

The logo features a stylized bar chart on the left with vertical bars of varying heights in shades of green and blue. To the right, the text "CDC·2024" is written in a green sans-serif font, with "MILANO" in a blue sans-serif font below it.

CDC·2024
MILANO

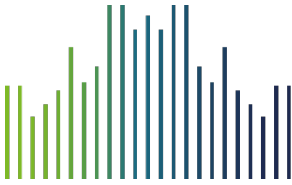


CONFERENCE PROGRAM



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CDC·2024 MILANO

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The IEEE Conference on Decision and Control (CDC) is the premier conference organized by the Control Systems Society in cooperation with the Society for Industrial and Applied Mathematics (SIAM), the Japanese Society for Instrument and Control Engineers (SICE), and the European Control Association (EUCA). Now in its 63rd iteration, CDC continues to deliver strong and forward-looking technical content. In fact, by pretty much every measure, CDC is a highly successful conference in terms of participation and technical quality. But what exactly are the ingredients required to cook up such a successful conference?

In one of my Presidential Columns in the IEEE Control Systems Magazine, I asked the question of why people attend our conferences. The answers I got painted a clear picture. The number one reason people attend our conferences is to network and reconnect with friends and colleagues. A close second was to keep a finger on the technical pulse and see what is going on in the community. Reason number three was “interesting locations”. The 63rd CDC in Milan is certainly firing on all three of these cylinders; the technical program is great and as far as interesting locations go, Milan has a lot to offer – from San Siro to La Scala.

But, perhaps the most important (yet sometimes not explicitly acknowledged) reason why a conference is successful is great and dedicated organizers. As someone who has served as both General Chair and Program Chair for past CDCs, I know firsthand the effort and hard work that is required to pull off a conference of this scale and scope, and I have nothing but the outmost respect for the volunteers who take on this massive task. I want to thank the Co-General Chairs, Maria Prandini and Luca Zaccarian, the Program Chair, Sophie Tarbouriech, and all the members of the Organizing Committee for putting together a stellar conference.

While the organizing committee may be the public-facing side of the conference, I also want to thank the unsung heroes on the IEEE CSS Conference Editorial Board, chaired by Amir Aghdam. Together, they fight the Second Law of Thermodynamics by reducing the entropy in the world through the diligent organization and processing of thousands of papers, reviews, and editorial decisions.

As you navigate the 63rd CDC, take advantage of the program on display inside the session rooms. But don't miss out on the informal program in-between talks and during coffee breaks. In fact, our conferences are ultimately all about community – technical as well as social. And I am very excited about the program that the organizers of the 63rd CDC have prepared for us.

A handwritten signature in black ink, appearing to read 'Magnus Egerstedt'.

Magnus Egerstedt
President, IEEE Control Systems Society

WELCOME FROM THE CONFERENCE CHAIRS



Welcome to the 63rd IEEE Conference on Decision and Control (CDC)

On behalf of the Organizing Committee, we warmly welcome you to Milan for the 63rd IEEE Conference on Decision and Control. Milan, home to the pioneering work of Giorgio Quazza and a hub of Italian creativity, innovation, and culture, offers a perfect backdrop for an inspiring conference experience.

The IEEE CDC, the flagship event of the IEEE Control Systems Society, is known for its technical excellence and legacy spanning over six decades. We are excited to host the CDC in Italy for the second time and are confident you will enjoy Milan's dynamic and cosmopolitan atmosphere.

This year has set records, with an unprecedented 2,520 submissions, including regular, invited papers, L-CSS journal contributions, plus 36 workshop proposals—the highest in CDC history. The technical program features 1,427 presentations across four days, with four plenary sessions, eight tutorials, and 174 contributed sessions, covering a wide range of topics in control.

With an acceptance rate around 55%, the selection process was rigorous, and we extend our gratitude to our Technical Program Committee, anonymous reviewers, and the Conference Editorial Board, under the expert leadership of Amir Aghdam. We are also excited to introduce Demo Sessions and Special Sessions during lunch and evening hours, offering more networking and in-depth discussion opportunities.

We are proud to provide over 160 fully funded double hotel rooms to student authors, thanks to the IEEE CSS and NSF's support, fostering the next generation of researchers.

Our heartfelt thanks go to the Organizing Committee members—João Manoel, Lars, Christophe, Hyungbo, Fulvio, Martina, Romain, Constantino, Philipp, Fabio, Giulio, Simone, Philip, Amir, and Lucrezia—as well as to Rossella Spangaro, our PCO, and her team—Andrea, Camilla, Laura, Veronica—for expertly guiding us through the challenges of organizing a conference in the "bel paese."

Three handwritten signatures in blue ink, corresponding to the three chairs mentioned in the text.

Maria Prandini, Luca Zaccarian

General Co-Chairs, 2024 IEEE Conference on Decision and Control

Sophie Tarbouriech

Program Chair, 2024 IEEE Conference on Decision and Control

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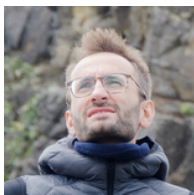
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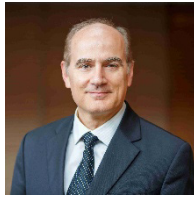
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The main charge of the Conference Editorial Board (CEB) is to ensure the technical quality of major conferences sponsored or co-sponsored by the Society. The CEB coordinates the receiving, logging, acknowledging, distributing, collecting and collating reviews, and evaluating papers submitted to the IEEE Conference on Decision and Control and the American Control Conference.

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The Control System Society Technical Committees (TC) organize focused events around a selected technical area. Typical activities include organizing invited sessions for conferences, special issues in journals, technical meetings (workshops and conferences), maintaining web sites for technical resources, and publishing electronic newsletters that focus on various technical areas. The current list of technical committees is shown below. For more information, please consult the TC web sites

<https://www.ieeecss.org/activities/technical-committees>

and contact the TC Chairs directly for additional information. All technical committee meetings are open. It is our hope that you will find the collaborations and resources useful.

Technical Committee

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Speaker: Paulo Tabuada, *University of California, USA*

Title: Ask not what AI can do for control, ask what control can do for AI

Time: Monday, December 16, 8:30-9:30

Location: Auditorium

Abstract: AI has drastically changed the landscape of several engineering disciplines, such as computer vision and natural language processing, and is now an integral part of several commercial products. In this talk I will argue, through several vignettes, that ideas and techniques from control can help answer fundamental questions about the power, limitations, and societal impact of AI.

Bio: Paulo Tabuada was born in Lisbon, Portugal, one year after the Carnation Revolution. He received his “Licenciatura” degree in Aerospace Engineering from Instituto Superior Tecnico, Lisbon, Portugal in 1998 and his Ph.D. degree in Electrical and Computer Engineering in 2002 from the Institute for Systems and Robotics, a private research institute associated with Instituto Superior Tecnico. Between January 2002 and July 2003, he was a postdoctoral researcher at the University of Pennsylvania. After spending three years at the University of Notre Dame, as an Assistant Professor, he joined the Electrical and Computer Engineering Department at the University of California, Los Angeles, where he currently is the Vijay K. Dhir Professor of Engineering. Paulo Tabuada's contributions to control and cyber-physical systems have been recognized by multiple awards including the NSF CAREER award in 2005, the Donald P. Eckman award in 2009, the George S. Axelby award in 2011, the Antonio Ruberti Prize in 2015, the grade of fellow awarded by IEEE in 2017 and by IFAC in 2019. He has been program chair and general chair for several conferences in the areas of control and of cyber-physical systems such as NecSys, HSCC, and ICCPS. He currently serves on the HSCC steering committee and served on the editorial board of the IEEE Embedded Systems Letters and the IEEE Transactions on Automatic Control.



Speaker: Dimitra Panagou, *University of Michigan, USA*

Title: Towards Safe and Resilient Autonomy Using Synergistic Control, Observation and Learning

Time: Tuesday, December 17, 8:30-9:30

Location: Auditorium

Abstract: Enabling autonomy for robotic and cyber-physical systems with provable safety and resilience guarantees has been an ongoing area of research. Despite significant progress over the years, there are still open challenges due to constraints (e.g., safety and time specifications; sensing, computation and communication limitations), and environmental uncertainty. This plenary talk will present some of our recent results and ongoing work on a framework that interconnects control, planning and learning methods towards provably-correct safety-critical robotic and aerospace systems under constraints and uncertainty.

Bio: Dimitra Panagou received the Diploma and PhD degrees in Mechanical Engineering from the National Technical University of Athens, Greece, in 2006 and 2012, respectively. In September 2014 she joined the Department of Aerospace Engineering, University of Michigan as an Assistant Professor. Since July 2022 she is

an Associate Professor with the newly established Department of Robotics, with a courtesy appointment with the Department of Aerospace Engineering, University of Michigan. Prior to joining the University of Michigan, she was a postdoctoral research associate with the Coordinated Science Laboratory, University of Illinois, Urbana-Champaign (2012-2014), a visiting research scholar with the GRASP Lab, University of Pennsylvania (June 2013, Fall 2010) and a visiting research scholar with the University of Delaware, Mechanical Engineering Department (Spring 2009). Her research program spans the areas of nonlinear systems and control; multi-agent systems, autonomy and control; and aerospace robotics. She is particularly interested in the development of provably-correct methods for the safe and secure (resilient) operation of autonomous systems in complex missions, with applications in robot/sensor networks and multi-vehicle systems (ground, marine, aerial, space) under uncertainty. She is a recipient of the NASA Early Career Faculty Award, the AFOSR Young Investigator Award, the NSF CAREER Award, the George J. Huebner, Jr. Research Excellence Award, and a Senior Member of the IEEE and the AIAA.



Speaker: Carsten Scherer, *University of Stuttgart, Germany*

Title: From Dissipativity to the Design of Controllers for Optimization

Time: Wednesday, December 18, 8:30-9:30

Location: Auditorium

Abstract: Recent years have witnessed a renewed interest in considering optimization algorithms as feedback systems. This viewpoint turns, for example, the analysis of the convergence properties of a first order algorithm into a problem of stability analysis of a Lur'e system. In this talk we highlight why dissipativity plays a key role for developing unprecedented tools to analyze the convergence properties of first order algorithms for solving convex programs. In contrast to alternative approaches, we reveal that the proposed avenue permits not only the analysis but also the systematic design of optimization algorithms using convex semi-definite programming. We substantiate that the proposed tools form a promising ingredient of a system theory for the design of controllers for optimization.

Bio: Carsten W. Scherer received his Ph.D. degree in mathematics from the University of Würzburg (Germany) in 1991. In 1993, he joined Delft University of Technology (The Netherlands) where he held positions as an assistant and associate professor. From 2001 until 2010 he was a full professor at the Delft Center for Systems and Control at Delft University of Technology. Since March 2010 he holds the SimTech Chair for Mathematical Systems Theory in the Department of Mathematics at the University of Stuttgart (Germany). Dr. Scherer acted as the chair of the IFAC technical committee on Robust Control, and he has served as an associated editor for the IEEE Transactions on Automatic Control, Automatica, Systems and Control Letters and the European Journal of Control. He is an IEEE fellow "for contributions to optimization-based robust controller synthesis." Dr. Scherer's main research activities cover various topics in applying optimization techniques for developing new advanced controller design algorithms and their application to mechatronics and aerospace systems.



