AIDAN LORENZ

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**TECHNICAL SKILLS**

**Software/Technologies:** Python, Anaconda, uv, Git, Linux, WSL, Model Context Protocol (MCP), Docker/Podman, AWS S3, Pytorch, LaTeX, RStudio, Matlab, Mathematica

**EDUCATION**

**PhD in Mathematics***, Vanderbilt University*, GPA: 3.93 2019 – August 2024

Dissertation topics: Geometric group theory, low dimensional topology.

Selected courses: Mathematical Data Science ⦿ Data Structures ⦿ Database Management Systems ⦿ College Teaching

Bootcamp mini-courses: Machine Learning ⦿ Applied Statistics and Data Science ⦿ Python ⦿ R ⦿ Stochastic Modeling ⦿ Optimization

**Master’s in Mathematics***, Vanderbilt University* 2019 – 2022

**Honors Bachelor of Science**, Mathematics & Physics, Certificate in Programming, *Temple University* 2015 – 2019

**SELECTED EXPERIENCE**

**Senior AI/ML Engineer** August 2024 – Present

*ARKA Group*

* Fine-tune CV models on custom real & synthetic datasets and experiment with SSL techniques (DINO) for small object detection.
* Creating an agentic AI system using MCP that includes a RAG pipeline with a Chroma vector database.
* Interface regularly with customers; read papers to stay up-to-date; performed leading AI/ML role in securing a $1M+ contract.

**Doctoral Mathematics Researcher** 2019 – Present

*Vanderbilt University, Department of Mathematics*

* Built package to work with small dilatation pseudo-Anosov homeomorphisms using Veering triangulations integrating Python, Sage, Regina, and Mathematica.
* Instructor of Record for 3 courses including Statistics Lab in R, TA for additional 5 courses, completed optional teaching certification.

**Participant, Math to Industry Bootcamp** June – July 2023

*University of Minnesota, Institute for Mathematics and its Applications*

* Worked with a group at Pacific Northwest National Laboratory on assessing robustness of deep learning models (Meta’s Segment Anything Model, GPT-2, Bloom, Pythia, and other large language models).
* Utilized embedding models from Huggingface and standard computer vision metrics in our assessment.

**Participant, Data Science Bootcamp** September – December 2023

*Erdős Institute*

* Took comprehensive semester-long course on Machine Learning techniques.
* Built a collaborative filtering beer recommendation system with a group using matrix factorization and Pytorch.

**Research Assistant, Mathematics** 2017 – 2019

*Temple University, Department of Mathematics*

* Studied “shadows” (approximations of elements) of the Grothendieck-Teichmüller group.
* Paper accepted to Algebraic & Geometric Topology.

**Research Assistant, Mathematics** June – July 2018

*Cornell University, Department of Mathematics*

* Collaborated on a project about generating sets of finite groups with a group of fellow undergraduates from other universities.
* Wrote programs in GAP to carry out group-theoretic computations.
* Paper accepted to Communications in Algebra.

**PUBLICATIONS** *\*Authors listed in alphabetical order*

* Applying Deep Learning Object Detection Techniques to Detect RSOs for Ground-Based EO Sensors *Aidan Lorenz* et al. **AMOS Conference Proceedings (In Preparation; 2025)**
* What are GT-shadows?, *Vasily Dolgushev, Khanh Le, Aidan Lorenz*, **Algebraic & Geometric Topology (2023)**
* On the replacement property for PSL(2,p)*, David Cueto Noval, Aidan Lorenz, Baran Zadeoglu,* **Communications in Algebra (2021)**

**SELECTED AWARDS**

ARKA Excellence Award ⦿ B.F. Bryant Prize for Excellence in Teaching ⦿ Sholomskas Award for Outstanding Students (Mathematics) ⦿ Phi Beta Kappa ⦿ Undergraduate Research Program Poster Session Honorable Mention ⦿ Robert A. Figlin Family Research Award ⦿ Most Promising Mathematics Major Award ⦿ Science Scholars Program ⦿ President’s (full tuition merit) Scholarship ⦿ Dean’s List ⦿ Graduated Magna Cum Laude