

Technical Committee on Control Education

The IEEE Control Systems Society (CSS) Committee on Control Education plays a pivotal role in shaping the future of control education. The committee promotes public awareness, university education, and continuing education related to control. It enhances the education in theory and practice of control systems and improves accessibility through resource sharing. The committee emphasizes the importance of laboratory experiments, computer-aided learning, and the use of distance and virtual education technologies in control education. It aims to raise general awareness among precollege students and teachers about the significance of systems and control technology, highlighting the cross-disciplinary nature. The committee has a strong collaboration with the International Federation of Automatic Control (IFAC) Technical Committee (TC) on Control Education (Chair: Antonio Visioli) and the American Automatic Control Council TC on Control Education (Chair: Daniel Abramovitch).

CONTROL EDUCATION WEBINAR SERIES

The control education webinar series is a collaboration between the CSS TC on Control Education and the IFAC TC9.4. The webinars are given by renowned experts in the field of control education and deliver 45-min talks with a brief question-and-answer segment. Webinars are recorded and posted to the [IFAC YouTube Channel](#). Recent webinars include:

- » Brian Douglas on the topic of “Don’t Reinvent the Wheel:

Making Use of the Best Control System Resources”

- » José Luis Guzman on “Interactivity for Engineering Education: Automatic Control With Interactive Tools”
- » John Hedengren on “Data-Driven Engineering and Process Control Education With Portable Labs”
- » Steffi Korn on “Controlled Fun:

Teaching Automatic Control With Gamification.”

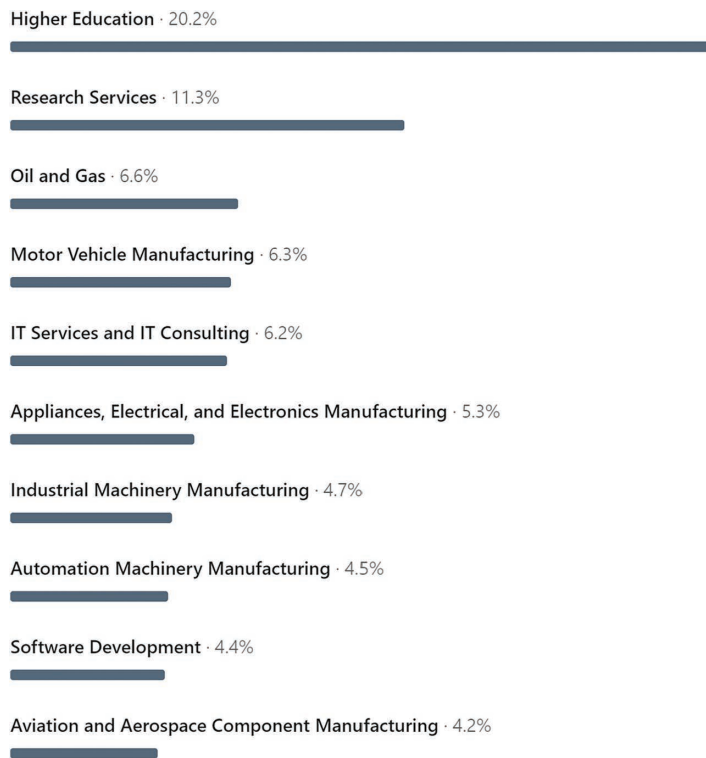
Upcoming webinars include Anthony Rossiter, Steve Brunton, Alberto Leva, and Anja Garone. The webinars are designed to be accessible to a broad audience and are promoted through mailing lists and LinkedIn groups of the TCs on control education. The initiative is



The CSS TC on Control Education.



Recent webinars on control education and posted to the IFAC YouTube channel.



Distribution of TC LinkedIn members by industry.

particularly beneficial for instructors, enhancing awareness of resources and best practices in control education.

CONTROL EDUCATION COMMUNITY ROADMAP

A CSS working group investigated the role of control theory and engineering in solving some of the many current and future societal challenges. The outcome of that study is “Control Education for Societal-Scale Challenges: A Community Roadmap” [1] as a comprehensive view of the current state and outlook of control education. The authors discuss the evolving landscape of control education, highlighting the need for curriculum redesign to reflect broader applicability, especially considering modern societal issues. The article advocates the introduction of control systems courses earlier in the curriculum, utilizing more accessible resources, and adopting modular teaching approaches.

Key points include:

- » *Broadened scope:* Control education is expanding beyond traditional contexts like manufacturing and proportional-integral-derivative loops, incorporating areas like sustainable agriculture and biomedical science.
- » *Educational approach:* A shift from mathematically heavy courses to those focusing on broader scenarios, utilizing computational tools, and fostering student engagement.
- » *Modularization:* Emphasizing the need for modular and open access educational resources to provide flexibility and adaptability in course design.
- » *Case studies:* The article includes detailed case studies from institutions like Brigham Young University, The University of California, Berkeley, Universidad Nacional de Educación a Distancia, and Imperial College

London, showcasing innovative approaches to control education, like using hands-on labs, virtual and remote laboratories, and integrating control theory with other disciplines.

The article emphasizes the importance of reimagining control education to meet the demands of modern societal challenges, urging educators to adapt teaching methods and materials accordingly. Additional articles [2], [3], [4] give other valuable insights on a first-year course in control engineering.