Speaker: Karl H. Johansson, *KTH Royal Institute of Technology, Sweden*

Title: *Semper in motu*: Transforming mobility through learning and control

Time: Thursday, December 19, 8:30-9:30

Location: Auditorium

Abstract: The transformation of the transport sector is continuously in motion. Through advances in sensing, connectivity, computing, and electrification, the control community has been, and will continue to be, actively engaged in shaping a sustainable and efficient infrastructure for moving people and goods. While self-driving technologies have garnered significant attention, achieving widespread, safe deployment remains a challenge. Meanwhile, innovations in optimizing and enhancing the resilience of transport systems continue to advance, highlighting the broader impact of control technology on mobility. This lecture will explore the emerging field of learning-enabled cyber-physical-human systems and discuss some specific examples in intelligent transport. We will show how connected vehicles acting as mobile sensors and actuators can enable traffic predictions and control at a scale never before possible, by learning traffic models using physics-informed machine learning techniques. The complexities of safe interactions between automated and human-driven vehicles will be discussed, emphasizing the integration of formal reasoning methods and the use of tele-operation. The presentation highlights joint work with students, postdocs, and collaborators in academia and industry.

Bio: Karl H. Johansson is Swedish Research Council Distinguished Professor in Electrical Engineering and Computer Science at KTH Royal Institute of Technology in Sweden and Director of Digital Futures. He received MSc degree in Electrical Engineering and PhD in Automatic Control from Lund University. He has held visiting positions at UC Berkeley, Caltech, NTU among other institutions. His research interests are in networked control systems and cyber-physical systems with applications in transportation, energy, and automation networks. For his scientific contributions, he has received several best paper awards and other distinctions from IEEE, IFAC, and other organizations. He has been awarded Distinguished Professor by Swedish Research Council, Wallenberg Scholar with the Knut and Alice Wallenberg Foundation, Future Research Leader from the Swedish Foundation for Strategic Research, the triennial IFAC Young Author Prize, and IEEE CSS Distinguished Lecturer. He is Fellow of the IEEE and the Royal Swedish Academy of Engineering Sciences. He is the recipient of the 2024 IEEE CSS Hendrik W. Bode Lecture Prize. His services to the community include currently being IEEE CSS Vice President Diversity, Outreach & Development, Member of IFAC Council, and Immediate Past President of the European Control Association. He has been on the Editorial Boards for *Automatica*, *IEEE TAC*, *IEEE TCNS* and many other journals. He has served on the Swedish Scientific Council for Natural Sciences and Engineering Sciences.

3rd CSS Breakfast for Under-Represented Communities**Schedule:** Monday (December 16), 7:00-8:30**Location:** Panorama Lounge (Level 3)**Organizers:** Philip E. Paré (Purdue University) and Martina Maggio (Saarland University)**Abstract:** This activity is aimed at building a community for individuals who identify as under-represented within the Control Systems Society. The program includes some speakers, but most of the time will be devoted to informal interactions. The breakfast is open to students, postdocs, researchers, and faculty members who identify as under-represented in the control systems field, STEM, or the academic community. This may include, but is not limited to, those who identify as being Black/African American, Hispanic, Indigenous, LGBTQ+, or as having a disability.

(While women are welcome, this event is aimed at those from other under-represented groups. Women are encouraged to attend the Women in Controls luncheon, which provides a similar venue for community building.)

Win more grant proposals and secure more funding with Quanser's free grant assistance program!**Schedule:** Monday (December 16), 12:00 - 13:30**Location:** Amber 1 (Level 2)**Speaker:** Amirpasha Javid (Quanser, Director, Research Partnerships)**Abstract:** Developing a successful grant proposal is a time consuming and cumbersome process with many steps, uncertainties, and hidden corners. Yet it is key to the growth and success of an educational institution's faculty and their teaching and research objectives. Having a partner that understands federal and private funding mechanisms and knows how to navigate the various steps of submitting a successful grant proposal is a valuable asset. Especially if such assistance is provided at no cost! In this session we present Quanser's approach to securing funding for academic faculty and how a partnership with Quanser can help you increase the chances of your proposal's success and accessing the tools you need to conduct the proposed work. We will look at examples of previous awarded applications and some of the best practices that were deployed to make them successful. We will also present a few relevant current and upcoming funding opportunities across North America, UK and Europe for your review and consideration.**F1TENTH Sim Racing League Celebration****Schedule:** Monday (December 16), 18:00-19:00**Location:** Amber 1 (Level 2)**Organizers:** Venkat Narayan Krovi, Chinmay Samak and Tanmay Samak (Clemson University)**Abstract:** Join our celebration event to relive the nail-biting races, hear the top teams brag on their winning strategies and start your engines for the physical competition. For more information on the F1TENTH Autonomous Racing Competition.

The list of speakers will be publicized after the announcement of the virtual race results on December 9.

Road2CDC Best Theses presentation – IEEE CSS Italy Chapter**Schedule:** Monday (December 16), 18:00-19:00**Location:** Amber 2 (Level 2)

Organizers: Fabrizio Dabbene (Chapter Chair, CNR IEIT, Torino); Alessandro Rizzo (Chapter Vice-Chair, Politecnico di Torino), Mauro Franceschelli (Chapter Secretary, Università di Cagliari), Martina Mammarella (Chapter Secretary, CNR IEIT, Torino)

Abstract: This dedicated session will host the presentation of the ten awardees of the IEEE CSS Italy Best MSc Theses in Control. This is the final event of the Road2CDC Initiative, founded by the IEEE CSS Outreach program to stimulate students' interest in controls. The students will present a five-minute summary of their MSc thesis. The session will be chaired by the IEEE CSS Vice President for members activities, and it will end with an award ceremony. All the winners will be presented an award certificate, and the best among the presented works will be awarded with a plaque. The session is held immediately before the newcomers and YP aperitif.

AI in the Time of Control: an A-Political Rally

Schedule: Tuesday (December 17), 12:00 - 13:30

Location: Brown 3 (Level 2)

Panelists: Prof. Victor Solo - Prof. Pramod Khargonekar - Prof. Bob Bitmead - Prof. Magnus Egerstedt

Précis: The strong promotion of Artificial Intelligence (AI) as a panacea/menace/smokescreen across so many areas of human endeavor has captured the attention of scientists, policymakers, granting agencies and large fractions of the public. And yet, there is very serious concern both from inside and outside the AI community that the basis for optimism is misplaced, needs rigorous examination, sophisticated regulation, and public oversight. Primarily, there are unmet requirements of quantified performance, interpretation, generalization, etc, etc. Control theory and practice intersects many of the target domains pronounced for AI, and yet has both a more formal methodology and metrics of behavior, bringing the closed-loop firmly into the picture. The rally is aimed at exploring how to achieve this in order to meet these collective challenges and realize the potential opportunities in the control space.

The central themes for consideration are:

1. Reclaiming Expertise: Reclaiming agency over Robotics, Automation and technical Decision Sciences.
2. Supplying Expertise: Reconstituting AI for Safety using the tools from Control.
3. Solving the PhD student dilemma: Why Engineering Science trumps purely 'Data Driven' Engineering and can help deliver on some of the promise.
4. Stopping the 'brain drain' from Engineering to Computer Science and attract talent to work on this more material agenda.

The presenters, while preserving their varied personal non-agnostic control-based viewpoints, shall lead off the discussion with brief (five minute) secular arguments extolling their positions. Then the audience will be invited to air their views focusing (solely) on the four themes above. The objective is to appreciate the way forward and not simply the airing of grievances or statements of position. The panelists are extraordinarily optimistic that control has much to offer to this debate.

Early Career Lunch (Tuesday, 12:00 - 13:30)

Schedule: Tuesday (December 17), 12:00 - 13:30

Location: Amber 1 (Level 2)

Organizers: Philip E. Paré (Purdue University), Anastasia Bizyaeva (Cornell University), Brooks A. Butler (University of California, Irvine)

Abstract: Graduate students, postdoctoral scholars, and early career researchers are warmly invited to a special lunch session. This lunch will be a perfect opportunity to meet new peers and to make a game plan for the rest of your conference agenda. It

is also a chance to meet members of the newly formed NextCom committee within the IEEE Control Systems Society (CSS) and learn about upcoming resources, workshops, and networking opportunities aimed at supporting early career members of our community. **All are welcome!**

Please join us to learn about all the exciting things happening in CSS and explore getting more involved!

Mitsubishi Electric Research Labs: Fundamental Research with Real-World Impact

Schedule: Wednesday (December 18), 12:00 – 13:30

Location: Amber 1 (Level 2)

Organizer: Mitsubishi Electric Research Labs

Speakers: S. Di Cairano, K. Berntorp, A. Vinod, A. Weiss

Abstract: Mitsubishi Electric Research Laboratories (MERL) is a leading research organization that conducts fundamental research for industrially motivated problems. MERL is a subsidiary of Mitsubishi Electric Corporation, a global manufacturer of a wide range of products including robots, automotive, HVAC, factory automation, electrical systems, and space systems. MERL researchers collaborate with corporate laboratories and academic partners from around the world to develop novel solutions to challenging problems.

In this talk we present an overview of control-related research activities at MERL. We discuss fundamental research including model predictive control and control of constrained systems, estimation and motion planning for autonomous systems, real-time optimization and integration of learning and control. Then, we describe how these fundamental research areas have impacted real world applications and products such as automated vehicles, drones, spacecraft, robots and navigation systems.

Students interested in internship and staff positions, and faculty interested in exchange of ideas and collaborations including potential sabbatical stays are encouraged to attend.

The Budd-e Project for blind and visually impaired users

Schedule: Wednesday (December 18), 12:00 - 13:30

Location: Amber 2 (Level 2)

Organizer: Marcello Farina (Dipartimento di Elettronica e Informazione, Politecnico di Milano)

Speakers: Marcello Farina and Matteo Corno (Dipartimento di Elettronica e Informazione, Politecnico di Milano); Emanuele Lettieri (Department of Management Engineering, Politecnico di Milano, Istituto dei Ciechi di Milano); Franco Lisi and Francesco Cusati (Istituto dei Ciechi di Milano)

Abstract: The session will discuss the experience gained in the development of the BUDD-e project. The project, initially funded by Politecnico di Milano through the Polisocial 2021 programme, aims to develop a guide robot for blind and visually impaired users to be displayed, e.g., in structured spaces (such as hospitals and shopping centres). The project has involved as partners, among others, the Istituto dei Ciechi di Milano ONLUS, Unione Italiana dei Ciechi e degli Ipovedenti ONLUS-APS, ASST Grande Ospedale Metropolitano Niguarda, and Servizio Sport of Politecnico di Milano.

During the session, project members and partners will describe the challenges and the main results obtained in the project. Besides the technical issues, a particular focus will be given on the experience gained through the close collaboration with the associations and institutions involved, in defining the characteristics of the guide robot and the needs, in terms of accessibility, within the considered spaces.

Integrating Intelligent Control Systems into Engineering Education with MATLAB and Simulink

Schedule: Thursday (December 19), 12:00 - 13:30

Location: Amber 1 (Level 2)

Organizer: Craig Buhr, MathWorks

Speaker: Dr. Claudia Yasar, Yildiz Technical University

Abstract: Intelligent control systems, integrating both classical and contemporary methodologies, are pivotal in managing complex systems that exceed the capabilities of traditional control mechanisms. Utilizing adaptive and learning capabilities—often by employing artificial intelligence algorithms—these systems address intricate challenges effectively. This session will highlight an innovative engineering course designed to embed intelligent control principles within the curriculum, utilizing state-of-the-art MATLAB and Simulink tools.

TUTORIAL SESSIONS

Data-Driven Learning of Stable Control Laws for Adaptive Robot Planning: A Dynamical Systems Perspective

Organizers: Aude Billard, Bernardo Fichera, Aradhana Nayak

Time: MoA01 - Monday 10:00-12:00

Location: Auditorium

Abstract: Control laws based on Autonomous Dynamical Systems (DS) provide a robust and reactive framework for high-level control in robotics, ensuring stability of the vector field. Recent advancements, particularly in geometry-based DS shaping techniques, leverage differential geometry tools to enhance expressivity and adaptability, while maintaining stability assurances. This tutorial focuses on the theoretical foundation for data-driven learning of DS-based control laws, with examples from robotic applications. Key topics include estimating non-linear dynamical systems, enabling highly reactive obstacle avoidance, and leveraging differential geometry for controllability of nonlinear dynamics. Hands-on exercises in MATLAB and real-world video illustrations will cover safe navigation in crowds and robust control of robotic manipulators around human co-workers.

