
Control and Adaptation: Imagine What's Next

A WORKSHOP IN HONOR OF MIROSLAV KRSTIC'S 60TH BIRTHDAY

The workshop “Control and Adaptation: Imagine What's Next” was held on 15 December 2024, at the MiCo Convention Center in Milano, Italy, the day before the 2024 IEEE Conference on Decision and Control (CDC), to celebrate the 60th birthday of Prof. Miroslav Krstic (Figure 1) and his pioneering contributions to control theory and engineering. The workshop was organized by Nikolaos Bekiaris-Liberis (Technical University of Crete), Mamadou Diagne (University of California, San Diego), Iasson

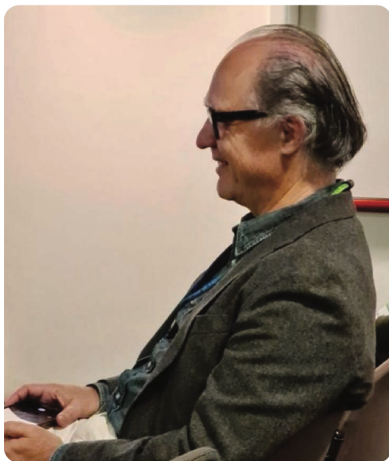


FIGURE 1 Miroslav Krstic during one of the workshop sessions.

Karafyllis (National Technical University of Athens Zografou Campus), Tiago Roux Oliveira (State University of Rio de Janeiro), Shu-Xia Tang (Texas Tech University), Rafael Vazquez (Universidad de Sevilla), and Huan Yu (The Hong Kong University of Science and Technology).

Miroslav Krstic was born in 1964 in Pirot, southeastern Serbia, in the former Yugoslavia. He received his Dipl. Ing. degree from the University of Belgrade, Yugoslavia, in 1989, and his M.S. and Ph.D. degrees from the University of California, Santa Barbara, 1992 and 1994, respectively, under the guidance of P. Kokotovic. He joined

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the University of California, San Diego (UCSD) in 1997, where he currently serves as a Distinguished Professor of mechanical and aerospace engineering, holds the Alspach Endowed Chair, and is the founding director of the Cymer Center for Control Systems and Dynamics. He also serves as the senior associate vice chancellor for research at UCSD. His work has fundamentally shaped research in nonlinear and adaptive control, partial differential equation (PDE) control, and extremum seeking.

Throughout his career, Prof. Krstic has been elected a Fellow of seven scientific societies (IEEE, IFAC, ASME, SIAM, AAAS, IET, and AIAA) and as a foreign member of the Serbian Academy of Sciences and Arts and the Academy of Engineering of Serbia. His major honors include the Richard E. Bellman Control Heritage Award, Bode Lecture Prize, SIAM Reid Prize, and ASME Oldenburger Medal. He has also received three IFAC triennial awards—in nonlinear control systems, distributed parameter systems (Ruth Curtain Award), and adaptive and learning systems—as well as the inaugural A. V. Balakrishnan Award. As a graduate student, Prof. Krstic won the UC Santa Barbara best dissertation award and remained for 23 years the only student to win best paper awards at both CDC and ACC.

The workshop drew more than 50 attendees at various times, including senior and junior researchers and graduate students in engineering and mathematics. The workshop began with a welcome dinner on 14 December, where participants gathered to celebrate Prof. Krstic's contributions (Figure 2). The technical program consisted of four sessions and included 20 technical talks by distinguished speakers, covering the spectrum of modern control theory and engineering, from foundational advances in PDE control and backstepping to emerging applications in battery systems, traffic flow, and machine learning.

The first two sessions of the workshop featured talks on the control of PDE systems. The third included talks on nonlinear control and control of delay systems, and the fourth included talks on extremum seeking. The first two sessions opened with a plenary talk by Jean-Michel Coron (Figure 3), who discussed robustness with respect to uncertainties in 1D hyperbolic systems. Consequently, the following talks were presented in that order. Rafael Vazquez spoke on exploiting symmetry in higher-dimensional PDE control from a backstepping perspective; Huan Yu (Figure 4) presented research on traffic congestion control by PDE backstepping; Jean Auriol shared recent

contributions on the stabilization of networks of hyperbolic systems; Scott Moura discussed the estimation of battery PDE models; Thomas Meurer presented a talk on backstepping control for multidimensional PDEs; Shumon Koga addressed control of the Stefan problem; Nicolas Espitia spoke about prescribed-time control for distributed parameter systems, and Yuanyuan Shi presented a talk on neural operator learning for control with stability and robustness guarantees.

The third and fourth sessions opened with a plenary talk by Tamer Başar (Figure 5), who presented a talk on "Softly Shaping Behavior." Consequently, the following presentations were delivered



FIGURE 2 Participants enjoy the preworkshop dinner and some personal thanks from Prof. Krstic at a restaurant occupying an 18th-century house in Milano's Navigli district.



FIGURE 3 Jean-Michel Coron, Emilia Fridman, and Naomi Leonard at the welcome dinner on 14 December.



FIGURE 4 Huan Yu presenting her research on traffic flow control.



FIGURE 5 Tamer Başar delivers the opening talk of the afternoon session on "Softly Shaping Behavior."



FIGURE 6 Delphine Bresch-Pietri presenting her work on predictor feedback.



FIGURE 7 Participants and presenters of the workshop in honor of Prof. Krstic.

in that order. Iasson Karafyllis discussed robust adaptive control; Nikolaos Bekiaris-Liberis presented a talk on predictor feedback; Delphine Bresch-Pietri (Figure 6) addressed predictor feedback for unknown, stochastic, and input-dependent delays; Andrey Polyakov spoke about homogeneous stabilization with time and state constraints; Mrdjan Jankovic reflected on "30 Years of Collaboration, With and Without Delay;" Tiago Roux Oliveira discussed extremum and Nash equilibrium seeking through delays and PDEs; Alexander Scheinker presented on extremum seeking for the stabilization of unknown systems with unknown control directions; Yang Zhu discussed extremum seeking via

time-delay approaches; and Ji Wang presented on safe regulation of sand-hyperbolic PDEs.

The workshop closed with Prof. Krstic's personal remarks, which provided unique insight into the speakers' trajectories and their impact on the field. His acknowledgment included two participants who could not attend: Mamadou Diagne, who led the organizational efforts, and Jorge Poveda, who could not deliver his talk on extremum seeking due to illness.

Prof. Krstic's final tribute to his colleagues embodied the workshop's theme of imagining what's next in control and adaptation. The workshop not only celebrated Prof. Krstic's 60th birthday but also highlighted

how his vision and mentorship have shaped a truly global research community. The presentations and personal tributes demonstrated the remarkable breadth of his influence, bringing together researchers from across Europe, Asia, the Americas, and Africa to advance both theoretical foundations and practical applications of control theory (Figure 7).

Nikolaos Bekiaris-Liberis

Mamadou Diagne

Iasson Karafyllis

Tiago Roux Oliveira

Shu-Xia Tang

Rafael Vazquez

Huan Yu