Date of birth 1991-10-21
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Dominik Baumann

Education

2017–2020 **Ph.D.**, *Max Planck Institute for Intelligent Systems, Stuttgart/Tübingen, Germany and KTH Royal Institute of Technology, Stockholm, Sweden*.
Studies on the intersections of dynamical systems, machine learning, and communication networks. Main advisor: Prof. Sebastian Trimpe (RWTH Aachen University and MPI Stuttgart); Co-advisor: Prof. Karl H. Johansson (KTH Stockholm).

2011–2016 **Dip.-Ing.**, *TU Dresden, Dresden, Germany*.
Electrical Engineering, focus on systems and control theory.

Languages German (native speaker), English (proficient), French, Spanish (intermediate)

Experience

2022–current **Postdoctoral Researcher**, *Uppsala University, Uppsala, Germany*.
Research and teaching in dynamical systems and control theory and machine learning.

2021–current **Postdoctoral Researcher**, *RWTH Aachen University, Aachen, Germany*.
Research and teaching in dynamical systems and control theory and machine learning.

2017–2020 **Ph.D. student**, *Max Planck Institute for Intelligent Systems, Stuttgart/Tübingen, Germany and KTH Royal Institute of Technology, Stockholm, Sweden*.

Awards

2019 **Best Paper Award**, *ACM/IEEE International Conference on Cyber-Physical Systems*, Montréal, Canada.

2019 **Best Demo Award**, *ACM/IEEE International Conference on Information Processing in Sensor Networks*, Montréal, Canada.

2019 **Future Award of the Ewald Marquardt Foundation**.

Invited Talks

Nov. 2021 **Systems and control theory for autonomous and interacting agents**, *University of Stuttgart*, Stuttgart, Germany.

Sep. 2021 **Causality in learning-based control**, *RWTH Aachen University*, Aachen, Germany.

Jan. 2021 **Wireless control of cyber-physical systems**, *ETH Zürich*, Zürich, Switzerland.

Dec. 2019 **Feedback control and causal identification for cyber-physical systems**, *Uppsala University*, Uppsala, Sweden.

Aug. 2017 **Distributed and event-based wireless control of cyber-physical systems**, *KTH Royal Institute of Technology*, Stockholm, Sweden.

Oct. 2016 **Enhancing a robot's control system with memristors**, *Max Planck Institute for Intelligent Systems*, Tübingen, Germany.

Teaching

Supervision of Master Students

2021 **Bhavya Sukhija**, *ETH Zürich*.

2020–2021 **Hannah Markgraf**, *RWTH Aachen University*.

2019–2020 **Niklas Funk**, *ETH Zürich*.

2019–2020 **Erik Hörman**, *Sapienza University of Rome*.

2018–2019 **José Mario Mastrangelo**, *ETH Zürich*.

2018 **Oleksandr Zlatov**, *University of Tübingen*.

Lectures, Tutorials

Aug. 2021 **Lecturer for the summer school "Production Technology meets Industry 4.0"**, *RWTH Aachen University*, Aachen, Germany.
Design and teaching of four lectures on "Introduction to Artificial Intelligence"

Apr. 2021–Jul. 2021 **Seminar "Ethics of Artificial Intelligence and Robotics"**, *RWTH Aachen University*, Aachen, Germany.
Planning, organization, and conductance of a new seminar covering ethical and societal impacts of artificial intelligence and robotics

Sep. 2020–Mar. 2021 **Teaching assistant for course "Computer Science in Mechanical Engineering II"**, *RWTH Aachen University*, Aachen, Germany.
Material design and teaching of exercise lectures.

Dec. 2018–Feb. 2019 **Project supervision for course "Statistical Learning Methods and Stochastic Control"**, *University of Stuttgart*, Stuttgart, Germany.
Design and supervision of a project for a group of 3 students.

Jan. 2018 **Teaching assistant for tutorial "Introduction to Control Theory"**, *Winter School of DFG Priority Program on "Cyber-physical Networking"*, Arosa, Switzerland.
Preparation and presentation of Python examples.

2013–2016 **Tutor for "Mathematics for Electrical Engineering"**, *TU Dresden*, Dresden, Germany.
Teaching of mathematics to groups of up to 50 electrical engineering students.

Services

2022 **Associate editor**, *IFAC Conference on Advances in Control Education*, Hamburg, Germany.

2021 **Associate editor**, *IEEE International Conference on Multisensor Fusion and Integration*, Karlsruhe, Germany.

2021 **Program committee member**, *International Conference on Event-based Control, Communication, and Signal Processing*, virtual.

2021 **Co-organization of a competition on "Learning by Doing: Controlling a Dynamical System using Control Theory, Reinforcement Learning, or Causality"**, *Advances in Neural Information Processing Systems*, virtual.

2018–2021 **Ombudsperson of the Max Planck Institute for Intelligent Systems**, *Tübingen, Germany*.

2020 **Co-organization of an open invited track on "Control for Next Generation Wireless Networks"**, *IFAC World Congress*, virtual.

Publications

Journals

F. Mager, D. Baumann, C. Herrmann, S. Trimpe, and M. Zimmerling, "Scaling beyond bandwidth limitations: Wireless control with stability guarantees under overload," *ACM Transactions on Cyber-Physical Systems*, 2022.

D. Baumann, F. Mager, U. Wetzker, L. Thiele, M. Zimmerling, and S. Trimpe, "Wireless control for smart manufacturing: Recent approaches and open challenges," *Proceedings of the IEEE*, 2021.

N. Funk, D. Baumann, V. Berenz, and S. Trimpe, "Learning event-triggered control from data through joint optimization," *IFAC Journal of Systems and Control*, 2021.