Hybrid Feedback Control Design

Organizers: Ricardo G. Sanfelice, Pedro Casau, Francesco Ferrante

Time: MoB01 - Monday 13:30-15:30

Location: Auditorium

Abstract: The goal of this tutorial session is to present a self-contained introduction to hybrid feedback control and to design tools that make hybrid control a powerful design method. The session introduces hybrid feedback control through a self-contained examination of hybrid control systems modeled by the combination of differential and difference equations with constraints. Using multiple examples, it illustrates the power of hybrid feedback control, which stems from the integration of continuous and discrete dynamics, where state variables update instantaneously at specific events while flowing continuously otherwise. The session introduces hybrid closed-loop systems as interconnected hybrid plants and controllers with designated inputs and outputs and formalizes their solutions. It summarizes key properties of hybrid systems and reviews various control strategies, including supervisory control with logic variables to select feedback controllers, event-triggered control to minimize

control input updates, and strategies using multiple Lyapunov-like functions for stabilization. Pointers to further reading and other strategies in the literature are provided.

Half a Century of Multi-Pass Systems: Iterative Learning Control and Repetitive Processes - A Retrospective Tutorial

Organizers: Kevin L. Moore, Eric Rogers, Ying Tan, Tom Oomen, Bing Chu, Yuxin Wu

Time: TuA01 - Tuesday 10:00-12:00

Location: Auditorium

Abstract: Multi-pass systems are those that repeat or iterate their basic system operation, often from the same starting conditions. Such systems arise naturally from the system dynamics (repetitive processes) and through operational procedures and control actions (iterative learning control). Research in multipass systems dates from the middle 1970's to the present. In this tutorial session we will present an overview of the primary results in the field along with comments on future research directions. The session will be self-contained so that it is suitable for systems and control researchers and practitioners who may not be familiar with the concepts of multi-pass systems as well as of interest to those with some background in the field.

Model predictive control for tracking using artificial references: Fundamentals, recent results and practical implementation

Organizers: Daniel Limon, Melanie N. Zeilinger, Antonio Ferramosca, Johannes Köhler, Pablo Krupa, Ignacio Alvarado, Teodoro Alamo

Time: TuB01 - Tuesday 13:30-15:30

Location: Auditorium

Abstract: We propose a comprehensive tutorial on a family of recent Model Predictive Control (MPC) formulations, known as MPC for tracking, that are characterized for making use of an artificial reference. These formulations have several benefits with respect to the classical tracking MPC formulations, including guaranteed recursive feasibility under online reference changes, as well as asymptotic stability and an increased domain of attraction. The tutorial introduces the concept of using artificial references in MPC and the benefits and theoretical guarantees obtained by its use by first presenting the original linear MPC for tracking formulation. We then cover more recent advances and variations of the original formulation, including its non-linear extension, its application to robust control or its extension to tracking periodic reference trajectories, among others. We also discuss optimization aspects related to the implementation of MPC for tracking and its application to learning-based MPC. The goal of this tutorial is to increase the visibility of this family of MPC controllers whose use is ever increasing in the overall control community.

Forty plus years of model reduction and still learning

Organizers: Carolyn L. Beck, Henrik Sandberg, Jacquélien M.A. Scherpen, Alessandro Astolfi

Time: WeA01 - Wednesday 10:00-12:00

Location: Auditorium

Abstract: The construction of reduced order models for dynamical systems has long been considered an important research problem, not only in the field of control, but also in economics, image processing, circuit analysis and statistical mechanics, to cite just a few examples. The classic problem is this: given a model of a dynamical system,

determine a simplified model that facilitates tractable system analysis and controller synthesis where none may have existed before. For example, optimal controller synthesis may grow in computational complexity faster than $O(n^3)$, where n represents the state dimension of the model or the order of the differential equations describing the dynamical behavior of the system. Any particular reduction algorithm is then judged upon the level of complexity reduction achieved, how closely the reduced model captures the original system behavior, and the complexity of the reduction process itself. This classic formulation of the model reduction problem has been of interest in the control community for over 40 years, beginning perhaps with the linear system realization problem proposed by Kalman and Ho, or more directly with the balancing and principal component analysis perspective of Moore. As time passes, the mathematical models considered relevant in control problems increase in both dimension and complexity, involving distributed and interconnected systems of dynamical systems, switching systems, and complex non-linear dynamics. In this tutorial session, we begin with a historical overview of the classic problem formulation and review the timeline of developments in linear, nonlinear, and data-based model reduction methods.

Bringing Quantum Systems under Control

Organizers: Julian Berberich, Robert L. Kosut, Thomas Schulte-Herbrueggen

Time: WeB01 - Wednesday 13:30-15:30

Location: Auditorium

Abstract: Quantum computing comes with the potential to push computational boundaries in various domains including, e.g., cryptography, simulation, optimization, and machine learning. Exploiting the principles of quantum mechanics, new algorithms can be developed with capabilities that are unprecedented by classical computers. However, the experimental realization of quantum devices is an active field of research with enormous open challenges, including robustness against noise and scalability. While systems and control theory play a crucial role in tackling these challenges, the principles of quantum physics lead to a (perceived) high entry barrier for entering the field of quantum computing. This tutorial session aims at lowering the barrier by introducing basic concepts required to understand and solve research problems in quantum systems. First, we introduce fundamentals of quantum algorithms, ranging from basic ingredients such as qubits and quantum logic gates to prominent examples and more advanced concepts, e.g., variational quantum algorithms. Next, we formalize some engineering questions for building quantum devices in the real world, which requires the careful manipulation of microscopic quantities obeying quantum effects. To this end for N -level systems, we introduce basic concepts of (bilinear) quantum systems and control theory including controllability, observability, and optimal control in a unified frame. Finally, we address the problem of noise in real-world quantum systems via robust quantum control, which relies on a set-membership uncertainty description frequently employed in control. A key goal of this tutorial session is to demystify engineering aspects of quantum computing by emphasizing that its mathematical description mainly involves linear algebra (for quantum algorithms) and the handling of bilinear control systems (for quantum systems and control theory) but does not require too much detailed knowledge of quantum physics.

Recent advances in partially observed Markov decision processes: regularity, existence, approximations, and learning with agent-state policies

Organizers: Amit Sinha, Ali Devran Kara, Aditya Mahajan, Serdar Yuksel

Time: ThA01 - Thursday 10:00-12:00

Location: Auditorium

Abstract: Partially observed Markov Decision processes (POMDPs) present a versatile and appropriate model for many applications but this richness is accompanied by challenging and fundamental mathematical problems. Many practical physical models with control involve a hidden, unobservable, state dynamics which is controlled by a decision maker having access to partial information on the hidden state. Despite the practical significance, research in POMDPs still entails fundamental open questions and the past few decades has seen significant breakthroughs in our understanding of POMDPs, in view of regularity results such as continuity, existence, and filter stability; and the implications of these regularity results on robustness, approximations, learning theoretic aspects and practical reinforcement learning algorithms. Our goal in this tutorial is to present, to the control theory community, such recent findings within the broader panorama of prior knowledge and open problems for the future.

A Jump Start to Stock Trading Research for the Uninitiated Control Scientist: A Tutorial

Organizers: B. Ross Barmish, Simone Formentin

Time: ThB01 - Thursday 13:30-15:30

Location: Auditorium

Abstract: The target audience for this tutorial session are control systems researchers with an interest in algorithmic stock trading but without substantial background in related topic areas such as finance and economics. To this end, the speakers will explain basic ideas apropos to stock trading from a control-theoretic point of view. Once the market mechanics and the stock-price models of interest are set up and explained in the first two talks, our "bread and butter" tools such as feedback and optimization will come into play. To motivate tutorial attendees and get them rapidly "up to speed," we will consider a selected subset of the literature which can be easily understood by control community members without the need to invest an unduly large amount of time on the underlying financial theory motivating the formulations.

DEMOS

AIDA – Artificial Intelligence Driving Autonomous

Schedule: Monday (December 16) - Thursday (December 19), 9:30-18:00

Location: Exhibition Area

AIDA (Artificial Intelligence Driving Autonomous) is an ambitious project by the Politecnico di Milano, aimed at experimenting with autonomous driving on public roads. Of particular importance was the participation in the 2023 and 2024 editions of the historic 1000 Miglia race and in the Trofeo Vallecamonica, events that have allowed the system's capabilities to be tested in highly demanding and competitive contexts. Simultaneously, numerous new tests will be launched in urban environments with the objective of evaluating the effectiveness and reliability of autonomous driving in real and complex traffic scenarios. The project aims to create a future where road safety and reliability are significantly improved. This approach not only promises to reduce accidents and increase safety for all road users but also to make mobility more

efficient and sustainable. With the “AIDA” project, the Politecnico di Milano not only positions itself at the forefront of technological research but also commits to playing a key role in shaping the future of Italian mobility. The adoption of artificial intelligence in autonomous driving represents both a challenge and an opportunity to redefine the way we move, laying the foundations for a new era of innovation and progress in the transportation sector. The demo will consist of a presentation of two self-driving vehicles, including footage acquired during on-field testing. A team of engineers working on the project will be present to answer questions regarding the hardware and software of the vehicles.

For more information go to <https://1000mad.deib.polimi.it/en/>

Martec Quadruped Robots

Schedule: Tuesday (December 17), 9:30-18:00

Location: Gold Lounge

The robot dogs that will be presented during CDC2024 are the state of the art of kinematics and sw/hw management of movements and balance. The machines can perform a series of evolutions and movements managed remotely or they can also operate with the help of AI for missions with pre-established objectives.

The Budd-e Project for blind and visually impaired users

Schedule: Wednesday (December 18), 13:30-15:30

Location: Gold Lounge

Budd-e is an assistive robot designed to guide visually impaired people safely and effectively in complex environments. At CDC'24, you will have the chance to test this technology first-hand, with the possibility for the willing to test the guidance feature blind-folded.

Discover the Future of Micromobility: Autonomous E-Scooter Demonstration

Schedule: Thursday (December 19), 10:00-12:00 and 13:30-15:30

Location: Gold Lounge

Join us for a live demonstration of autonomous e-scooters, highlighting the integration of advanced control technology in micromobility solutions. Explore the potential of these autonomous vehicles in contributing to sustainable urban transport through innovative control strategies.

Highlights of the event include:

- **Live Demonstration:** Witness the autonomous e-scooters in action, navigating the hallways at CDC 2024.
- **Technical Discussion:** Hear from our team from the Institute for Systems Theory and Automatic Control, University of Stuttgart, about the control strategies and use cases for these vehicles, including their impact on sustainability.
- **Interactive Q&A:** Engage with the team and get answers to all your questions about this exciting development in urban transport.
- **Networking:** Connect with other professionals, enthusiasts, and colleagues interested and active in the field of micromobility and autonomous robots.

Get to know more about our project and explore how autonomous e-scooters can enhance urban mobility. We are looking forward to seeing you at CDC 2024. If you can't wait, check out our project website: <https://estaring.io>.

F1TENTH Virtual Racing Competition

Schedule:

- October to December: Preparation [Remote]
- December 7 and 8: Virtual Race Final [Remote]
- December 9: Result Announcement [Remote]
- December 16, 18:00-19:00: Celebration event [Finally in person at MiCo!]

