

ALEC L. CRITTEN

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Citizenship: United States of America
Languages: English, French (\sim A1/A2)

EDUCATION

Swansea University

PhD, Computer Science

Thesis: “SMT Solving for Graph-Theoretic Representations of Railway Systems”

September 2023 - present

Swansea, Wales, United Kingdom

University of Vermont

B.S. in Mathematics, minor in Computer Science

Honors College Scholar

Final GPA: 3.62/4.0

Thesis: “Characterizing Insecure Error Distributions for Various RLWE Problems”

August 2018 - May 2021

Burlington, Vermont, United States

RESEARCH INTERESTS

My work centres around the applications of formal methods to real-world systems, particularly through verification using automated and interactive theorem proving. As a PhD student and member of the Swansea Centre for Research in Digital Railways, I have worked to ensure the correctness of the design of safety-critical railway systems using techniques such as SMT solving.

TECHNICAL ABILITIES

Programming Languages

Python, C++, Visual Basic, C#, Haskell, Prolog,
CSP, Java, SageMath, MATLAB

Proof Assistants and Theorem Provers

Z3, cvc5, Rocq/Coq, Lean

Operating Systems

Windows, Linux (Ubuntu)

Additional Skills

Git, Jira, Bitbucket, L^AT_EX, Wolfram Mathematica

WORK EXPERIENCE

Swansea University

Graduate Teaching Assistant

October 2023 - present

Swansea, Wales, UK

- Responsible for supporting the teaching mission of the University’s Computer Science Department. Provides support through lab demonstrations, assisting lecturers, and marking courseworks and examinations.
- Obtained the Advance HE Associate Fellowship (AFHEA) teaching qualification as part of my position.
- Modules supported: CSCM985 (Logic, Modelling, and Verification), CSCM/385 (Modelling and Verification Techniques), CSC375 (Logic for Computer Science), CSCM/364 (Software Testing), CSCM/313 (High-Integrity and Critical Systems), CS-205 (Declarative Programming), CS-135 (Professional Issues 2: Software Development), CSC005 (Computational Probability)

Siemens

Software Engineer (internship)

July 2025 - September 2025

Chippenham, England, UK

- Engaged with the formal methods team in the R&D division of Siemens Mobility, particularly with regard to integrating graph-theoretic SMT solving into current internal railway verification software.

Peraton
Applications Programmer and Analyst

September 2022 - August 2023
Warner Robins, Georgia, U.S.

- Responsible for providing software engineering support for a program under the U.S. Air Force. Maintained and developed code for a GUI project.

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Software Developer

August 2021 - August 2022
Huntsville, Alabama, U.S.

- Responsible for software design, development, test and integration support for a modeling and simulation effort in U.S. ballistic missile defense.

Georgia Military College
Adjunct Faculty and Tutor in Mathematics

June 2021 - July 2021
Warner Robins, Georgia, U.S.

- Adjunct faculty member, lecturer (College Prep Algebra II), and tutor in mathematics.

Polymath REU, virtual
Undergraduate Researcher and Group Leader

Summer 2020
Virtual

- Participated in a multi-national collaborative mathematical research experience. Led small research group in number theory. Developed mathematical conjectures and proofs. Contributed to published writing, available at: <https://arxiv.org/abs/2010.14932>

CONFERENCES AND EVENTS

UKRRIN Student Conference 2026
Swansea, Wales, UK

January 2026

Co-chair of conference, member of programme committee and organising committee

Summer School Marktoberdorf 2025
Marktoberdorf, Germany

August 2025

Attendee of summer school

BCTCS 2025
Glasgow, Scotland, UK

April 2025

Presented a talk: “Developing user propagators for graph-based SMT reasoning”

UKRRIN Student Conference 2025
Sheffield, England, UK

January 2025

Gave a poster presentation: “SMT solving for graph-theoretic representations of railway systems”

Proof and Computation Autumn School 2024
Fischbachau, Germany

September 2024

Attendee of autumn school

SMT/SAT/AR Summer School 2024
Nancy, France

June 2024

Attendee of summer school