Dr. rer. nat. **Valentin Noah Hartmann**

v@vhartmann.com – 25/08/1995 - Swiss permit C

Education

ETH Zürich — **Zürich (CH)**
Postdoctoral Researcher at the Computational Robotics Lab — *01/24 –*

TU Berlin/Excellence Cluster IntCDC Stuttgart — **Stuttgart/Berlin (DE)**
Doctoral Student - Supervisor Prof. Marc Toussaint - magna cum laude — *10/19 – 12/23*

- Dissertation: Scalable Multi-Agent Task and Motion Planning for Robotic Building Construction
- Research topics: Task and Motion Planning, Path planning, Multi-Agent Systems; Applied on architectural artifacts
- Teaching: 'Motion Planning', 'Numerical Optimization', 'Grundlagen der KI'; Supervision of multiple student projects and Bachelor/Master Theses

University of Oxford/Virtual — **Oxford (GB)**
Visiting Researcher in the ESP group - Supervisor Prof. Jonathan D. Gammell — *06/21 – 06/22*

- Research topic: Efficient multiquery motion planning for task and motion planning
- Developed tools and evaluation methods for multiquery motion planning

ETH Zürich — **Zürich (CH)**
Mechanical Engineering MSc - GPA 5.73/6 — *09/16 – 02/19*

- Focus on Robotics, Systems and Control - Coursework included: Mathematical Optimization, System Identification, Probabilistic Artificial Intelligence, Autonomous Mobile Robots, Game Theory and Control, Stochastic Systems, Advanced Topics in Control
- Semester Thesis: *Implementation of a High Performance Integration Scheme for Numerical Optimal Control Applications* - Developed and benchmarked an algorithm for numerical integration in C++. Contributed it to Boost Odeint - Grade: 5.75/6
- Masters Thesis: *A Constant-Complexity Approximation for the Recursive Bayesian Estimation of Closed-Skew Normal Distributions* - Moving horizon (optimal) state estimation for skewed noise distributions. Demonstrated theoretical guarantees. Grade: 5.75/6

ETH Zürich — **Zürich (CH)**
Mechanical Engineering BSc - GPA 4.88/6 — *09/13 – 08/16*

- Focus on Mechatronics - Coursework included: Machine Learning, System Modeling, Signals and Systems, Statistics
- Bachelors Thesis: *Inductance Based Stiffness Sensing Catheter* - Simulation, design, iteration, fabrication, and prototyping. Additionally developed libraries in C/C++ for communication with sensors that were used in my and other theses Grade: 6/6

Work Experience

Intrinsic - Formerly part of Google X — **Munich/Berlin (DE)**
PhD Resident in the Motion & Control Team — *08/22 – 12/22*

BCG Gamma — **Munich (DE)**
Visiting Data Scientist — *04/19 – 08/19*

- Designed and implemented data pipelines for large throughput (> 1 TB) for churn prediction and NLP projects for two large international companies
- Communicated and presented analysis and solutions to stakeholders

Verity Studios — **Zürich (CH)**
Trajectory Generation Intern - Software Development — *03/18 – 08/18*

- Developed collision free transition algorithms for a large number of drones as a part of the choreography generation tools
- Choreographed drone swarms of various sizes for internal customer demos and public-facing events (e.g. Drake, Starlight-Express)

Amazon Robotics — **Berlin (DE)**
Robotics Intern – International Launch Performance — *09/17 – 02/18*

- Generated a daily email report with insightful visualizations that is currently used to identify problematic areas of the robotic field and deployed it to all warehouses in Europe which lead to an up to 30% reduction of robot breakdowns
- Analyzed and visualized complex data sets pertaining to mobile robot performance and field errors for remediation of high-severity incidents
- Developed hardware and software solutions for human performance estimation and prediction

ETH Zürich - Computational Science and Engineering Laboratory — **Zürich (CH)**
Research Assistant — *02/17 – 08/17*

- Analyzed and predicted chaotic processes by examination of learned representations with recurrent neural networks

ETH Zürich — **Zürich (CH)**
Teaching Assistant — *09/14 – 12/16*

- Held TA positions in Kinematics and Statics, Mechanics of Materials, Dynamics, and Biomechanics I multiple times
- Prepared and held exercise sessions for up to 90 undergraduate mechanical engineering students per lesson
- Created the midterm exams in a team of two for the Kinematics and Statics course with over 800 enrolled students

Selected Publications

In Preparation/Under review

- *iDb-A*: Iterative Search and Optimization for Optimal Kinodynamic Motion Planning*, Joaquim Ortiz-Haro, **Valentin N. Hartmann**, Marc Toussaint, Wolfgang Hönig