In the 2nd F1TENTH Sim Racing League, teams will develop cutting-edge algorithms to navigate high-speed tracks using digital twins of F1TENTH cars. Please, visit the link below for all relevant information

<https://autodrive-ecosystem.github.io/competitions/f1tenth-sim-racing-cdc-2024/>

F1TENTH Physical Racing Competition

Schedule: Monday (December 16) - Thursday (December 19) at MiCo!

The 22nd F1tenth Autonomous Grand Prix is an in-person competition where teams bring their own scaled autonomous race cars and develop software to navigate the track. Teams receive a build manual and can use open-source software to get started, while the organizers provide the race setup, track, and infrastructure. The competition begins with a qualification session to determine seeding, followed by head-to-head knockout races, challenging teams to refine their perception, planning, and control algorithms against standardized vehicles on a shared track. Come and check out the trial runs and the race.

PRE-CONFERENCE WORKSHOPS

The 63rd IEEE Conference on Decision and Control (CDC 2024) will be preceded by workshops on Sunday, December 15, 2024, addressing current and future topics in control systems presented by experts from academia, research institutes, and industry. The workshops will take place at the same venue.

1: Contraction Theory for Systems, Control, Optimization, and Learning

Organizer: Francesco Bullo

Website: <http://motion.me.ucsb.edu/contraction-workshop-2024/>

Location: Amber 1 (Level 2)

2: Control and Optimization in the Probability Space

Organizers: Liviu Aolaritei, Giovanni Russo, Florian Dörfler

Website: <https://sites.google.com/unisa.it/cdc-2024-workshop/home-page>

Location: Amber 2 (Level 2)

4: Safe and Secure Learning-Enabled Systems

Organizers: Thinh T. Doan, Kyriakos G. Vamvoudakis

Website: <https://sites.google.com/view/ssles-workshop-cdc-2024>

Location: Suite 1 (Level 2)

5: Control Architecture Theory

Organizers: Aaron D. Ames, Nikolai Matni, Gioele Zardini

Website: <https://cat-cdc24.github.io/>

Location: Amber 4 (Level 2)

6: Leveraging bifurcations for control of intelligent and collective behaviors

Organizers: Anastasia Bizyaeva, Alessio Franci

Website: <https://sites.google.com/view/cdc2024-bifurcations-workshop>

Location: Suite 6 (Mezzanine/Intermediate level)

7: Control of Multiagent Systems: Challenges and Solutions

Organizers: Tansel Yucelen, Deniz Kurtoglu, David W. Casbeer, Dejan Milutinovic

Website: <http://tinyurl.com/cdc2024-workshop/>

Location: Amber 5 (Level 2)

8: Fair Decision-Making and Societally-Aware Control in Networked Systems

Organizers: Valentina Breschi, Eugenia Villa, Chiara Ravazzi, Fabrizio Dabbene, Mara Tanelli, Marco Pavone

Website: <https://sites.google.com/view/cdc-2024-fairworkshop/home>

Location: Suite 5 (Mezzanine/Intermediate level)

9: Large Population Teams: Control, Equilibria, and Learning

Organizers: Aditya Mahajan, Panagiotis Tsiotras, Serdar Yüksel

Website: <https://dcslgatech.github.io/cdc24-large-teams-workshop/>

Location: Suite 8 (Mezzanine/Intermediate level)

10: Complex Socio-Technical Networked Dynamics

Organizers: Angela Fontan, Karl H. Johansson, Pedro U. Lima, Sergio Pequito, Alessandro Rizzo, Lorenzo Zino

Website: <https://sites.google.com/view/socio-technical-cdc2024>

Location: Suite 3 (Level 2)

11: Past and Future in Control of Networked Systems: Insights and Perspectives

Organizers: Jeff S. Shamma, Giacomo Como, Luca Schenato, Lacro Pavel

Website: <https://sites.google.com/view/cdc24-ieee-tcns-workshop>

Location: Suite 4 (Level 2)

12: From Formal Methods to Data-Driven Verification and Control

Organizers: Abolfazl Lavaei, Chuchu Fan, Lars Lindemann, Saber Jafarpour

Website: <https://lavaei-cps.de/workshop-CDC2024.html>

Location: Amber 8 (Level 2)

13: Data-driven modelling, analysis, and control using the Koopman operator

Organizers: Petar Bevanda, Sandra Hirche, Armin Lederer, Alexandre Mauroy, Karl Worthmann

Website: <https://www.tu-ilmenau.de/cdc24>

Location: Amber 6 (Level 2)

14: Data-driven control: theory and applications

Organizers: M. Kanat Camlibel, Jeremy Coulson, Paolo Rapisarda, Henk J. van Waarde

Website: <https://sites.google.com/rug.nl/cdc24-workshop/home>

Location: Amber 7 (Level 2)

15: Learning Dynamics from Data: Fusing Machine Learning and System Identification

Organizers: Yuhan Liu, Maarten Schoukens, Roland Tóth, Dario Piga

Website: <https://sites.google.com/view/cdc2024-mlsysid>

Location: Amber 3 (Level 2)

16: Remembrance of Allen Tannenbaum: Foundations of modern robust control and beyond

Organizer: Tryphon T. Georgiou

Location: Suite 2 (Level 2)

17: Control and Adaptation: Imagine What's Next - Celebrating the 60th Birthday of Miroslav Krstic

Organizers: Mamadou Diagne, Nikolaos Bekiaris-Liberis, Shuxia Tang, Huan Yu, Tiago Roux Oliveira, Rafael Vazquez, Iason Karafyllis

Website: <https://www.insync-lab.org/cdc2024-session>

Location: Suite 7 (Mezzanine/Intermediate level)

18: NedicFest! A Workshop Celebrating Angelia Nedić at the CDC 2024

Organizers: Cesar A. Uribe, Philip E. Paré, Tinh T. Doan, Soomin Lee, Tatiana Tatarenko, Behrouz Touri, Jinming Xu, Shi Pu, Rasoul Etesami, Hoi-To Wai, Ji Liu, Farzad Yousefian

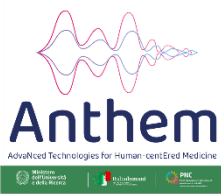
Website: <https://cauribe.rice.edu/nedicfest2024/>

Location: Suite 9 (Mezzanine/Intermediate level)

SPONSORS

We extend our heartfelt gratitude to the sponsors of IEEE-CDC 2024 for their valuable contributions and presence at this conference, which support ongoing advancements in control systems engineering and enrich our professional community.

Gold Sponsors:



Silver Sponsors:



Bronze Sponsors:



Mitsubishi Electric Research Laboratory (MERL)

Mitsubishi Electric Research Laboratories (MERL), located in Cambridge, MA, is the North American R&D organization for Mitsubishi Electric Corporation, a \$40B global manufacturer of electrical products including elevator and escalators, HVAC systems, electrical power systems, satellites, factory automation equipment, automotive electronics and visual information systems. Controls researchers at MERL collaborate with corporate R&D laboratories, business units in Japan and the United States, and academic partners around the world to develop new control algorithms and control technologies that extend the capabilities and the performance envelope of these systems.

For students who are interested in pursuing an exciting research internship, please check out our internship program and learn more on our Website, Facebook, LinkedIn or @MERL_news.

MERL interns work closely with top researchers, and gain valuable industry experience – at an impressive 1:1 intern to researcher ratio. Internships are expected to lead to publications in major conferences and journals. We also recently started a PostDoc program. See our website www.merl.com for application procedures.

We offer competitive compensation and relocation assistance. Boston is a fantastic student-oriented city, home to some of the best universities in the world.

The summer season is especially lively as MERL and Boston are teeming with researchers and visitors from all over the world.



FREE GRANT PROPOSAL WRITING SUPPORT

Developing a successful grant proposal is a time consuming and cumbersome process with many steps, uncertainties, and hidden corners. Yet it is key to the growth and success of an educational institution's faculty and their teaching and research objectives. Having a partner that understands federal and private funding mechanisms and knows how to navigate the various steps of submitting a successful grant proposal is a valuable asset. Especially if such assistance is provided at no cost!

In this session we present Quanser's approach to securing funding for academic faculty and how a partnership with Quanser can help you increase the chances of your proposal's success and accessing the tools you need to conduct the proposed work. We will look at examples of previous awarded applications and some of the best practices that were deployed to make them successful. We will also present a few relevant current and upcoming funding opportunities across North America, UK and Europe for your review and consideration.

SPECIAL SESSION

WIN MORE GRANT PROPOSALS AND SECURE MORE FUNDING

Location: Allianz MiCo, Milan Convention Centre, Italy

Date: Monday, Dec. 16, 2024

Time: 12:00 pm – 1:30 pm (Lunch will be provided)

Every year the IEEE and the Control Systems Society recognizes the outstanding contributions of individuals belonging to our technical community by giving a number of awards. The Control Systems Society is grateful for the work each member of the corresponding committee or subcommittee devotes to the selection process. The 2024 IEEE CSS Awards Chair is John Baillieux, and the Awards Nomination Chair is Claire Tomlin. The subcommittee Chairs are

Grüne, Lars	George S. Axelby Outstanding Paper Award
Fleming, Andrew	TCST Outstanding Paper Award
Arcak, Murat	TCNS Outstanding Paper Award
Mesbahi, Mehran	CSM Outstanding Paper Award
Papachristodoulou, Antonis	L-CSS Outstanding Paper Award
Duncan, Stephen	Control Systems Technology Award
Salapaka, Murti	Transition to Practice Award
Hovakimyan, Naira	CSS Aerospace Award
Dochain, Denis	Antonio Ruberti Young Researcher Prize
Colaneri, Patrizio	Roberto Tempo Best CDC Paper Award
Mehta, Prashant	CDC Best Student-Paper Award
Namerikawa, Toru	CCTA Best Student-Paper Award

More details about the awards, the nomination process and past winners can be found on the IEEE CSS web site <http://ieeecss.org/awards/awards-program>

The George S. Axelby Outstanding Paper Award recognizes outstanding papers published in the *IEEE Transactions on Automatic Control*. The 2024 award was given to the paper "Safety verification and robustness analysis of neural networks via quadratic constraints and semidefinite programming" co-authored by **Mahyar Fazlyab, Manfred Morari** and **George J. Pappas** *IEEE Transactions on Automatic Control* 67, no. 1 (2022): 1-15.

The TCST Outstanding Paper Award recognizes outstanding papers published in the *IEEE Transactions on Control Systems Technology*. The 2024 award was given to the paper "Experimental Testing of a Preview-enabled Model Predictive Controller for Blade Pitch Control of Wind Turbines" co-authored by **Michael N. Sinner, Vlaho Petrović, Apostolos Langidis, Lars Neuhaus, Martin Kühn** and **Lucy Y. Pao**, *IEEE Transactions on Control Systems Technology* 30, no. 2 (2022): 583-597.

The TCNS Outstanding Paper Award recognizes outstanding papers published in the *IEEE Transactions on Control of Network Systems*. The 2024 award was given to the paper "Distributed and Localized Model Predictive Control—Part II: Theoretical Guarantees" co-authored by **Carmen Amo Alonso, Jing Shuang Li, James Anderson** and **Nikolai Matni**, *IEEE Transactions on Control of Network Systems* 10, no. 3 (2023): 1113-1123.

The CSM Outstanding Paper Award recognizes outstanding articles or columns published in *IEEE Control Systems Magazine*. The 2024 award was given to the paper "Data-Driven Control Based on the Behavioral Approach: From Theory to Applications in Power Systems" co-authored by **Ivan Markovskiy, Linbin Huang** and **Florian Dörfler**, *IEEE Control Systems Magazine* 43, no. 5 (2023): 28-68.

