

Kenta Hoshino

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Personal Information

Name: Kenta Hoshino

Date of Birth: July 23, 1986

Nationality: Japanese

Place of Birth: Saitama, Japan

Professional Address: Yoshida-honmachi, Sakyo-ku, Kyoto 606-8501, Japan

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Education

Graduate School of Information Science and Technology, Hokkaido University

Ph.D. in Information Science and Technology

2011–2014

Graduate School of Information Science and Technology, Hokkaido University

Master's Degree of Information Science and Technology

2009–2011

Faculty of Engineering, Hokkaido University

Bachelor's Degree of Engineering

2005–2009

Research/Teaching Experience

Graduate School of Informatics, Kyoto University

Assistant Professor

2019–present

University College London

Visiting Researcher

Sep. 2023 – Feb. 2024

Georgia Institute of Technology

Visiting Scholar

Feb. 2023 – Sep. 2023

College of Science and Engineering, Aoyama Gakuin University

Assistant Professor

2014–2019

Research Interests

Stochastic control theory: Stochastic optimal control, Optimal transport, Stochastic stabilization, Stochastic Lyapunov methods, Stochastic finite-time stability and stabilization, Stochastic homogeneous systems

Nonlinear control theory: Lyapunov methods, Stabilization of nonholonomic systems, Finite-time

stability and stabilization, Homogeneous systems, Safety-critical control

Applications: Control of multi-rotor aerial vehicles

Honors/Awards

- The Award of the Japan Society of Naval Architects and Ocean Engineers (Paper Award), 2024
- SICE Control Division Young Author's Award (Fundamental Area), 2022
- SICE International Young Authors Award, 2020

Academic Membership

- Member of IEEE
- Member of the Society of Instrument and Control Engineering (SICE)
- Member of the Institute of Electronics, Information and Communication Engineers (IEICE)
- Member of the Institute of Systems, Control and Information Engineers (ISCIE)

Committee Service

- Member of national organizing committee of the 3rd IFAC conference on Modelling, Identification and Control of Nonlinear Systems (MICNON 2021, Tokyo)
- Member of national organizing committee of the 10th IFAC symposium on Robust Control Design (ROCOND 2022, Kyoto)
- Member of national organizing committee of the 8th IFAC conference on Nonlinear Model Predictive Control 2024 (NMPC 2024, Kyoto)

Publications

Journal articles

- [1] Y. Nishimura and K. Hoshino, "Control barrier functions for stochastic systems and safety-critical control designs," *IEEE Transactions on Automatic Control*, 2024.
- [2] T. Nagata, K. Hoshino, and T. Ohtsuka, "Adversarial obstacle avoidance of a multicopter by nonlinear receding horizon differential game," *Transactions of the Institute of Systems, Control and Information Engineers*, vol. 36, no. 10, pp. 337–348, 2023. (in Japanese).
- [3] A. Maki, K. Hoshino, L. Dostal, Y. Maruyama, F. Hane, and Y. Yoshimura, "Stochastic stabilization and destabilization of ship maneuvering motion by multiplicative noise," *Journal of Marine Science and Technology*, vol. 28, no. 3, pp. 704–718, 2023.
- [4] K. Kasaura, S. Miura, T. Kozuno, R. Yonetani, K. Hoshino, and Y. Hosoe, "Benchmarking actor-critic deep reinforcement learning algorithms for robotics control with action constraints," *IEEE Robotics and Automation Letters*, vol. 8, no. 8, pp. 4449–4456, 2023.
- [5] K. Hoshino, Z. Wang, and Y. Nakahira, "Scalable long-term safety certificate for large-scale systems," *IEEE Control Systems Letters*, vol. 7, pp. 1285–1290, 2023.

