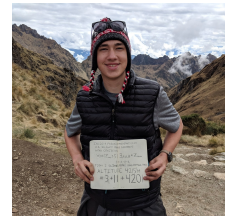


Markus de Medeiros

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Vancouver, Canada



RESEARCH

- **Existence and Stability of Symmetric and Asymmetric Patterns for the Half-Laplacian Gierer-Meinhardt System in a One-Dimensional Domain**
With Dr. Jun-Cheng Wei and Dr. Wen Yang, supported by NSERC USRA
Published, Mathematical Models and Methods in Applied Sciences (M3AS)
- **Spike Solutions to the Supercritical Fractional Gierer-Meinhardt System**
With Dr. Jun-Cheng Wei, Dr. Wen Yang, Dr. Daniel Gomez supported by NSERC USRA
Software contributor. Submitted to the Journal of Nonlinear Science
- **Design of an intermediate specification language for Prusti**
With Dr. Alex Summers (UBC) and Aurel Bily (ETH Zurich), supported by SURE grant
Design and implementation of an extensible intermediate language between Rust MIR with Hoare-style separation logic semantics, for modelling the *core memory safety proof* in Prusti.
In progress.

SELECTED WORK EXPERIENCE

- **Undergraduate TA**
UBC, Starting September 2022
TA for CPSC 421: Theory of Computation
- **Summer research assistant**
UBC, May 2022 to August 2022
Working with Dr. Alex Summers on Prusti: permissions-based verification for Rust. Continuing as thesis.
- **Undergraduate TA**
UBC, January 2022 to April 2022
Lab TA for CPSC 310: Intro to Software Engineering.
- **Summer research assistant**
UBC, May 2021 to August 2021
Performed numerical experiments and helped prove a variety of lemmas in fractional differential equations, with Dr. Jun-Cheng Wei and international collaborators.
- **Undergraduate TA**
UBC, September 2019 to December 2019
Workshop TA for two sections of MATH 184: differential calculus.
- **Summer registration support**
Centre for Learning@Home, May 2019 to August 2019
Assist administrators in registering students for high school. Automated several of my tasks in Python.

SELECTED PROJECTS

- **Prusti** [[main](#)] [[fork](#)]
Development of new operational semantics between unstable rust MIR and Viper static verifier
Rust, Viper
- **Lucid** [[source](#)]
Music visualizer with bindings to FFMPEG
Haskell
- **Brainf** [[source](#)]
BrainF interpreter using monad transformers
Haskell
- **A Theory of Programs** [[source](#)]
First typesetting of a historical Dana Scott paper
LaTeX
- **Unify** [[source](#)]
A generic, rewrite-free, recursion-free unification implementation
Rust
- **GrobnerCAD** [[source](#)]
2D CAD frontend, converts geometrically constrained drawings into systems of polynomials
Java, CAD, algebraic geometry

EDUCATION

- **Combined Honours in CS and Mathematics**

University of British Columbia.

Mathematics (avg. 85%), including:

- MATH 223 Hon. Linear Algebra: 94%
- MATH 342 Algebra & Coding Theory: 93%
- MATH 320 Hon. Real Analysis: 87%
- MATH 322 Hon. Group Theory: 86%

Computer Science (avg. 91%), including:

- CPSC 421/501 Theory of Computation: 100%
- CPSC 509 Graduate PL Principles: 98%
- CPSC 312 Functional & Logic Programming: 95%
- CPSC 313 Hardware & Operating Systems: 94%

SKILLS

- Haskell, broadly functional programming
- Rust, including compiler internals and API's
- Hindley-Milner type systems
- Discrete mathematics and information theory
- Algebraic automata and the Krohn-Rhodes theory
- C/C++, Python, NumPy.
- bash, git, vim, \LaTeX .

EXTRACURRICULARS

- 3D printing, CAD, machining
- Ultimate Frisbee
- PLU-311 programming languages reading group, weekly attendee and occasional presenter.
- **Pirate 311:** Organized a student-led reading group to cover material from UBC's CPSC 311, which was cancelled in 2022 due to scheduling issues. Led weekly discussions about the fundamentals of programming languages.

INTERESTS

- **Computer Science:**

Programming Languages, systems, formal verification.
Broad interest in exploring the relationship between proofs and programs.

- **Mathematics:**

Applications of algebra/algebraic geometry, computer algebra systems, computational mathematics.
Broad interest in applications of algebraic techniques in combinatorial and algorithmic problems.

AWARDS

- SURE award, 2022
- Stanley M. Grant Scholarship in Mathematics 2021, by recommendation of the UBC math dept.
- NSERC USRA, 2021
- UBC RAPID Member Productivity Award 2018, by recommendation of team leads.