The Control Systems Letters Outstanding Paper Award recognizes outstanding papers published in the *IEEE Control Systems Letters*. The 2024 award was given to the paper “Euclidean Contractivity of Neural Networks With Symmetric Weights” co-authored by **Veronica Centorrino, Anand Gokhale, Alexander Davydov, Giovanni Russo** and **Francesco Bullo**, *IEEE Control Systems Letters* 7 (2023): 1724-1729.

The Control Systems Technology Award recognizes outstanding contributions to control systems technology, either in design and implementation or project management. The 2024 award was conferred to **Anuradha Annaswamy**, MIT, honored for pioneering innovations in design and implementation of control and optimization in propulsion systems, aerospace systems, automotive systems, and power systems.

The Transition to Practice Award recognizes outstanding collaborative scientific interactions between industry or research laboratories and academic communities that transition basic controls and system theory to practical systems for the benefit of society at large. The winner of the 2024 CSS Transition to Practice Award is **Thomas Parisini**, Imperial College London, Aalborg University and University of Trieste, honored for the research, development, and transition to practice of monitoring and control tools and digital twins for the process and metal industry.

The **Award for Technical Excellence in Aerospace Control** recognizes a person or team of people that performed an aerospace control engineering activity demonstrating excellence & significant results with a demonstrable impact. The 2024 award was given to **Christopher Elliott**, CM Elliott Applied Science, LLC, honored for contributions to the fielding of adaptive flight controls and the development of flight controls for the safe operation of advanced fighter aircraft.

The Antonio Ruberti Young Researcher Prize recognizes outstanding achievements in research in systems and control by a young researcher. The 2024 Ruberti Prize was given to **Na Li**, Harvard University, honored for fundamental contributions to control, learning, and optimization of cyber-physical systems and application to biomedical and energy systems

The Roberto Tempo Best CDC Paper Award recognizes the best paper presented at the annual IEEE Conference on Decision and Control. The 2024 award was given to the 2023 CDC paper “Variational Principles for Mirror Descent and Mirror Langevin Dynamics” by **Belinda Tzen, Anant Raj, Maxim Raginsky** and **Francis Bach**, *62nd IEEE Conference on Decision and Control*, pp. 6301-6306, 2023.

The CDC Outstanding Student Paper and Best Student Paper Awards recognize excellence in a paper presented at the IEEE CDC, whose primary author is a student member of the IEEE. One of the Outstanding Student Paper awardees will be selected as the winner of the Best Student Paper Award, and will receive that award in lieu of the Outstanding Student Paper Award. Awards are based on originality, clarity, and potential impact on practical applications or theoretical foundations of control. The student winners are:

Outstanding Student Paper Awardee: Mahrokh Ghoddousi Boroujeni

Paper Title: A PAC-Bayesian Framework for Optimal Control with Stability Guarantees

Authors: Mahrokh Ghoddousi Boroujeni, Clara Lucia Galimberti, Andreas Krause, and Giancarlo Ferrari-Trecate

Session: ThC02.3

Outstanding Student Paper Awardee: Mohammad Al-Jarrah

Paper Title: Data-Driven Approximation of Stationary Nonlinear Filters with Optimal Transport Maps

Authors: Mohammad Al-Jarrah, Bamdad Hosseini and Amirhossein Taghvaei

Session: TuA14.3

Outstanding Student Paper Awardee: Asmaa Eldesoukey

Paper Title: An excursion onto Schrodinger's bridges: Stochastic flows with spatio-temporal marginals

Authors: Asmaa Eldesoukey, Olga Movilla Miangolarra, and Tryphon T. Georgiou

Session: TuC10.2

Outstanding Student Paper Awardee: Spencer Kraisler

Paper Title: Output-feedback Synthesis Orbit Geometry: Quotient Manifolds and LQG Direct Policy Optimization

Authors: Spencer Kraisler and Mehran Mesbahi

Session: ThA12.4

The winner of the **IEEE 2024 CDC Best Student Paper Award** will be announced at the CSS Awards Ceremony (Wednesday, December 18, 18:45-20:00, MiCo Auditorium).

The CSS Distinguished Member Awards are conferred to selected members of our community who have made significant technical contributions as well as having provided outstanding long-term service to the society. The 2024 awards went to **Fabrizio Dabbene**, CNR-Politecnico di Torino, **Maria Domenica Di Benedetto**, Universita' dell'Aquila, and **Yannis Paschalidis**, Boston University.

The Outstanding Chapter Award recognizes a chapter for demonstrating a high level of activity, innovation, or growth. The Vice-President of Member Activities, Kristin Y. Pettersen was responsible for this award. The 2024 Award went to the **Nanjing Chapter**, chaired by **Bin Jiang** in recognition of its initiatives to promote the advances of control theory and practice through technical activities, educational outreach and conferences.

The CCTA Best Student Paper Awards recognize excellence in a CCTA paper whose primary contributor(s) is a (are) student member(s) of the IEEE. One of the Outstanding Student Paper awardees is selected as the winner of the Best Student Paper Award, and receives that award in lieu of the Outstanding Student Paper Award.

Best Student Paper Awardee: Toshiyuki Oshima

Paper Title: Online Coverage Path Generation for Aquatic Environmental Monitoring with Multiple USVs through Constraint-based Control

Authors: Toshiyuki Oshima, Yo Toyomoto and Takeshi Hatanaka

Outstanding Student Paper Awardee: Mingyang Chen

Paper Title: A Game-based Optimal and Safe Lane Change Control of Autonomous Vehicles in Mixed Traffic Scenario

Authors: Mingyang Chen, Jingjing Jiang and Boli Chen

Outstanding Student Paper Awardee: Fabian Flürenbrock

Paper Title: Model-based Estimation of Ventricular Cerebrospinal Fluid Volume

Authors: Fabian Flurenbrock, Simon Muntwiler, Leonie Korn, Marianne Schmid Daners and Melanie N. Zeilinger

The IEEE Control Systems Society Graduate Collaboration Fellowship aims to promote and provide support to initiate collaborative research with a hosting faculty member of well-established institutions in the area of Systems and Control for outstanding graduate students in developing geographical regions by visiting leading institutions in countries outside their own. The 2024 awardees are Hanxu Zhao, Dinesh Patra, Chendi Qu, Yingjie Gong, David Erazo-Caicedo, Sebastián Martínez, Paulo Henrique Foganholo Biazzetto and Jiaxin Yu.



The IEEE CSS Hendrik W. Bode Lecture Prize recognizes distinguished contributions to control systems science or engineering. The Chair of the Bode Lecture Prize is the CSS President, Magnus Egerstedt. The 2024 Bode Lecture Prize was given to **Karl Henrik Johansson**, for outstanding contributions to networked control with applications to transportation and automation systems.



The Control Systems Award recognizes outstanding contributions to control systems engineering, science, or technology. The Chair of the Control Systems Award is Alberto Isidori. The 2023 Control Systems Award was given to **Alain Bensoussan** for fundamental contributions to stochastic control, control-theoretic methods in management and finance, and impactful leadership of scientific and engineering organizations.

Welcome Reception

Sunday, December 15
18:00 – 20:00

MiCo (Gold Foyer)

Women in Control Luncheon

Monday, December 16
12:00 – 13:30

NH City Life Hotel

Meet the Faculty Candidates Poster Session

Monday, December 16,
18:00 - 19:00

Gold Hallway (Level 2)

**Newcomers and Young Professionals
Aperitif**

Monday, December 16
19:00 - 20:00

MiCo (Gold Lounge)

**Conference Banquet at the Alfa Romeo
Museum**

Tuesday, December 17
20:00 – 23:00

Departures by bus from MiCo
starting at 18:15

PreK-12 Family Lunch and Panel

Wednesday, December 18
12:00-13:30

MiCo (Suite 1)

CSS Awards Ceremony

Wednesday, December 18
18:45 – 20:00

MiCo Auditorium

Farewell Reception

Thursday, December 19
18:00 – 20:00

MiCo (Gold Foyer)

Coffee Breaks

Monday to Thursday
9:30 - 10:00 and 15:30 - 16:00

MiCo (Gold Foyer)

Women in Control Luncheon: The Women in Control Committee (WiC) is dedicated to empowering and promoting gender diversity in the Control Systems Society (CSS) by facilitating the development of mentoring and programs to promote the retention, recruitment, and growth of women CSS members. The WiC luncheon at CDC 2024 in Milan, Italy provides the opportunity to network, discuss women's roles in CSS, inspire the next generation of female leaders, and foster collaborations to advance women's leadership.

Newcomers and Young Professionals Aperitif: This social event is organized for participants who are young professionals, or who registered to IEEE for the first time in 2024, or who attend CDC for the first time. This will be a friendly occasion for them to meet other participants freshly arrived in our scientific community, while enjoying an aperitif!

PreK-12 Family Lunch and Panel: A family lunch at CDC is organized at the Pizzeria Fra Diavolo at City Life for Wednesday December 18th. If you are attending CDC with your family, you can enroll for the lunch (free of cost for you and your family, including a spot for your partner and children) while there are free spots remaining. To enroll, you need to follow the link in the QR code to fill out a form. You will receive a confirmation email (separate from the email summarizing your answer) if you have received a spot. We will meet as a group at MiCO (Suite 1) for a brief introduction and discussion, and then walk together to the Pizzeria. The details of the location will be communicated in the confirmation email.





