Markus de Medeiros

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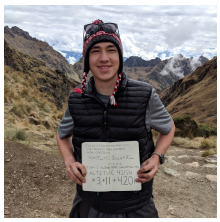

RESEARCH

- **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 contibutor. *Submitted to the Journal of Nonlinear Science*
- **Design of an intermediate specification language for Prusti**
  With Dr. Alex Summers (UBC) and Aurel Bílý (ETH Zurich), supported by SURE grant
  Design and implementation of an extensible intermediate language between Rust MIR with Hoare-style separataion 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 geometery

EDUCATION

- **Combined Honours in CS and Mathematics**
  University of British Columbia. In progress, year 5 of 5.

  Mathematics (avg. 84%), 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. 90%), 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.