Maximilian Schmitz

Graduate Student · University of Stuttgart

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Education

University of Stuttgart *Stuttgart, Germany*

Master of Science in Engineering Cybernetics *Oct 2019 - Jan 2023*

- Faculty of Design, Production Engineering and Automotive Engineering
- Concentration in Nonlinear Dynamics, Controls, Systems Theory and Autonomous Systems
- Advisor: Prof. David. C. Remy

University of Padua *Padua, Italy*

ERASMUS Exchange Program *Feb 2022 - Aug 2022*

- Department of Information Engineering
- Concentration in Natural Language Processing and Robotics and Control
- Full Scholarship recipient of the University of Stuttgart

Georgia Institute of Technology *Atlanta, GA, US*

Master of Engineering Science and Mechanics *Aug 2020 - May 2022*

- School of Civil and Environmental Engineering
- Concentration in Computer Vision and Wave Propagation
- Full Scholarship recipient of University of Stuttgart, DAAD and Baden-Württemberg Stiftung
- Final GPA: 3.75/4.00
- Advisor: Prof. Laurence J. Jacobs

University of Duisburg-Essen *Duisburg, Germany*

Bachelor of Science in Mechanical Engineering *Oct 2015 - June 2019*

- Institute for Mechatronics and System Dynamics
- Concentration in Mechatronics
- Final grade 1.7 (top 3.9% of all graduates)
- Advisor: Prof. Andrés Kecskeméthy

Research Experience

Graduate Research Assistant *Atlanta, GA, US*

Georgia Institute of Technology, Nondestructive Evaluation Lab *Aug 2020 - Dec 2021*

- Developed a data-driven machine learning algorithm to predict coating thicknesses for thin coatings
- Learned to scale computations for the Georgia Tech high-performance cluster (PACE)
- Trained ConvNets for a deep learning-based inversion on PACE cluster
- Advisor: Prof. Laurence J. Jacobs

Research Project *Atlanta, GA, US*

Georgia Institute of Technology, Statistical Machine learning *Aug 2020 - Dec 2020*

- Directed research team and developed strong leadership skills
- Analyzed existing automatic controller tuning algorithm based on Gaussian processes (SafeOpt) and applied it to a quadcopter simulation model
- Proved that save automatic controller gain tuning can be applied to controllers with numerous DOFs
- Advisor: Prof. Matthieu R. Bloch

Graduate Research Assistant *Stuttgart, Germany*

University of Stuttgart, Institute of Nonlinear Dynamics *Dec 2019 - Sep 2020*

- Set up computer-motor system to control quadrupedal robot
- Expanded control algorithm and communication protocol with TwinCAT via EtherCAT
- Gained experience in working with robotic hardware
- Advisor: Prof. David C. Remy

Research Project *Stuttgart, Germany*

University of Stuttgart, Project Competition Advanced Concepts of Control Theory *Mar 2020 - Oct 2020*

- Designed a non-linear state-feedback controller for single track vehicle model that steers along a racetrack
- Optimized trajectory with a race trajectory optimization toolbox
- Finished at 2nd place with distinction out of 37 groups
- Advisor: Prof. Frank Allgöwer

Research Project *Stuttgart, Germany*

University of Stuttgart, Statistical Learning and Stochastic Control *Oct 2019 - Mar 2020*

- Identified use of vector-valued Gaussian processes from Bayesian perspective to approximate multi-dimensional functions
- Evaluated different methods to construct the covariance matrix for multi-dimensional Gaussian processes
- Advisors: Prof. Sebastian Trimpe and Prof. Christian Ebenbauer

Research Project *Stuttgart, Germany*

University of Stuttgart, Advanced Concepts of Control Theory Lab *Oct 2019 - Mar 2020*

- Modelled and simulated mechanical-electrical 3 DOF helicopter
- Developed LQG controller and applied it to real physical system
- Advisor: Prof. Frank Allgöwer

Undergraduate Research Assistant *Duisburg, Germany*

University of Duisburg-Essen, Chair of Mechanics and Robotics *May 2017 - Dec 2018*

- Substitute lecturer in 300+ student class (Mechanics 2)
- Creation of various graphs for research funding applications
- Supported planning for ECCOMAS Multibody Dynamics Conference 2019
- Advisor: Prof. Andrés Kecskeméthy

Research Project *Duisburg, Germany*

University of Duisburg-Essen, Capstone Project Mechatronics *May 2017 - Dec 2018*