CONFERENCE PROGRAM

CDC 2024 Conference Program Monday December 16, 2024

Track 1	Track 2	Track 3	Track 4	Track 5	Track 6	Track 7	Track 8	Track 9	Track 10
07:00-08:30 • Panorama Lounge • Special Session MoBSUR • 3rd CSS Breakfast for Under-Represented Communities									
08:30-09:30 • Auditorium • Plenary Session MoP1 • Ask Not What AI Can Do for Control, Ask What Control Can Do for AI									
<p>10:00-12:00 Auditorium Tutorial Session MoA01</p> <p>Data-Driven Learning of Stable Control Laws for Adaptive Robot Planning: A Dynamical Systems Perspective</p>	<p>10:00-12:00 Amber 1 Invited Session MoA02</p> <p>Estimation, Control and Learning of Quantum Systems</p>	<p>10:00-12:00 Amber 2 Invited Session MoA03</p> <p>Multi-Agent Systems: Awareness, Learning, and Formal Methods I</p>	<p>10:00-12:00 Amber 3 Invited Session MoA04</p> <p>Modeling, Control and Decisions for Natural Gas Systems and Components</p>	<p>10:00-12:00 Amber 4 Invited Session MoA05</p> <p>Data-Based Model Predictive Control for Nonlinear Systems</p>	<p>10:00-12:00 Amber 5 Regular Session MoA06</p> <p>Control of Networks</p>	<p>10:00-12:00 Amber 6 Regular Session MoA07</p> <p>Game Theory I</p>	<p>10:00-12:00 Amber 7 Regular Session MoA08</p> <p>Optimal Control I</p>	<p>10:00-12:00 Amber 8 Regular Session MoA09</p> <p>Predictive Control for Linear Systems I</p>	<p>10:00-12:00 Brown 1 Invited Session MoA10</p> <p>Safe Planning and Control with Uncertainty Quantification I</p>
12:00-13:30 • Amber 1 • Special Session MoLuSp1 • Win More Grant Proposals and Secure More Funding with Quanser's Free Grant Assistance Program!					12:00-13:30 • NH City Life Hotel • Social Session MoLuSp2 • Women in Control Luncheon				
<p>13:30-15:30 Auditorium Tutorial Session MoB01</p> <p>Hybrid Feedback Control Design</p>	<p>13:30-15:30 Amber 1 Invited Session MoB02</p> <p>New Tools for Estimation, Modeling and Control of Quantum Systems</p>	<p>13:30-15:30 Amber 2 Invited Session MoB03</p> <p>Multi-Agent Systems: Awareness, Learning, and Formal Methods II</p>	<p>13:30-15:30 Amber 3 Invited Session MoB04</p> <p>Incentives, Flexibility, and Human Factors in Large-Scale Distributed Energy Resources Control</p>	<p>13:30-15:30 Amber 4 Invited Session MoB05</p> <p>Numerical Methods for Mixed-Integer and Nonsmooth Optimal Control I</p>	<p>13:30-15:30 Amber 5 Regular Session MoB06</p> <p>Networked Control Systems I</p>	<p>13:30-15:30 Amber 6 Regular Session MoB07</p> <p>Game Theory II</p>	<p>13:30-15:30 Amber 7 Regular Session MoB08</p> <p>Optimal Control II</p>	<p>13:30-15:30 Amber 8 Regular Session MoB09</p> <p>Predictive Control for Linear Systems II</p>	<p>13:30-15:30 Brown 1 Invited Session MoB10</p> <p>Safe Planning and Control with Uncertainty Quantification II</p>
<p>16:00-18:00 Auditorium Invited Session MoC01</p> <p>Contraction Theory in Systems and Control I</p>	<p>16:00-18:00 Amber 1 Invited Session MoC02</p> <p>Machine Learning: Physics-Informed and Large Language Models for Control</p>	<p>16:00-18:00 Amber 2 Invited Session MoC03</p> <p>Multi-Agent Systems: Awareness, Learning, and Formal Methods III</p>	<p>16:00-18:00 Amber 3 Regular Session MoC04</p> <p>Sampled-Data Control</p>	<p>16:00-18:00 Amber 4 Invited Session MoC05</p> <p>Numerical Methods for Mixed-Integer and Nonsmooth Optimal Control II</p>	<p>16:00-18:00 Amber 5 Regular Session MoC06</p> <p>Networked Control Systems II</p>	<p>16:00-18:00 Amber 6 Regular Session MoC07</p> <p>Game Theory III</p>	<p>16:00-18:00 Amber 7 Regular Session MoC08</p> <p>Optimal Control III</p>	<p>16:00-18:00 Amber 8 Regular Session MoC09</p> <p>Predictive Control for Linear Systems III</p>	<p>16:00-18:00 Brown 1 Invited Session MoC10</p> <p>Stochastic Systems, Control and Related Fields</p>
18:00-19:00 • Amber 1 • Special Session MoEvSp1 • F1TENTH Sim Racing League Celebration			18:00-19:00 • Amber 2 • Special Session MoEvSo1 • Road2CDC24 - IEEE Italy CSS Chapter			18:00-19:00 • Gold Hallway • Social Session MoEvSo2 • Meet the Faculty Candidates Poster Session			
19:00-20:00 • Gold Lounge • Social Session MoNINy • Newcomers and Young Professionals Aperitif									

CDC 2024 Conference Program Monday December 16, 2024

Track 11	Track 12	Track 13	Track 14	Track 15	Track 16	Track 17	Track 18	Track 19	Track 20
07:00-08:30 • Panorama Lounge • Special Session MoBSUR • 3rd CSS Breakfast for Under-Represented Communities									
08:30-09:30 • Auditorium • Plenary Session MoP1 • Ask Not What AI Can Do for Control, Ask What Control Can Do for AI									
10:00-12:00 Brown 2 Regular Session MoA11 Data Driven Control I	10:00-12:00 Brown 3 Regular Session MoA12 Reinforcement Learning Control	10:00-12:00 Suite 1 Invited Session MoA13 Estimation and Control of Distributed Parameter Systems I	10:00-12:00 Suite 2 Regular Session MoA14 Cyber-Physical Systems Security	10:00-12:00 Suite 3 Regular Session MoA15 Emerging Control Applications	10:00-12:00 Suite 4 Regular Session MoA16 Fault Detection	10:00-12:00 Suite 6 Regular Session MoA17 Biological Systems I	10:00-12:00 Suite 7 Regular Session MoA18 Linear Systems I	10:00-12:00 Suite 8 Regular Session MoA19 Stochastic Optimal Control I	10:00-12:00 Suite 9 Regular Session MoA20 Algebraic/Geometric Methods
12:00-13:30 • Amber 1 • Special Session MoLuSp1 • Win More Grant Proposals and Secure More Funding with Quanser's Free Grant Assistance Program!					12:00-13:30 • NH City Life Hotel • Social Session MoLuSp2 • Women in Control Luncheon				
13:30-15:30 Brown 2 Regular Session MoB11 Data Driven Control II	13:30-15:30 Brown 3 Regular Session MoB12 Reinforcement Learning I	13:30-15:30 Suite 1 Invited Session MoB13 Estimation and Control of Distributed Parameter Systems II	13:30-15:30 Suite 2 Regular Session MoB14 Large-Scale Systems	13:30-15:30 Suite 3 Regular Session MoB15 Control of Complex Systems	13:30-15:30 Suite 4 Regular Session MoB16 Fault Detection and Accomodation	13:30-15:30 Suite 6 Regular Session MoB17 Biological Systems II	13:30-15:30 Suite 7 Regular Session MoB18 Linear Systems II	13:30-15:30 Suite 8 Regular Session MoB19 Stochastic Optimal Control II	13:30-15:30 Suite 9 Regular Session MoB20 Parameter Varying Systems
16:00-18:00 Brown 2 Regular Session MoC11 Data Driven Control III	16:00-18:00 Brown 3 Regular Session MoC12 Reinforcement Learning II	16:00-18:00 Suite 1 Invited Session MoC13 Estimation and Control of Distributed Parameter Systems III	16:00-18:00 Suite 2 Regular Session MoC14 Kalman Filtering	16:00-18:00 Suite 3 Regular Session MoC15 Mechatronics	16:00-18:00 Suite 4 Regular Session MoC16 Fault Tolerant Systems	16:00-18:00 Suite 6 Regular Session MoC17 Biomedical and Biomolecular Systems	16:00-18:00 Suite 7 Regular Session MoC18 Linear Systems III	16:00-18:00 Suite 8 Regular Session MoC19 Stochastic Optimal Control III	16:00-18:00 Suite 9 Regular Session MoC20 Control with Limited Information
18:00-19:00 • Amber 1 • Special Session MoEvSp1 • F1TENTH Sim Racing League Celebration			18:00-19:00 • Amber 2 • Special Session MoEvSo1 • Road2CDC24 - IEEE Italy CSS Chapter			18:00-19:00 • Gold Hallway • Social Session MoEvSo2 • Meet the Faculty Candidates Poster Session			
19:00-20:00 • Gold Lounge • Social Session MoNINy • Newcomers and Young Professionals Aperitif									

CDC 2024 Conference Program Tuesday December 17, 2024

Track 1	Track 2	Track 3	Track 4	Track 5	Track 6	Track 7	Track 8	Track 9	Track 10
08:30-09:30 • Auditorium • Plenary Session TuP1 • Towards Safe and Resilient Autonomy Using Synergistic Control, Observation and Learning									
<p>10:00-12:00 Auditorium Tutorial Session TuA01</p> <p>Half a Century of Multi-Pass Systems: Iterative Learning Control and Repetitive Processes - a Retrospective Tutorial</p>	<p>10:00-12:00 Amber 1 Invited Session TuA02</p> <p>Learning and Control Approaches for Human-AI Collaboration</p>	<p>10:00-12:00 Amber 2 Invited Session TuA03</p> <p>Seeking and Leveraging Nash Equilibria in Large Learning-Agent Populations</p>	<p>10:00-12:00 Amber 3 Invited Session TuA04</p> <p>Cyber-Physical Systems: Resilience, Cybersecurity, and Privacy I: Attack Design and Cybersecurity</p>	<p>10:00-12:00 Amber 4 Invited Session TuA05</p> <p>Projected Dynamics in Control</p>	<p>10:00-12:00 Amber 5 Regular Session TuA06</p> <p>Network Analysis and Control I</p>	<p>10:00-12:00 Amber 6 Regular Session TuA07</p> <p>Sensors Fusion and Networks</p>	<p>10:00-12:00 Amber 7 Regular Session TuA08</p> <p>Optimal Control IV</p>	<p>10:00-12:00 Amber 8 Regular Session TuA09</p> <p>Optimization Algorithms I</p>	<p>10:00-12:00 Brown 1 Invited Session TuA10</p> <p>Advances in Stochastic Control I: Optimization Methods</p>
12:00-13:30 • Brown 3 • Special Session TuLuSp1 • AI in the Time of Control: An A-Political Rally					12:00-13:30 • Amber 1 • Special Session TuLuSp2 • Early Career Lunch				
<p>13:30-15:30 Auditorium Tutorial Session TuB01</p> <p>Model Predictive Control for Tracking Using Artificial References: Fundamentals, Recent Results and Practical Implementation</p>	<p>13:30-15:30 Amber 1 Invited Session TuB02</p> <p>Learning-Based Control I: Model Learning and System Identification</p>	<p>13:30-15:30 Amber 2 Invited Session TuB03</p> <p>Open Multi-Agent Systems: Theory and Applications</p>	<p>13:30-15:30 Amber 3 Invited Session TuB04</p> <p>Cyber-Physical Systems: Resilience, Cybersecurity, and Privacy II: Resilience and Privacy</p>	<p>13:30-15:30 Amber 4 Invited Session TuB05</p> <p>Recent Advances in Distributed Optimization and Learning Algorithms</p>	<p>13:30-15:30 Amber 5 Regular Session TuB06</p> <p>Network Analysis and Control II</p>	<p>13:30-15:30 Amber 6 Regular Session TuB07</p> <p>Game Theory IV</p>	<p>13:30-15:30 Amber 7 Regular Session TuB08</p> <p>Optimal Control V</p>	<p>13:30-15:30 Amber 8 Regular Session TuB09</p> <p>Optimization Algorithms II</p>	<p>13:30-15:30 Brown 1 Invited Session TuB10</p> <p>Advances in Stochastic Control II: Reinforcement Learning</p>
<p>16:00-18:00 Auditorium Invited Session TuC01</p> <p>Contraction Theory in Systems and Control II</p>	<p>16:00-18:00 Amber 1 Invited Session TuC02</p> <p>Learning-Based Control II: Control Policy Learning</p>	<p>16:00-18:00 Amber 2 Invited Session TuC03</p> <p>Event-Triggered and Self-Triggered Control</p>	<p>16:00-18:00 Amber 3 Invited Session TuC04</p> <p>Cyber-Physical Systems: Resilience, Cybersecurity, and Privacy III: Resilience in Multi-Agent Systems</p>	<p>16:00-18:00 Amber 4 Invited Session TuC05</p> <p>Recent Advances in Theoretical Advances in Reinforcement Learning</p>	<p>16:00-18:00 Amber 5 Regular Session TuC06</p> <p>Network Analysis and Control III</p>	<p>16:00-18:00 Amber 6 Regular Session TuC07</p> <p>Game Theory V</p>	<p>16:00-18:00 Amber 7 Regular Session TuC08</p> <p>Optimal Control VI</p>	<p>16:00-18:00 Amber 8 Regular Session TuC09</p> <p>Predictive Control Applications</p>	<p>16:00-18:00 Brown 1 Invited Session TuC10</p> <p>Advances in Stochastic Control III: Partial and Decentralized Information</p>
8:15-23:00 • Alfa Romeo Museum • Social Session TuEvSo • Conference Banquet									