A. Marco, D. Baumann, M. Khadiv, P. Hennig, L. Righetti, and S. Trimpe, "Robot learning with crash constraints," *IEEE Robotics and Automation Letters*, 2021.

D. Baumann, F. Mager, M. Zimmerling, and S. Trimpe, "Control-guided communication: Efficient resource arbitration and allocation in multi-hop wireless control systems," *IEEE Control Systems Letters*, 2020.

D. Baumann, F. Mager, R. Jacob, L. Thiele, M. Zimmerling, and S. Trimpe, "Fast feedback control over multi-hop wireless networks with mode changes and stability guarantees," *ACM Transactions on Cyber-Physical Systems*, 2019.

S. Trimpe and D. Baumann, "Resource-aware IoT control: Saving communication through predictive triggering," *IEEE Internet of Things Journal*, 2019.

A. Ascoli, D. Baumann, R. Tetzlaff, L. O. Chua, and M. Hild, "Memristor-enhanced humanoid robot control system–Part I: Theory behind the novel memcomputing paradigm," *International Journal of Circuit Theory and Applications*, 2018.

D. Baumann, A. Ascoli, R. Tetzlaff, L. O. Chua, and M. Hild, "Memristor-enhanced humanoid robot control system–Part II: Circuit theoretic model and performance analysis," *International Journal of Circuit Theory and Applications*, 2018.

Conferences

D. Baumann, A. Marco, M. Turchetta, and S. Trimpe, "Gosafe: Globally optimal safe robot learning," in *IEEE International Conference on Robotics and Automation*, Xi'an, China, 2021.

J. M. Mastrangelo, D. Baumann, and S. Trimpe, "Predictive triggering for distributed control of resource constrained multi-agent systems," in *IFAC Workshop on Distributed Estimation and Control in Networked Systems*, Chicago, IL, USA, 2019.

D. Baumann, F. Solowjow, K. H. Johansson, and S. Trimpe, "Event-triggered pulse control with model learning (if necessary)," in *American Control Conference*, Philadelphia, PA, USA, 2019.

F. Mager, D. Baumann, R. Jacob, L. Thiele, S. Trimpe, and M. Zimmerling, "Feedback control goes wireless: Guaranteed stability over low-power multi-hop networks," in *ACM/IEEE International Conference on Cyber-Physical Systems*, (**Best Paper Award**), Montréal, Canada, 2019.

D. Baumann, J.-J. Zhu, G. Martius, and S. Trimpe, "Deep reinforcement learning for event-triggered control," in *IEEE International Conference on Decision and Control*, Miami, FL, USA, 2018.

F. Solowjow, D. Baumann, J. Garcke, and S. Trimpe, "Event-triggered learning for resource-efficient networked control," in *American Control Conference*, Milwaukee, WI, USA, 2018.

D. Baumann, F. Mager, H. Singh, M. Zimmerling, and S. Trimpe, "Evaluating low-power wireless cyber-physical systems," in *IEEE Workshop on Benchmarking Cyber-Physical Networks and Systems*, Porto, Portugal, 2018.

Theses

D. Baumann, "Learning and control strategies for cyber-physical systems: From wireless control over deep reinforcement learning to causal identification," Ph.D. thesis, KTH Royal Institute of Technology, 2020.

——, "Fast and resource-efficient control of wireless cyber-physical systems," Licentiate thesis, KTH Royal Institute of Technology, 2019.

——, "Numerical study and analysis of the performance of a novel cognitive sensorimotor loop (CSL) based on circuit elements with memory," Diploma thesis, TU Dresden, 2016.

Abstracts, Posters

D. Baumann and S. Trimpe, *Wireless control of cyber-physical systems*, Tagungsband GMA-Fachausschuss 1.50 Grundlagen vernetzter Systeme, virtual, 2021.

D. Baumann, F. Mager, R. Jacob, L. Thiele, M. Zimmerling, and S. Trimpe, *Feedback control goes wireless*, Digitalize in Stockholm, Stockholm, Sweden, 2019.

D. Baumann and S. Trimpe, *Fast and resource-efficient control of wireless cyber-physical systems*, Tagungsband GMA-Fachausschuss 1.40 Theoretische Verfahren der Regelungstechnik, Anif, Austria, 2019.

F. Mager, D. Baumann, R. Jacob, L. Thiele, S. Trimpe, and M. Zimmerling, *Fast feedback control and coordination with mode changes for wireless cyber-physical systems*, ACM/IEEE International Conference on Information Processing in Sensor Networks, (**Best Demo Award**), Montréal, Canada, 2019.

D. Baumann and S. Trimpe, *Feedback control goes wireless*, Tagungsband GMA-Fachausschuss 1.50 Grundlagen vernetzter Systeme, Günzburg, Germany, 2019.

D. Baumann, J.-J. Zhu, G. Martius, and S. Trimpe, *Deep reinforcement learning for resource-aware control*, Bosch Conference on Artificial Intelligence, Renningen, Germany, 2018.

D. Baumann, K. H. Johansson, and S. Trimpe, *Fast and resource-efficient control of wireless cyber-physical systems*, Reglermöte, Stockholm, Sweden, 2018.

F. Mager, D. Baumann, S. Trimpe, and M. Zimmerling, *Toward fast closed-loop control over multi-hop low-power wireless networks*, ACM/IEEE International Conference on Information Processing in Sensor Networks, Porto, Portugal, 2018.

D. Baumann, F. Solowjow, and S. Trimpe, *Learning to save communication*, Max Planck ETH Workshop on Learning Systems, Zürich, Switzerland, 2018.

D. Baumann and S. Trimpe, *Distributed and event-based wireless control of cyber-physical systems*, PhD School on Cyber-Physical Systems, Lucca, Italy, 2017.