Christopher Brix

Ph.D. candidate at RWTH Aachen University

Personal Info

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LinkedIn
www.linkedin.com/in/
christopher-brix

GitHub
www.github.com/ChristopherBrix

Website
www.christopher-brix.de

Skills

Programming Languages
Python (proficient)
Java (good)
C (basic)

Spoken Languages
German (native)
English (fluent)
French (basic)

Honors & Awards

Heidelberg Laureate Forum
2024 (Networking event: Turing Award / Fields Medal laureates; received Abbe Grant)

ICT Young Researcher Award
2020 (1.500€)

Scholarship "Deutschlandstipendium"
2016, 2018 (3.600€ each)

Dean's List
2016, 2017

Passions

Ballroom Dancing
Competitive dancing for 4 years

Cooking
Hobbyist

CS Ph.D. candidate focused on **safety & robustness** of **neural networks** with a background in machine translation. Published **two NeurIPS** (1x **first-author**) and **one first-author ACL** papers. Organizer of the **VNN-COMP**, the international competition for **neural network verification** tools.

Education

Mar 2021 - Dec 2025 (est.) — **RWTH Aachen University, Computer Science, Ph.D.**
Department for Software Modeling and Verification, Prof. Dr. Ir. Dr. h. c. Katoen
- Focus on verification of safety properties of neural networks

Apr 2018 - Aug 2020 — **RWTH Aachen University, Computer Science, M.Sc.**
- Master thesis "Proving Non-Existence of Imperceptible Adversarial Examples in Deep Neural Networks using Symbolic Propagation with Error Bounds", grade 1.0
- Final grade: 1.5

Oct 2014 - Mar 2018 — **RWTH Aachen University, Computer Science, B.Sc.**
- Bachelor thesis "Extension of the Attention Mechanism in NMT", grade 1.2
- Final grade: 1.6

Experience

Jul 2024 - Nov 2024 — **Applied Scientist Intern, Amazon Seattle**
Seattle, WA, USA
- Developed benchmark and evaluation pipeline to measure robustness to question rephrasing in customer facing LLM $\rightarrow$ identified critical inconsistencies; generated comprehensive robustness score of agents
- Investigated empirical relation between task complexity, network capacity and attainable network robustness $\rightarrow$ trained 30,000+ networks; conference submission targeted

Jul 2023 - Nov 2023 — **Applied Scientist Intern, Amazon Boston**
Boston, MA, USA
- Replicated & extended AlphaDev, a reinforcement algorithm for code generation
- Incorporated formal verification to automatically prove code correctness
- Enabled automatic code generation for complex algorithms

Aug 2022, Jul 2023, Jul 2024 — **Coorganizer of the VNN-COMP**
FoMLAS (CAV): Haifa, Israel; Paris, France; Montreal, Canada
- Fully automated evaluation of submitted benchmarks and toolkits
- Supported 15+ international teams with diverse requirements

Sep 2020 - Jan 2021 — **Research SWE Intern, Google Zurich**
Zurich, Switzerland (remotely, due to COVID-19)
- Fine-tuned BERT models for Named Entity Recognition (Python)
- Wrote data augmentation pipeline to improve small datasets (C++, Bazel)
- Final result: Increased key metrics by up to 25 percentage points (57% $\rightarrow$ 82%)
- Side project: Managed program to pair interns for approx. 700 1:1 meetings

Nov 2016 - Feb 2020 — **Student Research Assistant**
RWTH, Human Language Technology and Pattern Recognition, Professor Ney
Analyzed alternatives for the attention mechanism in NMT
- Implemented TensorFlow support for 2D-LSTMs using C/CUDA
- Designed and extended 2D-LSTMs to support bidirectional translation

Teaching

Yearly since 2021 — **Lab Supervision**
- Responsible for the lab, bi-weekly plenary and individual meetings, grading
- Each year 32 students, task: implementation of an AI for a board game

Each semester since 2021 — **Thesis Supervision**
- Responsible for task definition, weekly meetings, grading recommendations
- 9 bachelor/master theses in total

Social Engagement

Mar 2022 - Dec 2024 — **Board Member, Grün-Weiß Aquisgrana Aachen e.V.**
Aachen, Germany; dance club with approx. 700 members
- Point of contact for all members and trainers of non-tournament adult classes
- Responsible for the scheduling and promotion of new classes

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Publications

Dez 2024   D. Zhou, **C. Brix**, G. A. Hanasusanto, H. Zhang: Scalable Neural Network Verification with Branch-and-bound Inferred Cutting Planes. *Advances in Neural Information Processing Systems*, 2024.

Dez 2023   S. Kotha*, **C. Brix***, Z. Kolter, K. Dvijotham, H. Zhang: Provably Bounding Neural Network Preimages. *Advances in Neural Information Processing Systems*, 2023.
(*equal contribution)

May 2023   **C. Brix**, M. N. Müller, S. Bak, T. T. Johnson, C. Liu: First three years of the international verification of neural networks competition (VNN-COMP). *International Journal on Software Tools for Technology Transfer*, 2023.

Nov 2020   P. Bahar, **C. Brix**, and H. Ney. Two-Way Neural Machine Translation: A Proof of Concept for Bidirectional Translation Modeling using a Two-Dimensional Grid. *IEEE Spoken Language Technology Workshop*, 2021.

Jun 2020   **C. Brix**, P. Bahar, and H. Ney. Successfully Applying the Stabilized Lottery Ticket Hypothesis to the Transformer Architecture. *Association for Computational Linguistics*, 2020.

Oct 2018   P. Bahar, **C. Brix**, and H. Ney. Towards Two-Dimensional Sequence to Sequence Model in Neural Machine Translation. *Conference on Empirical Methods in Natural Language Processing*, 2018.

Jun 2017   P. Bahar, T. Alkhouli, J.-T. Peter, **C. Brix**, and H. Ney. Empirical Investigation of Optimization Algorithms in Neural Machine Translation. *Prague Bulletin of Mathematical Linguistics*, 2017.

Other Work

Dez 2022   M. N. Müller*, **C. Brix***, S. Bak, C. Liu, T. T. Johnson: The Third International Verification of Neural Networks Competition (VNN-COMP 2022): Summary and Results. *arXiv preprint arXiv:2212.10376*, 2022.
(*equal contribution)

Apr 2022   **C. Brix**, L. Pühl: Binary-Search Tree Exploration in Verification of Neural Networks. *LiVe 2022 6th Workshop on Learning in Verification*, 2022.

Jul 2021   Participated in the VNN-COMP 2021: S. Bak, C. Liu, and T. Johnson. The Second International Verification of Neural Networks Competition (VNN-COMP 2021): Summary and Results., *arXiv preprint arXiv:2109.00498*, 2021.

Jun 2020   **C. Brix** and T. Noll. Debona: Decoupled Boundary Network Analysis for Tighter Bounds and Faster Adversarial Robustness Proofs. *arXiv preprint arXiv:2006.09040*, 2020.