Journals

- *Long-Horizon Multi-Robot Rearrangement Planning for Construction Assembly*, **Valentin N. Hartmann**, Andreas Orthey, Danny Driess, Ozgur S. Oguz, Marc Toussaint, Transaction on Robotics (T-RO), 2022
- *Leveraging Building Material as Part of the In-Plane Robotic Kinematic System for Collective Construction*, Samuel Leder, H. Kim, Ozgur S. Oguz, Nicolas Kubail Kalousdian, **Valentin N. Hartmann**, Achim Menges, Marc Toussaint, Metin Sitti, Advanced Science, 2022
- *Learning Robotic Manipulation of Natural Materials with Variable Properties for Construction Tasks*, Nicolas Kubail Kalousdian, Grzegorz Łochnicki, **Valentin N. Hartmann**, Samuel Leder, Ozgur S. Oguz, Achim Menges, Marc Toussaint, IEEE Robotics and Automation Letters (RA-L), 2022

Conferences

- *iDb-RRT: Sampling-based Kinodynamic Motion Planning with Motion Primitives and Trajectory Optimization*, Joaquim Ortiz-Haro, Wolfgang Hönig, **Valentin N. Hartmann**, Marc Toussaint, and Ludovic Righetti, IROS 2024
- *Effort Level Search for Hierarchical Problem Solving of Task-and-Motion Planning*, Marc Toussaint, Joaquim Ortiz-Haro, **Valentin N. Hartmann**, Erez Karpas, Wolfgang Hönig, Int. Conf. on Robotics and Automation 2024 (ICRA)
- *Efficient Path Planning In Manipulation Planning Problems by Actively Reusing Validation Effort*, **Valentin N. Hartmann**, Joaquim Ortiz-Haro, Marc Toussaint, IROS, 2023
- *Effort Informed Roadmaps (EIRM*): Efficient Asymptotically Optimal Multiquery Planning by Actively Reusing Validation Effort*, **Valentin N. Hartmann**, Marlin P. Strub, Marc Toussaint, Jonathan D. Gammell, International Symposium on Robotics Research (ISRR), 2022
- *ST-RRT*: Asymptotically-Optimal Bidirectional Motion Planning through Space-Time*, Francesco Grothe, **Valentin N. Hartmann**, Andreas Orthey, Marc Toussaint, Int. Conf. on Robotics and Automation 2022 (ICRA)
- *Learning Efficient Constraint Graph Sampling for Robotic Sequential Manipulation*, Joaquim Ortiz de Haro, **Valentin N. Hartmann**, Ozgur S. Oguz, Marc Toussaint, Int. Conf. on Robotics and Automation 2021 (ICRA)
- *Self-supervised Learning of Scene-Graph Representations for Solving Sequential Manipulation Problems*, Son-Tung Nguyen, Ozgur S. Oguz, **Valentin N. Hartmann**, Marc Toussaint, Conference on Robot Learning 2020 (CoRL)
- *Robust Task and Motion Planning for Long-Horizon Architectural Construction Planning*, **Valentin N. Hartmann**, Ozgur S. Oguz, Danny Driess, Marc Toussaint, Achim Menges, Int. Conf. on Intelligent Robots and Systems 2020 (IROS)

Workshops

- *TAPAS: A Dataset for Task Assignment and Planning for Multi Agent Systems*, Miguel Zamora, **Valentin N. Hartmann**, Stelian Coros, Workshop for Data Generation for Robotics at Robotics, Science and Systems '24
- *Towards computing low-makespan solutions for multi-arm multi-task planning problems*, **Valentin N. Hartmann**, Marc Toussaint. Workshop for Planning and Robotics (PlanRob), International Conference on Automated Planning and Scheduling (ICAPS), 2023
- *Planner Development Tools (PDT): Reproducible experiments and statistical analysis for developing and testing motion planners*, Jonathan D. Gammell, Marlin P. Strub, **Valentin N. Hartmann**. Proceedings of the Workshop on Evaluating Motion Planning Performance (EMPP), International Conference on Intelligent Robots and Systems (IROS) 2022.

Reviewing

- Int. Conf. on Robotics and Automation (ICRA)
- Int. Conf. on Intelligent Robots and Systems (IROS)
- IEEE Robotics and Automation Letters (RA-L)
- IEEE Transactions on Robotics (T-RO)

IT Skills

Languages: Proficient in C++, C, Matlab, Python, working knowledge of Bash, Mathematica, SQL

Languages

German: Native speaker **English**: Fluent (CEFR Level C2) **French**: Intermediate knowledge