- [6] Y. Aoki, Y. Asano, A. Honda, N. Motooka, K. Hoshino, and T. Ohtsuka, "Nonlinear model predictive control for hexacopter with failed rotors based on quaternions—simulations and hardware experiments—," *Mechanical Engineering Journal*, vol. 8, no. 5, pp. 21–00204, 2021.
- [7] K. Hoshino, Y. Nishimura, and Y. Yamashita, "Convergence rates of stochastic homogeneous systems," *Systems & Control Letters*, vol. 124, pp. 33–39, 2019.
- [8] J. Yoneyama, Y. Takenaka, and K. Hoshino, "Decay rate control with guaranteed cost for takagi-sugeno fuzzy system," *IEEJ Transactions on Electronics, Information and Systems*, vol. 139, no. 12, pp. 1468–1473, 2019. (in Japanese).
- [9] O. Uehara, Y. Nishimura, and K. Hoshino, "Compensator for finite-time stabilized systems against stochastic noises," *The IEICE Transactions on Fundamentals of Electronics, Communications and Computer Sciences (Japanese Edition)*, vol. 100, no. 8, pp. 303–308, 2017. (in Japanese).
- [10] K. Hoshino, Y. Nishimura, Y. Yamashita, and D. Tsubakino, "Global asymptotic stabilization of nonlinear deterministic systems using Wiener processes," *IEEE Transactions on Automatic Control*, vol. 61, no. 8, pp. 2318–2323, 2016.
- [11] J. Yoneyama and K. Hoshino, "Non-fragile dynamic output feedback control design for fuzzy stochastic systems," *Transactions of the Institute of Systems, Control and Information Engineers*, vol. 29, no. 12, pp. 552–558, 2016.
- [12] K. Hoshino and Y. Yamashita, "Stochastic extremum-seeking algorithm for one-dimensional and multivariate static systems," *SICE Journal of Control, Measurement, and System Integration*, vol. 6, no. 3, pp. 177–185, 2013.

Expository articles/Survey papers

- [13] K. Hoshino and K. Sakurama, "An approach to one-way carsharing relocation problem from the perspectives of control engineering and optimal transportation," *Journal of The Society of Instrument and Control Engineers*, vol. 63, no. 6, pp. 355–360, 2024. (in Japanese).
- [14] K. Hoshino, "[Questions and Answers] What are optimal transportation and Wasserstein distance?," *Systems, control and information*, vol. 67, no. 5, pp. 202–203, 2023. (in Japanese).
- [15] K. Hoshino, "Optimal control of Markov chains with Wasserstein distance and application to one-way carsharing," *Systems, control and information*, vol. 67, no. 10, pp. 420–425, 2023. (in Japanese).
- [16] K. Hoshino and T. Ohtsuka, "Applications of nonlinear control methods for drones," *Keisoku Gijyutsu*, vol. 10, no. 11, pp. 29–34, 2022. (in Japanese).
- [17] K. Hoshino, "Application of nonlinear stabilization control to multicopters," *Journal of The Society of Instrument and Control Engineers*, vol. 61, no. 2, pp. 121–126, 2022. (in Japanese).

Book chapters

- [18] K. Sakurama, K. Kashima, T. Ikeda, N. Hayashi, K. Hoshino, M. Ogura, and C. Zhao, "System-control-based approach to car-sharing systems," in *Advanced Mathematical Science for Mobility Society*, pp. 127–171, Springer, 2024.