TC MEMBERS



There are 951 TC members in the [LinkedIn group](#) with strong representation from higher education, research, oil and gas, and vehicle manufacturing. Visit the [CSS TC on Control Education](#) website for additional information on joining the committee and the current activities.

The CSS TC on Control Education seeks to make a significant contribution to the field of control systems. Through the committee’s ongoing efforts, control education is highlighted as relevant, engaging, and aligned with the technological advancements and interdisciplinary nature of modern engineering challenges.

John Hedengren 
TC Chair

REFERENCES

- [1] J. A. Rossiter et al., “Control education for societal-scale challenges: A community roadmap,” *Annu. Rev. Control*, vol. 55, pp. 1–17, 2023, doi: [10.1016/j.arcontrol.2023.03.007](https://doi.org/10.1016/j.arcontrol.2023.03.007).
- [2] J. A. Rossiter, J. D. Hedengren, and A. Serbezov, “Technical committee on control education: A first course in systems and control engineering,” *IEEE Control Syst. Mag.*, vol. 41, no. 1, pp. 20–23, Jan. 2021, doi: [10.1109/MCS.2020.3033106](https://doi.org/10.1109/MCS.2020.3033106).

[3] J. A. Rossiter, A. Serbezov, A. Visioli, K. Žáková, and M. Huba, "A survey of international views on a first course in systems and control for engineering undergraduates," *IFAC J. Syst. Control*, vol. 13,

Sep. 2020, Art. no. 100092, doi: [10.1016/j.ifacsc.2020.100092](https://doi.org/10.1016/j.ifacsc.2020.100092).

[4] T. F. Edgar, B. A. Ogunnaike, J. J. Downs, K. R. Muske, and B. W. Bequette, "Renovating the

undergraduate process control course," *Comput. Chem. Eng.*, vol. 30, no. 10–12, pp. 1749–1762, 2006, doi: [10.1016/j.compchemeng.2006.05.012](https://doi.org/10.1016/j.compchemeng.2006.05.012).

Control Systems Society Technical Committee on Stochastic Systems and Control

The purpose of the IEEE Control Systems Society (CSS) Technical Committee (TC) on Stochastic Systems and Control (SSC) is to coordinate developments and advances in stochastic modeling, stochastic systems and control, stochastic games, data science, estimation and system identification, nonlinear filtering, computational mathematics, innovative ideas, and technology in emerging applications. Integrating research and education and research project-based teaching play an important role in activities by members of the committee.

This committee has established a record of global collaboration on different projects. Stochastic systems and control is a multidisciplinary and interdisciplinary field and, as such, has established a record of partnerships with other IEEE societies/councils/units/programs that include the Computer Society (CS), Systems Council, Society for Social Implications of Technology (SSIT), Nuclear and Plasma Society, Industrial and Electronics Society, Education Society, History Center, Women in Engineering (WIE), REACH Program, IEEE Youth Endeavors for Social Innovation Using Sustainable Technology (YESIST)12 Global Competition, IEEE Returning Mothers Conference, and the WePOWER (Women in Power Sector) Global Network. The SSC members have a long-term record of being active in

the World Bank and IEEE WIE WePOWER professional network for the South Asian Region, in the International Federation of Automatic Control (IFAC), Society for Industrial and Applied Mathematics, and American Automatic Control Council (AACC) and their conferences.

MOTIVATION

In the new era, stochastic systems and control play increasingly important roles. Not only are they used in traditional fields, such as engineering, but also in emerging application areas, such as financial engineering, economics, risk management, biology, ecology, neuroscience, actuarial sciences, large-scale data, environmental sciences, and social networks, to mention just a few. It is well known that a good understanding of randomness in systems is a critical and central issue in all areas of science. Stochastic systems and control is an interdisciplinary field that spans all science, technology, engineering, and mathematics (STEM) fields.

It requires collective and collaborative efforts and diversity in ideas, approaches, methods, and tools in problem-solving. This committee brings an inclusive group of enthusiastic, passionate research innovators and educators with diverse backgrounds, contributions, and established records of attracting K–12 students, college students, and young professionals to stochastic systems, control, and adaptive control with their broad spectrum of everyday life applications.

Noise in the systems cannot be disregarded, as there are examples showing that noise can stabilize or destabilize the system. This is particularly important in rapidly advanced biomedical and financial engineering areas of applications, as well as in all areas where measurements carry on errors. Mathematical statistics and probability with a good understanding of randomness in big data, modeling and analyzing it, making proper statistical inferences is a must-learn for students, along with programming languages, now and for the next 10 years. Illustrative examples include societal systems, autonomous systems, infectious disease systems, universal access to technology that include ethics, security, privacy, data-driven and physics-driven diversity in approaches will lead to machine learning and artificial intelligence. SSC TCs will have a continued significant impact on advances and innovations in control research and education.

RECENT AND UPCOMING ACTIVITIES

- » Panel sessions on Systems and Control and Diversity, Equity, Inclusion, and Belonging, cosponsored by the CSS, CS, Systems Council, and SSIT, ACC2023, May 2023, San Diego, CA USA
- » Meetings of the SSC Committee at ACC2023 in San Diego, CA and at the Conference on Decision and Control 2023 in Singapore.