- Developed basic heat control system for charcoal BBQ grill
- Implemented web interface to control and monitor grill temperatures wirelessly from cell phone
- Integrated automatic flipping mechanism for grilled food
- Advisor: Prof. Dieter Schramm

Professional Experience

Software Developer and Partner in Startup *Atlanta, GA, US*

& Arise *Jan 2021 - Aug 2021*

- Started development of a blockchain-based banking system for refugees, see andarise.org
- Established a business incubator for refugees on Malta
- Created and started first social media campaigns with marketing department

Intern *Cologne, Germany*

Ford Werke-GmbH, Electrical and Electronic Systems Engineering Group *Dec 2018 - July 2019*

- Developed a camera-based stop sign warning system for passenger cars
- Led analysis and benchmarks with competitor products/cars
- Applied software to prototype and tested it in real traffic
- Created tool to extract map data from vehicle CAN-bus

Intern *Detroit, MI, US*

Sakthi Automotive Group *Sept 2018 - Oct 2018*

- Analyzed cast aluminum specimen for tensile strength
- Performed FEA analysis to optimize material properties after casting

Intern *Detroit, MI, US*

Ford Motor Company *Sept 2016 - Oct 2016*

- Tuned active interior engine sound enhancement and active noise cancellation
- Conducted binaural sound measurements

Intern *Mettmann, Germany*

Georg Fischer *June 2016 - July 2016*

- Developed fundamental skills in welding and casting iron
- Gained experience working in a production plant

Intern *Wuppertal, Germany*

Schaeffler Technologies AG & Co. KG *May 2016 - June 2016*

- Acquired fundamental skills in machining and manufacturing of steel and aluminum parts

Publications

Published

Charles N. Tenorio, **Maximilian Schmitz**, Jin-Yeon Kim, David E. Torello, Laurence J. Jacobs. 2022. Machine Learning Inversion to Experimental Dispersion Curves for Characterizing Thin Coatings. [Poster] In: QNDE2022-98008; 49th Annual Review of Progress in Quantitative Nondestructive Evaluation; July 25 – 27, 2022; San Diego, CA

Revise and Resubmit

Maximilian Schmitz, Jin-Yeon Kim, Laurence J. Jacobs. 2022. Machine and Deep Learning for Coating Thickness Prediction Using Lamb Waves. [Journal Article] In: Wave Motion. Preprint available at SSRN

Project Papers (unpublished)

Schmitz, Maximilian, Gray, Justin, Oh, Jaeyo, Lu, Yuwei, Kanwar, Bharat. 2020. Gaussian Processes for Automatic Controller Gains Tuning in Robotics and Control.

Schmitz, Maximilian, Rühle, Josias. 2020. Bericht zum Kurs "Projektwettbewerb Konzepte der Regelungstechnik". (English: "*Report for the Project Competition in Advanced Concepts of Control Theory*")

Gschweng, Melanie, Görner, Daniel, **Schmitz, Maximilian**. 2019. Vector-Valued Gaussian Processes and their Application on Recovering Missing Sensor Data.

Awards, Fellowships, & Grants

2022	**ERASMUS Scholarship**, University of Stuttgart	*$ 2,700*
2020	**Graduate Research Scholarship**, DAAD (German Academic Exchange Service)	*$ 8,200*
	Institute of Engineering and Computational Mechanics Scholarship, University of Stuttgart	*$ 7,000*
	Baden-Württemberg Scholarship, Baden-Württemberg Foundation	*$ 5,600*
	Promos Stipend, DAAD (German Academic Exchange Service), University of Stuttgart - declined after exclusive Baden-Württemberg Scholarship was awarded	*$ 3,000*
	2nd place with honors for project competition in Advanced Concepts of Control Theory, Institute for Systems Theory and Automatic Control, Prof. Frank Allgöwer	
2015	**Award for outstanding merit in physics from the German Physical Society**, German Physical Society (*German: Deutsche Physikalische Gesellschaft (DPG)*)	

Teaching Experience

Fall 2021 & Fall 2022	**MUSI 6103 - Music Recording & Mixing**, Guest lecturer on EDM and electronic music production for 30+ students	*Atlanta, GA, US*
Spring 2018	**Mechanics 2**, Exercise lecturer for 300+ students	*Duisburg, Germany*
2016 - 2019	**Physics for Refugees**, Physics teacher for refugees (voluntary), German Physical Society in cooperation with CBE e.V.	*Mülheim a.d. Ruhr, Germany*

