industry. **The IFAC World Congress 2023 will be held in Yokohama, Japan**, which is the second congress hosted in Japan with the first being IFAC 1982 in Kyoto.



Conference Format

The IFAC2023 national organizing committee would make every effort to realize face-to-face meetings as possible. Still, there will also be an option to participate on-line, to accommodate the likely lasting influences of the COVID-19 pandemic.

Program Highlights

The vision of IFAC2023 is “Wa”, which literally means “harmony” in Japanese. In a broad sense, it represents the design of large harmonious control loops to solve societal problems in various domains.

The congress program includes special sessions to focus on this vision from various aspects, through *plenary and semi-plenary lectures, forums, panel discussions, demonstrations, tutorials, workshops*, as well as regular technical sessions.



Paper Categories

- Regular paper (R): up to 6 pages in the proceedings (up to 8 pages for initial submission)
- Survey paper (S): up to 12 pages in the proceedings (up to 16 pages for initial submission)
- Discussion paper (D): from 2 to 4 pages, for discussing specific topics, particularly from non-academic participants (not to be included in IFAC-PapersOnLine (POL))

Submission Categories

- Regular contributions (R/S/D)
- Invited contributions (R/S/D): invited by the organizers, selected under regular criteria
- Open Invited Track contributions (R/S/D): focus on specific research topics, based on proposals
- Demonstrator contributions (R/D): for promoting and showcasing research or education-oriented devices, innovative prototypes and transferring technologies to the enterprise.
- Dissemination contributions: papers recently accepted by IFAC journals, not to be included in IFAC-POL
- Tutorials and Workshops

Important Dates

Sep. 15, 2022	Open Invited Track proposals deadline
Oct. 15, 2022	Invited Session proposals deadline
Oct. 31, 2022	Regular / Invited papers submission deadline
Nov. 30, 2022	Tutorial / Workshop proposals deadline
	Discussion papers (Invited Sessions / Open Invited Tracks) deadline
Feb. 1, 2023	Discussion papers due (Regular) deadline
Feb. 21, 2023	Notification of acceptance
Mar. 31, 2023	Final paper submission deadline



IFAC2023 Technical Areas

Systems & Signals
Design Methods
Computers, Cognition & Communication
Mechatronics, Robotics & Components
Cyber-Physical Manufacturing Enterprise
Process and Power Systems
Transportation & Vehicles Systems
Bio- & Ecological Systems
Social Systems

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Hideaki Ishii (JP) Benoit lung (FR)
Andreas Kugi (AT) Jay H. Lee (KR)
Laura Menini (IT) Lawrence Stapleton (IE)
Ronald van Nooijen (NL)

IFAC2023 Industry Group is a large and active community including colleagues from academia and industry. It takes in organizing various collaborative events such as panel discussions, forums, exhibitions and technical tours. (Chair: Kazuya Asano)

Industry subgroups

Mechatronic Systems	Aerospace Technology
Power & Energy Systems	Marine Systems
Machinery and Robotics	Environmental Systems
Steel Manufacturing Process	Biological & Medical Systems
Chemical Processes	Systems Science & Technology
Automotive Control	Internet of Things
Smart Cities	Artificial Intelligence
Smart Agriculture	Measurement and Instrumentation
Control in Construction	

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Organizers

IFAC Japan NMO (under the Science Council of Japan)
Japan Association of Automatic Control (JAAC)

Co-Organizers

The Society of Instrument and Control Engineers (SICE)
The Institute of Systems, Control and Information Engineers (ISCIE)

Supported by

City of Yokohama
Yokohama Convention and Visitors Bureau
Japan National Tourism Organization (JNTO)

JAAC

SICE

ISCIE



Join the IFAC Control Orchestra!

The IFAC2023 organizers are planning to form an orchestra ensemble, including only musicians from the automatic control community, to make a live performance on site during the world congress. We are looking for colleagues who have some musical experience. If you have some musical experience and are interesting in this event, please subscribe to the orchestra mailing list through the congress website.



[Performance at IFAC2020](#)

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