CDC 2024 Conference Program Tuesday December 17, 2024

Track 11	Track 12	Track 13	Track 14	Track 15	Track 16	Track 17	Track 18	Track 19	Track 20	Track 21
08:30-09:30 • Auditorium • Plenary Session TuP1 • Towards Safe and Resilient Autonomy Using Synergetic Control, Observation and Learning										
10:00-12:00 Brown 2 Regular Session TuA11 Data Driven Control IV	10:00-12:00 Brown 3 Regular Session TuA12 Reinforcement Learning III	10:00-12:00 Suite 1 Invited Session TuA13 Estimation and Control of Distributed Parameter Systems IV	10:00-12:00 Suite 2 Regular Session TuA14 Filtering and Estimation	10:00-12:00 Suite 3 Regular Session TuA15 Electrical Systems	10:00-12:00 Suite 4 Regular Session TuA16 Adaptive Control I	10:00-12:00 Suite 6 Regular Session TuA17 Aerospace	10:00-12:00 Suite 7 Regular Session TuA18 Nonlinear Systems I	10:00-12:00 Suite 8 Regular Session TuA19 Output Regulation	10:00-12:00 Suite 9 Regular Session TuA20 Stability Analysis	10:00-12:00 Gold Lounge Demo Session TuA21 Martec Quadruped Robots_Demo 1
12:00-13:30 • Brown 3 • Special Session TuLuSp1 • AI in the Time of Control: An A-Political Rally					12:00-13:30 • Amber 1 • Special Session TuLuSp2 • Early Career Lunch					
13:30-15:30 Brown 2 Regular Session TuB11 Data Driven Control V	13:30-15:30 Brown 3 Regular Session TuB12 Learning and Control	13:30-15:30 Suite 1 Invited Session TuB13 Estimation and Control of Distributed Parameter Systems V	13:30-15:30 Suite 2 Regular Session TuB14 Estimation I	13:30-15:30 Suite 3 Regular Session TuB15 Smart Grid	13:30-15:30 Suite 4 Regular Session TuB16 Adaptive Control II	13:30-15:30 Suite 6 Regular Session TuB17 Robotics I	13:30-15:30 Suite 7 Regular Session TuB18 Nonlinear Systems II	13:30-15:30 Suite 8 Regular Session TuB19 Uncertain Systems I	13:30-15:30 Suite 9 Regular Session TuB20 Discrete Event Systems I	13:30-15:30 Gold Lounge Demo Session TuB21 Martec Quadruped Robots_Demo 2
16:00-18:00 Brown 2 Regular Session TuC11 Data Driven Control VI	16:00-18:00 Brown 3 Regular Session TuC12 Learning and Iterative Learning Control	16:00-18:00 Suite 1 Invited Session TuC13 Network Traffic Modelling and Control	16:00-18:00 Suite 2 Regular Session TuC14 Estimation II	16:00-18:00 Suite 3 Regular Session TuC15 Energy Systems	16:00-18:00 Suite 4 Regular Session TuC16 Adaptive Systems	16:00-18:00 Suite 6 Regular Session TuC17 Robotics II	16:00-18:00 Suite 7 Regular Session TuC18 Nonlinear Systems III	16:00-18:00 Suite 8 Regular Session TuC19 Uncertain Systems II	16:00-18:00 Suite 9 Regular Session TuC20 Discrete Event Systems II	16:00-18:00 Gold Lounge Demo Session TuC21 Martec Quadruped Robots_Demo 3
8:15-23:00 • Alfa Romeo Museum • Social Session TuEvSo • Conference Banquet										

CDC 2024 Conference Program Wednesday December 18, 2024

Track 1	Track 2	Track 3	Track 4	Track 5	Track 6	Track 7	Track 8	Track 9	Track 10
08:30-09:30 • Auditorium • Plenary Session WeP1 • From Dissipativity to the Design of Controllers for Optimization									
<p>10:00-12:00 Auditorium Tutorial Session WeA01</p> <p>Forty Plus Years of Model Reduction and Still Learning</p>	<p>10:00-12:00 Amber 1 Invited Session WeA02</p> <p>Learning, Optimization, and Game Theory I</p>	<p>10:00-12:00 Amber 2 Invited Session WeA03</p> <p>Analysis and Control of Network Dynamics in the Social and Life Sciences</p>	<p>10:00-12:00 Amber 3 Invited Session WeA04</p> <p>Encrypted Control and Optimization</p>	<p>10:00-12:00 Amber 4 Invited Session WeA05</p> <p>Optimization and Control in Energy System Management</p>	<p>10:00-12:00 Amber 5 Regular Session WeA06</p> <p>Agent-Based Systems I</p>	<p>10:00-12:00 Amber 6 Regular Session WeA07</p> <p>Game Theory VI</p>	<p>10:00-12:00 Amber 7 Regular Session WeA08</p> <p>Optimization I</p>	<p>10:00-12:00 Amber 8 Regular Session WeA09</p> <p>Predictive Control for Nonlinear Systems I</p>	<p>10:00-12:00 Brown 1 Invited Session WeA10</p> <p>Biological Systems: Modelling, Analysis and Algorithms</p>
12:00-13:30 • Amber 1 • Special Session WeLuSP • Mitsubishi Electric Research Labs: Fundamental Research with Real-World Impact			12:00-13:30 • Amber 2 • Special Session WeLuT2 • The Budd-E Project for Blind and Visually Impaired Users			12:00-13:30 • Suite 1 • Social Session WeLuT3 • PreK-12 Family Lunch and Panel			
<p>13:30-15:30 Auditorium Tutorial Session WeB01</p> <p>Bringing Quantum Systems under Control</p>	<p>13:30-15:30 Amber 1 Invited Session WeB02</p> <p>Learning, Optimization, and Game Theory II</p>	<p>13:30-15:30 Amber 2 Invited Session WeB03</p> <p>Complex Networks - Analysis and Control</p>	<p>13:30-15:30 Amber 3 Invited Session WeB04</p> <p>Securing Cyber-Physical Resilience: Learning, Controls, and Design Insights</p>	<p>13:30-15:30 Amber 4 Invited Session WeB05</p> <p>Submodularity in Control, Robotics, and Machine Learning: Applications, Challenges, and Opportunities</p>	<p>13:30-15:30 Amber 5 Regular Session WeB06</p> <p>Agent-Based Systems II</p>	<p>13:30-15:30 Amber 6 Regular Session WeB07</p> <p>Cooperative Control I</p>	<p>13:30-15:30 Amber 7 Regular Session WeB08</p> <p>Optimization II</p>	<p>13:30-15:30 Amber 8 Regular Session WeB09</p> <p>Predictive Control for Nonlinear Systems II</p>	<p>13:30-15:30 Brown 1 Invited Session WeB10</p> <p>Context-Aware Analysis and Design of Genetic Circuits</p>
	<p>16:00-18:00 Amber 1 Invited Session WeC02</p> <p>Learning, Optimization, and Game Theory III</p>	<p>16:00-18:00 Amber 2 Invited Session WeC03</p> <p>Networks, Games and Learning I</p>	<p>16:00-18:00 Amber 3 Invited Session WeC04</p> <p>Security and Resilience in Distributed Optimization and Control</p>	<p>16:00-18:00 Amber 4 Invited Session WeC05</p> <p>Sparsity in Systems and Control: Trends and New Challenges</p>	<p>16:00-18:00 Amber 5 Regular Session WeC06</p> <p>Agent-Based Systems III</p>	<p>16:00-18:00 Amber 6 Regular Session WeC07</p> <p>Cooperative Control II</p>	<p>16:00-18:00 Amber 7 Regular Session WeC08</p> <p>Optimization III</p>	<p>16:00-18:00 Amber 8 Regular Session WeC09</p> <p>Extremum Seeking Control</p>	<p>16:00-18:00 Brown 1 Invited Session WeC10</p> <p>Modeling, Analysis and Control for Systems and Synthetic Biology</p>
18:45-20:00 • Auditorium • Social Session WeEvAw • CSS Awards Ceremony									

CDC 2024 Conference Program Wednesday December 18, 2024

Track 11	Track 12	Track 13	Track 14	Track 15	Track 16	Track 17	Track 18	Track 19	Track 20	Track 21
08:30-09:30 • Auditorium • Plenary Session WeP1 • From Dissipativity to the Design of Controllers for Optimization										
10:00-12:00 Brown 2 Regular Session WeA11 Data Driven Control VII	10:00-12:00 Brown 3 Regular Session WeA12 Iterative Learning Control	10:00-12:00 Suite 1 Invited Session WeA13 Macroscopic Traffic Modelling and Control	10:00-12:00 Suite 2 Regular Session WeA14 Estimation III	10:00-12:00 Suite 3 Regular Session WeA15 Power Systems I	10:00-12:00 Suite 4 Regular Session WeA16 Constrained Control I	10:00-12:00 Suite 6 Regular Session WeA17 Autonomous Robots I	10:00-12:00 Suite 7 Regular Session WeA18 Stability of Nonlinear Systems I	10:00-12:00 Suite 8 Regular Session WeA19 Stochastic Systems	10:00-12:00 Suite 9 Regular Session WeA20 Formal Verification	
12:00-13:30 • Amber 1 • Special Session WeLuSP • Mitsubishi Electric Research Labs: Fundamental Research with Real-World Impact				12:00-13:30 • Amber 2 • Special Session WeLuT2 • The Budd-E Project for Blind and Visually Impaired Users			12:00-13:30 • Suite 1 • Social Session WeLuT3 • PreK-12 Family Lunch and Panel			
13:30-15:30 Brown 2 Regular Session WeB11 Switched Systems I	13:30-15:30 Brown 3 Regular Session WeB12 Machine Learning I	13:30-15:30 Suite 1 Invited Session WeB13 Microscopic Traffic Modelling and Control	13:30-15:30 Suite 2 Regular Session WeB14 Estimation IV	13:30-15:30 Suite 3 Regular Session WeB15 Power Systems II	13:30-15:30 Suite 4 Regular Session WeB16 Constrained Control II	13:30-15:30 Suite 6 Regular Session WeB17 Autonomous Robots II	13:30-15:30 Suite 7 Regular Session WeB18 Stability of Nonlinear Systems II	13:30-15:30 Suite 8 Regular Session WeB19 Markov Jump Systems	13:30-15:30 Suite 9 Regular Session WeB20 Optimization for Nonlinear Systems	13:30-15:30 Room T1 Demo Session WeB21 The Budd-E Project Demonstration
16:00-18:00 Brown 2 Regular Session WeC11 Switched Systems II	16:00-18:00 Brown 3 Regular Session WeC12 Machine Learning II	16:00-18:00 Suite 1 Invited Session WeC13 Control for Smart Transportation Systems with Incomplete Information	16:00-18:00 Suite 2 Regular Session WeC14 Estimation V	16:00-18:00 Suite 3 Regular Session WeC15 Power Systems III	16:00-18:00 Suite 4 Regular Session WeC16 Robust and Constrained Control	16:00-18:00 Suite 6 Regular Session WeC17 Autonomous Systems	16:00-18:00 Suite 7 Regular Session WeC18 Stability of Nonlinear Systems III	16:00-18:00 Suite 8 Regular Session WeC19 Markov Processes	16:00-18:00 Suite 9 Regular Session WeC20 Numerical Algorithms	
18:45-20:00 • Auditorium • Social Session WeEvAw • CSS Awards Ceremony										