Conference proceedings

- [19] Z. Wang, R. Keller, X. Deng, K. Hoshino, T. Tanaka, and Y. Nakahira, "Physics-informed representation and learning: Control and risk quantification," in *Proceedings of the AAAI Conference on Artificial Intelligence*, vol. 38, pp. 21699–21707, 2024.
- [20] K. Hoshino, "Finite-horizon optimal control of continuous-time stochastic systems with terminal cost of wasserstein distance," in *2023 62nd IEEE Conference on Decision and Control (CDC)*, pp. 5825–5830, 2023.
- [21] Y. Nishimura and K. Hoshino, "Safety-probability analysis and control for stochastic systems based on lyapunov candidate functions," in *2023 62nd IEEE Conference on Decision and Control (CDC)*, pp. 4818–4823, 2023.
- [22] K. Hoshino, "On estimate of settling-time distributions of finite-time stable stochastic systems," in *the 61th IEEE Conference on Decision and Control*, pp. 1672–1677, 2022.
- [23] Y. Takayama, K. Hoshino, and T. Ohtsuka, "Algebraic approach to global finite-time stabilization of multi-input polynomial systems," in *the 61th IEEE Conference on Decision and Control*, pp. 1847–1854, 2022.
- [24] T. Kimura, K. Hoshino, Y. Asano, A. Honda, N. Motooka, and T. Ohtsuka, "Application of nonlinear model predictive control to quadcopter equipped with internal control system," in *2022 SICE International Symposium on Control Systems*, pp. 51–57, 2022.
- [25] K. Hoshino and K. Sakurama, "Probability distribution control of finite-state markov chains with wasserstein costs and application to operation of car-sharing services," in *the 60th IEEE Conference on Decision and Control*, pp. 6634–6639, 2021.
- [26] K. Hoshino, "Finite horizon control of discrete-time nonlinear systems with terminal cost of Wasserstein distance," in *the 59th IEEE Conference on Decision and Control*, 2020.
- [27] K. Hoshino and Y. Nishimura, "Conditions of almost sure boundedness and practical asymptotic stability of continuous-time stochastic systems," in *IFAC World Congress 2020*, 2020.
- [28] K. Hoshino and Y. Nishimura, "On stochastic finite-time stabilization with continuous state-feedback controllers," in *Joint Conference 8th IFAC Symposium on Mechatronic Systems (MECHATRONICS), and 11th IFAC Symposium on Nonlinear Control Systems (NOLCOS)*, pp. 282–287, 2019.
- [29] K. Hoshino, "A characterization of finite-time stability with density functions," in *18th European Control Conference (ECC)*, pp. 2608–2613, 2019.
- [30] K. Hoshino, "On stability analysis of non-smooth systems with density functions," in *12th Asian Control Conference (ASCC)*, pp. 1265–1270, 2019.
- [31] S. Nishigaki, K. Hoshino, and J. Yoneyama, "Coverage control in moving regions with unmanned aerial vehicles," in *2019 IEEE/SICE International Symposium on System Integration*, pp. 301–306, 2019.
- [32] K. Hoshino, "Application of finite-time stabilization to position control of quadcopters," in *15th International Conference on Control, Automation, Robotics and Vision*, pp. 60–65, 2018.

- [33] K. Hoshino and Y. Nishimura, "On design of homogeneous feedback controllers for finite-time stabilization of stochastic systems," in *50th ISCIE International Symposium on Stochastic Systems Theory and its Applications*, 2018.
- [34] J. Yoneyama, Y. Takenaka, and K. Hoshino, "New observer design conditions for Takagi-Sugeno fuzzy systems," in *2018 IEEE International Conference on Systems, Man, and Cybernetics*, pp. 2947–2952, 2018.
- [35] K. Hoshino and Y. Nishimura, "Strong solutions of stochastic differential equations in finite-time stabilization," *IFAC-PapersOnLine*, vol. 51, no. 13, pp. 266–271, 2018. (Proceedings of Second Conference on Modelling, Identification and Control of Nonlinear Systems (IFAC MICNON 2018)).
- [36] Y. Nishimura and K. Hoshino, "A non-smooth stochastic Lyapunov function and its relationship with viscosity solutions," in *11th Asian Control Conference (ASCC)*, pp. 699–704, 2017.
- [37] K. Hoshino and Y. Nishimura, "Finite-time stability of state-dependent homogeneous systems," in *11th Asian Control Conference (ASCC)*, pp. 841–846, 2017.
- [38] K. Hoshino, "On stability of state dependent homogeneous systems," in *2017 International Symposium on Nonlinear Theory and Its Applications*, 2017.
- [39] J. Yoneyama and K. Hoshino, "A new approach to non-fragile output feedback controller design for uncertain Takagi-Sugeno fuzzy systems," in *2016 IEEE International Conference on Systems, Man, and Cybernetics*, pp. 4798–4803, 2016.
- [40] J. Yoneyama and K. Hoshino, "Stability analysis of nonlinear time-delay systems via fuzzy system approach," in *SICE Annual Conference 2016*, pp. 1556–1559, 2016.
- [41] K. Hoshino, Y. Nishimura, and J. Yoneyama, "Homogeneous feedback laws for driftless input-affine systems with tunable convergence rates," in *SICE Annual Conference 2016*, pp. 54–57, 2016.
- [42] J. Yoneyama and K. Hoshino, "Stability analysis and synthesis for nonlinear networked control systems," *IFAC-PapersOnLine*, vol. 49, no. 22, pp. 297–302, 2016. (Proceedings of 6th IFAC Workshop on Distributed Estimation and Control in Networked Systems).
- [43] J. Yoneyama and K. Hoshino, "A novel non-fragile output feedback controller design for uncertain Takagi-Sugeno fuzzy systems," in *2016 IEEE International Conference on Fuzzy Systems*, pp. 2193–2198, 2016.
- [44] F. Sano, K. Hoshino, and J. Yoneyama, "Output feedback stabilization of discrete-time fuzzy systems," in *2016 IEEE International Conference on Fuzzy Systems*, pp. 2188–2192, 2016.
- [45] K. Hoshino, Y. Nishimura, Y. Yamashita, and J. Yoneyama, "Stabilization of Artstein's circle by continuous stochastic feedback," in *2015 IEEE Conference on Control Applications (CCA)*, pp. 257–262, 2015.
- [46] J. Yoneyama and K. Hoshino, "Non-fragile control for fuzzy stochastic systems," in *47th ISCIE International Symposium on Stochastic Systems Theory and its Applications 2015*, pp. 20–25, 2015.