Outreach & Professional Development

Service and Outreach

2021	**Ski and Snowboard Club at Georgia Tech**, Founding member and rental equipment manager	*Atlanta, GA, US*
2016-2019	**German Physical Society in cooperation with CBE e.V.**, Teacher for ”Physics for Refugees”	*Mülheim a.d. Ruhr, Germany*
2017	**German Ski Instructor Association (*German: Deutscher Skilehrerverband (DSLV)*)**, DSLV Ski Instructor Level 1	*St. Moritz, Switzerland*
2014-2017	**Private Lessons**, Private tutoring in mathematics and physics	*Essen, Germany*
2011-2016	**Forever the Underdogs**, Founder and member of band	*Essen, Germany*
2013-2015	**Theodor-Heuss-Gymnasium**, Leading member of student council	*Essen, Germany*
2014	**German Life Saving Association (*German: Deutsche Lebens-Rettungs-Gesellschaft (DLRG)*)**, German Lifesaver Badge Silver	*Essen, Germany*

Development

Seminar Intercultural Sensitization by CBE e.V., Occupying yourself with the own and foreign cultures to explore and exploit similarities and differences. Increased and reinforced empathy and tolerance through change of perspective and communication on eye level. Helped to understand and solve intercultural conflicts at the workplace already.

General Ski Instructor Seminar, Refreshment on newest methods in terms of teaching (especially children) and methods on optimal skiing mechanics. Learned how to increase fun and decrease fear for students learning how to ski which helped me getting a new perspective on talking to students in a university context too.

Folkwang University of the Arts Seminar Series, Seminar by the Institute of Computer Music and Electronic Media (German: *Institut für Computermusik und Elektronische Medien (ICEM)*). Introduction into networked composition and 3D sound perception. Working with different techniques to create a 3D sound experience (Ambisonics, Dolby Atmos, ...). Developing own 3D music pieces and presenting them at Forum NRW. Learned creative techniques to apply them to scientific research.

Professional Memberships

DPG - German Physical Society (*German: Deutsche Physikalische Gesellschaft*)

IFAC - International Federation of Automatic Control

Professional Skills

Relevant Coursework

Machine Learning & Artificial Intelligence	Machine Learning, Statistical Machine Learning, Deep Learning, Computer Vision, Natural Language Processing, Statistical Learning and Stochastic Control
Control & Engineering	Robotics and Control, Nonlinear Control, Optimal Control, Model Predictive Control, Advanced Concepts of Control Theory, Modeling and Identification of Dynamical Systems, Dynamics of Distributed Parameter Systems, Nonlinear Dynamics of Mechanical Systems, Modeling and Simulation in Design, Wave Propagation in Solids, Principles of Continuum Mechanics

Technical Skills

Programming Languages	Python, Matlab - Simulink, C++, SQL, Arduino, Assembly
Machine Learning	Pytorch, Sklearn
Version Control	Git, Github
Rapid Prototyping	dSPACE Controldesk/MicroAutobox II, Vector CANalyzer, MKT-View
Real-Time Control	TwinCAT, EtherCAT, Simulink Real-Time
CAE	Abaqus CAE, PTC Creo Parametric, MegaCAD
Adobe Creative Cloud	Illustrator, Photoshop, After Effects, Premiere Pro
Pro Audio Software	Cubase, Serato DJ, Reaper, Wavelab, Ableton
Text Editing	LaTeX

Languages

German	●●●●●	native
English	●●●●○	fluent speaker/listener, proficient reading/writing
Latin	●●○○○	intermediate reading
Spanish	●○○○○	basic speaker/listener, novice reading/writing
Italian	●○○○○	basic speaker/listener, novice reading/writing

Research Interests

Artificial Intelligence	Computer Vision, Deep Learning, Machine Learning, Reinforcement Learning, NLP
Robotics	Data-Driven System Analysis and Control, Model Predictive Control, Planning

Personal Interests

Musical Instruments	Piano, Bass Guitar
Music Production	Spotify: https://spoti.fi/3BGVTzv, Soundcloud: https://bit.ly/2zCAqfK
Sports	Team Handball, Alpine Skiing, Scuba Diving, Swimming, Hiking, Jogging, Wakeboarding