CDC 2024 Conference Program Thursday December 19, 2024

Track 1	Track 2	Track 3	Track 4	Track 5	Track 6	Track 7	Track 8	Track 9	Track 10
08:30-09:30 • Auditorium • Plenary Session ThP1 • Transforming Mobility through Learning and Control									
<p>10:00-12:00 Auditorium Tutorial Session ThA01</p> <p>Recent Advances in Partially Observed Markov Decision Processes: Regularity, Existence, Approximations, and Learning with Agent-State Policies</p>	<p>10:00-12:00 Amber 1 Invited Session ThA02</p> <p>Learning-Based Control III: Data-Driven Control</p>	<p>10:00-12:00 Amber 2 Invited Session ThA03</p> <p>Networks, Games and Learning II</p>	<p>10:00-12:00 Amber 3 Invited Session ThA04</p> <p>Data-Driven Control of CPS with Provable Guarantees: Theory and Application I</p>	<p>10:00-12:00 Amber 4 Regular Session ThA05</p> <p>Delay Systems</p>	<p>10:00-12:00 Amber 5 Regular Session ThA06</p> <p>Networked Control Systems III</p>	<p>10:00-12:00 Amber 6 Regular Session ThA07</p> <p>Distributed Control I</p>	<p>10:00-12:00 Amber 7 Regular Session ThA08</p> <p>Optimization IV</p>	<p>10:00-12:00 Amber 8 Regular Session ThA09</p> <p>Observers for Nonlinear Systems I</p>	<p>10:00-12:00 Brown 1 Invited Session ThA10</p> <p>Optimal and Model-Based Control of Biological Systems</p>
12:00-13:30 • Amber 1 • Special Session ThLuSp • Integrating Intelligent Control Systems into Engineering Education with MATLAB and Simulink									
<p>13:30-15:30 Auditorium Tutorial Session ThB01</p> <p>A Jump Start to Stock Trading Research for the Uninitiated Control Scientist: A Tutorial</p>	<p>13:30-15:30 Amber 1 Invited Session ThB02</p> <p>Learning-Based Control IV: Predictive Control</p>	<p>13:30-15:30 Amber 2 Invited Session ThB03</p> <p>Autonomous Aerospace, Marine, and Road Vehicles: Bridging the Gap between Advanced Theory and Application</p>	<p>13:30-15:30 Amber 3 Invited Session ThB04</p> <p>Data-Driven Control of CPS with Provable Guarantees: Theory and Application II</p>	<p>13:30-15:30 Amber 4 Regular Session ThB05</p> <p>Distributed Parameter Systems</p>	<p>13:30-15:30 Amber 5 Regular Session ThB06</p> <p>Networked Control Systems IV</p>	<p>13:30-15:30 Amber 6 Regular Session ThB07</p> <p>Distributed Control II</p>	<p>13:30-15:30 Amber 7 Regular Session ThB08</p> <p>Optimal-Based Approach</p>	<p>13:30-15:30 Amber 8 Regular Session ThB09</p> <p>Observers for Nonlinear Systems II</p>	<p>13:30-15:30 Brown 1 Invited Session ThB10</p> <p>Stochastic Analysis, Design and Control of Biomolecular Networks</p>
<p>16:00-18:00 Auditorium Invited Session ThC01</p> <p>Optimization and Learning-Based Methods for Motion Planning and Control in Automated Driving</p>	<p>16:00-18:00 Amber 1 Invited Session ThC02</p> <p>Learning-Based Control V: Safety and Convergence Guarantees</p>	<p>16:00-18:00 Amber 2 Invited Session ThC03</p> <p>Control Theory Innovations for Aerospace Multi-Vehicle Systems</p>	<p>16:00-18:00 Amber 3 Invited Session ThC04</p> <p>Data-Driven Control of CPS with Provable Guarantees: Theory and Application III</p>	<p>16:00-18:00 Amber 4 Regular Session ThC05</p> <p>Nonlinear Output Feedback</p>	<p>16:00-18:00 Amber 5 Regular Session ThC06</p> <p>Transportation Networks</p>	<p>16:00-18:00 Amber 6 Regular Session ThC07</p> <p>Optimization and Decentralized Control</p>	<p>16:00-18:00 Amber 7 Regular Session ThC08</p> <p>Optimality in Control and Modeling</p>	<p>16:00-18:00 Amber 8 Regular Session ThC09</p> <p>Observers for Linear Systems</p>	<p>16:00-18:00 Brown 1 Regular Session ThC10</p> <p>Variable-Structure Control</p>
18:00-20:00 • Gold Lounge • Social Session ThEvFR • Farewell Reception									

CDC 2024 Conference Program Thursday December 19, 2024

Track 11	Track 12	Track 13	Track 14	Track 15	Track 16	Track 17	Track 18	Track 19	Track 20	Track 21
08:30-09:30 • Auditorium • Plenary Session ThP1 • Transforming Mobility through Learning and Control										
10:00-12:00 Brown 2 Regular Session ThA11 Hybrid Systems I	10:00-12:00 Brown 3 Regular Session ThA12 Optimization and Machine Learning	10:00-12:00 Suite 1 Invited Session ThA13 Control and Estimation in Flow Systems	10:00-12:00 Suite 2 Regular Session ThA14 Estimation VI	10:00-12:00 Suite 3 Regular Session ThA15 Automotive Control	10:00-12:00 Suite 4 Regular Session ThA16 Robust Adaptive Control	10:00-12:00 Suite 6 Regular Session ThA17 Modeling	10:00-12:00 Suite 7 Regular Session ThA18 Stability of Linear Systems	10:00-12:00 Suite 8 Regular Session ThA19 Control of Nonlinear Systems	10:00-12:00 Suite 9 Regular Session ThA20 Planning and Safety in Control	10:00-12:00 Gold Lounge Demo Session ThA21 Discover the Future of Micromobility: Autonomous E-Scooter Demonstration, Demo 1
12:00-13:30 • Amber 1 • Special Session ThLuSp • Integrating Intelligent Control Systems into Engineering Education with MATLAB and Simulink										
13:30-15:30 Brown 2 Regular Session ThB11 Hybrid Systems II	13:30-15:30 Brown 3 Regular Session ThB12 Neural Networks I	13:30-15:30 Suite 1 Invited Session ThB13 Stability and Control of Nonlinear Time-Delay Systems I	13:30-15:30 Suite 2 Regular Session ThB14 Estimation VII	13:30-15:30 Suite 3 Regular Session ThB15 Quantum Information and Control I	13:30-15:30 Suite 4 Regular Session ThB16 Closed-Loop Identification	13:30-15:30 Suite 6 Regular Session ThB17 Reduced Order Modeling	13:30-15:30 Suite 7 Regular Session ThB18 Lyapunov Methods I	13:30-15:30 Suite 8 Regular Session ThB19 Robust Control I	13:30-15:30 Suite 9 Regular Session ThB20 Constrained Control - Application of Control Barrier Functions	13:30-15:30 Gold Lounge Demo Session ThB21 Discover the Future of Micromobility: Autonomous E-Scooter Demonstration, Demo 2
16:00-18:00 Brown 2 Regular Session ThC11 Hybrid Systems III	16:00-18:00 Brown 3 Regular Session ThC12 Neural Networks II	16:00-18:00 Suite 1 Invited Session ThC13 Stability and Control of Nonlinear Time-Delay Systems II	16:00-18:00 Suite 2 Invited Session ThC14 State Estimation on Lie Groups and Symmetric Spaces	16:00-18:00 Suite 3 Regular Session ThC15 Quantum Information and Control II	16:00-18:00 Suite 4 Regular Session ThC16 Nonlinear Systems Identification	16:00-18:00 Suite 6 Regular Session ThC17 Optimization and Robotics	16:00-18:00 Suite 7 Regular Session ThC18 Lyapunov Methods II	16:00-18:00 Suite 8 Regular Session ThC19 Robust Control II	16:00-18:00 Suite 9 Regular Session ThC20 Computational Methods	
18:00-20:00 • Gold Lounge • Social Session ThEvFR • Farewell Reception										

LOCAL ARRANGEMENTS AND ATTRACTIONS

Allianz MiCo Milano Convention Centre is conveniently located in the heart of Milan, making it easily accessible by various means of transportation.

How to Reach Milan

By Plane

Malpensa Airport

- approx. ~40 minutes by car;
- Malpensa Express to Cadorna Station (~40 min) > Metro Line 1 (Red) to Lotto > Metro Line 5 (Purple) to Portello.

Linate Airport

- approx. ~20 minutes by car
- by Metro ~60 minutes
- Line 4 (Blue) from Linate Aeroporto to San Babila > Line 1 (Red) from San Babila to Lotto > then Line 5 (Purple) from Lotto to Portello



By Train

Central Station

Metro Line 2 (Green) to Line 1 (Red) directly connects to Allianz MiCo

Porta Garibaldi

Metro Line 5 (Purple) directly connects to Allianz MiCo

Public Transportation

Milan boasts an efficient and well-connected public transportation system, making it easy to get around. The city's Metro, trams and buses form an extensive network that links key destinations, including the Allianz MiCo Convention Center.



Metro

Closest Lines: Metro Line 1 (Red) and Line 5 (Purple).

- Metro Stations: Portello and Lotto
- Operating Hours: ~6 am to midnight, frequent service.
- Nearby Attractions (short metro ride): Duomo, Galleria Vittorio Emanuele II, and Castello Sforzesco.

Trams and Buses

- Bus stops close to Allianz MiCo: Piazzale Lotto, Via Colleoni

Ticket Options

- Contactless Cards: Mastercard, Visa, or mobile wallets work directly on transport without registration.
- Tourist Travel Card: 1, 2, or 3-day unlimited travel on Milan's public transport.
- ATM Travel Card: Rechargeable, pay-as-you-go card for flexible city travel.



ATM Milano App Link

Download for real-time updates, route planning, and nearby services.



Taxi

Metered taxis available on the roadside or at taxi stands (e.g., Piazza del Duomo, Central Station).

Ride-Hailing Apps

Free Now, Uber, ItTaxi available for easy booking.

Allianz MiCo pick-up/drop-off points:

- Viale Eginardo, close to the convention center's main entrance.
- Viale Scarampo, providing easy access to the venue's multiple entrances.

Xmas time is a busy period: book your ride well in advance, especially if leaving for the airport upon departure!

Tourist Info

Welcome to Milan, the vibrant capital of Italian creativity and innovation, and the co-host of the Milano Cortina 2026 Olympic winter games.

Visit CDC 2024 Tourist Info Point at Allianz MiCo

Tourist Info Point hours:

- Sunday, December 15, from 4 to 7 PM
- Monday, December 16, from 12 PM to 7 PM
- Tuesday, December 17, from 12 PM to 6 PM
- Wednesday, December 18, from 12 PM to 7 PM
- Thursday, December 19, from 12 PM to 7 PM



For more info, visit YESMilano – Your Guide to the City

CONFERENCE VENUE

CDC2024 will be hosted on the second, mezzanine, and third level of the South Wing of Allianz MiCo - the newest, largest and the most flexible conference center in Italy - located at the heart of the new Citylife district, an urban project that re-shaped the Portello area with the iconic architectures of its skyscrapers, residential buildings and shopping malls.

The CDC entrance is at Gate 3 of Allianz MiCo, close to the “Portello” underground station of the M5 purple line.



REGISTRATION DESK

The Registration Desk is in a dedicated area at the entrance of the MiCo Conference venue, near the conference rooms.

All conference attendees must register. Personal badges are provided to identify registered participants. Packet pick-up for advanced registrants and on-site registration are available at the Registration Desk, which will be open from Sunday, December 15, through the morning of Thursday, December 19. Hours of operation of the Registration Desk are as follows:

Sunday, December 15	8:00 am - 10:00 am 1:00 pm - 6:00 pm
Monday, December 16	8:00 am - 6:00 pm
Tuesday, December 17	8:00 am - 6:00 pm
Wednesday, December 18	8:30 am - 6:00 pm
Thursday, December 19	8:30 am - 1:00 pm

USEFUL LINKS AND FLOORPLANS

CONFERENCE APP



android 



 iOS

CONFERENCE WEBSITE



cdc2024.ieeeccs.org

CONFERENCE PREPRINTS



paperhost.org/proceedings/css/CDC24

MEZZANINE



LEVEL 3



WIFI



Net: CDC2024_wifi
Psw: CDC2024_guest

(Map of Level 2 in the next page)

LEVEL 2