- [47] J. Yoneyama, M. Omura, and K. Hoshino, "Non-fragile static output feedback control design with guaranteed cost of uncertain systems with application to helicopter system," in *41st Annual Conference of the IEEE Industrial Electronics Society*, pp. 3143–3147, 2015.
- [48] J. Yoneyama and K. Hoshino, "Static output feedback control design for Takagi-Sugeno descriptor fuzzy systems," in *2015 International Conference on Informatics, Electronics & Vision*, pp. 1–4, 2015.
- [49] J. Yoneyama and K. Hoshino, "Non-fragile static output feedback control design with guaranteed cost of uncertain Takagi-Sugeno fuzzy systems," in *10th Asian Control Conference (ASCC)*, pp. 1–6, 2015.
- [50] K. Hoshino, Y. Yamashita, Y. Nishimura, and D. Tsubakino, "Homogeneous stabilization of driftless input-affine systems using Wiener processes," in *53rd IEEE Conference on Decision and Control (CDC)*, pp. 3167–3172, 2014.
- [51] J. Yoneyama and K. Hoshino, "Static output feedback control design with guaranteed cost of Takagi-Sugeno fuzzy systems," in *14th International Conference on Intelligent Systems Design and Applications*, pp. 39–43, 2014.
- [52] J. Yoneyama and K. Hoshino, "Output feedback control design with guaranteed cost of Takagi-Sugeno fuzzy systems," in *Joint 7th International Conference on Soft Computing and Intelligent Systems (SCIS) and 15th International Symposium on Advanced Intelligent Systems (ISIS)*, pp. 1170–1174, 2014.
- [53] K. Hoshino, Y. Yamashita, Y. Nishimura, and D. Tsubakino, "Stability and stabilization of homogeneous stochastic systems," in *52nd IEEE Conference on Decision and Control (CDC)*, pp. 1229–1234, 2013.
- [54] K. Hoshino, Y. Nishimura, Y. Yamashita, and D. Tsubakino, "Constructive design method of stochastic continuous feedback laws for stabilization of deterministic nonlinear systems," in *2013 American Control Conference (ACC)*, pp. 6424–6429, 2013.
- [55] K. Hoshino and Y. Yamashita, "Novel extremum seeking algorithm using Wiener process," in *19th Mediterranean Conference on Control & Automation*, pp. 886–891, 2011.
- [56] K. Hoshino and H. Igarashi, "A genetic algorithm for combinational optimization problems with uncertainties," in *2010 IEEE International Symposium on Computer-Aided Control System Design*, pp. 368–373, 2010.
- [57] K. Hoshino and H. Igarashi, "An image recognition based on neural oscillator network," in *2010 International Joint Conference on Neural Networks*, pp. 1–6, 2010.