

## RESEARCH INTERESTS

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My research goal is focused on creating agents which can solve complex tasks with sparse rewards, that requires a well thought out sequence of high level actions to solve. Specifically, environments in which high level plans may be correct, but the implementation of each step impacts whether the rest of the plan is still achievable. My research area involves combining reinforcement learning with traditional tree search methods. Coming from a background in math, I am particularly interested in finding ways to make predictions and solve difficult problems using rigorous tools from statistics.

## EDUCATION

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<b>University of Alberta</b> Ph.D. in Computer Science, Advisors: Michael Buro, Levi Lelis – Given exceptional status to transfer directly into Ph.D. from M.Sc. – Research focuses on combining tree search methods for efficient reinforcement learning	Edmonton, Alberta 2018 – Current
<b>Wilfrid Laurier University</b> B.S. in Computer Science & Mathematics (Double Major), GPA: 3.7/4.00	Waterloo, Ontario 2013 – 2017

## RESEARCH EXPERIENCE

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<b>University of Alberta</b> Department of Computer Science — Graduate Research Assistant – Extended algorithm runtime distribution prediction models into the Bayesian setting [1]	Edmonton, Alberta 2018 – Current
<b>Wilfrid Laurier University</b> Department of Mathematics — Undergraduate Research Assistant – Investigated how the sentiment of news affects prices in the stock market	Waterloo, Ontario Winter 2018
<b>Wilfrid Laurier University</b> Department of Computer Science — NSERC Undergraduate Research Assistant – Worked on an open conjecture in chromatic symmetric functions – Solved the $e$ -positivity conjecture for a subclass of claw-free graphs [2]	Waterloo, Ontario Summer 2017

## ACADEMIC TEACHING POSITIONS

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<b>University of Alberta</b> Principal Instructor – Responsible for creating and delivering teaching material for an upper year undergraduate course – Topics include C++ programming, AI for games, and RTS game engine internals	Edmonton, Alberta Fall 2022/2024
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**University of Alberta**  
Graduate Teaching Assistant

Edmonton, Alberta  
2018 – Current

- Responsible for facilitating and carrying out labs, course material, exams, and assignments
- Introduction to the Foundations of Computation II; Practical Programming Methodology in C; Advanced Game Programming in C++; Computational Cryptography; Search Knowledge and Simulations

**Wilfrid Laurier University**  
Undergraduate Teaching Assistant

Waterloo, Ontario  
2017 – 2018

- Responsible for facilitating and carrying out labs, course material, exams, and assignments
- Data Structures I; Introduction to Microprocessors; Algorithm Design and Analysis I

## PUBLICATIONS

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- [1] **J. Tuero** and M. Buro, “Bayes distnet - a robust neural network for algorithm runtime distribution predictions”, *Proceedings of the AAAI Conference on Artificial Intelligence*, vol. 35, no. 14, pp. 12 418–12 426, May 2021.
- [2] A. M. Hamel, C. T. Hoàng, and **J. Tuero**, “Chromatic symmetric functions and h-free graphs”, *Graphs and Combinatorics*, vol. 35, no. 4, pp. 815–825, 2019.

## INVITED TALKS

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1. “Learning to Generate Optimal Paths using Search-Aware Models”, *AIIDE-21 Workshop on Artificial Intelligence for Strategy Games*, Edmonton, Canada, Oct 11 2021.
2. “INSYN: Recommendation Models for Syntactically Incorrect Source Code”, *ATB Financial*, Edmonton, Canada, Jan 31 2019.

## PROGRAMMING LANGUAGES AND FRAMEWORKS

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- **Programming Languages:** C, C++ 11/14/17/20, Python, Java, 8600 Assembly
- **Frameworks:** PyTorch, Cuda

## PROJECTS & OPEN SOURCE CONTRIBUTIONS

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See full list of projects on [github.com/tuero](https://github.com/tuero)

- **tinytensor** (C++)  
*A C++ multi-dimensional array + automatic differentiation library with CUDA acceleration.*
- **MuZero-CPP** (C++)  
*A pure C++ implementation of the MuZero algorithm, using libtorch C++. Features multi-threaded async actor inference, complex action representation, efficient batched GPU inference.*
- **Stones n Gems — Open Spiel Framework** (C++)  
*Author of the game Stones n Gems for the Open Spiel framework by DeepMind. Stones n Gems is a simplified version of a mixture of common stone and gem games, such as Boulder Dash and Emerald Mines.*
- **Rocks n Diamonds** (C++)  
*A wrapper for the Rocks’n’Diamonds open source C arcade style game (based off Boulder Dash, Emerald Mines, Supaplex, and Sokoban). The project extends Rocks’n’Diamonds by letting users add their own AI controllers, providing a host of library functions to easily access the internal state of the engine, replay functionality, and logging.*

## WORK EXPERIENCE

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### AI4Good Lab

Teaching Assistant

Edmonton, Alberta

Summers 2021-2025

- AI4Good lab is a 7-week training program for women across Canada, which composes of lectures, workshops, and a self-directed team project
- Prepared teaching and lab material for students across many topics, including machine learning, recurrent and convolutional neural networks, reinforcement learning, and best practices
- Paired with 2 groups of students to help mentor and facilitate their projects

### CGI

Technical Analyst — Java Developer

Markham, Ontario

Summer 2018

- Worked on a Java Spring Boot dashboard for financial institutions
- Increased test coverage from 20 to 80 percent
- Investigated and presented to project managers how machine learning can be leveraged to further improve the application

### Intact Financial

Summer Student — IT Department

Toronto, Ontario

Summer 2016

- Created a dashboard to show agile metrics of the software developer teams' productivity for upper management

### Intact Financial

Summer Student — Taxation

Toronto, Ontario

Summer 2015

- Completed income tax returns for multiple companies under the intact umbrella
- Automated deposit recovery reconciliation using Excel macros

### Sun Life Financial

Junior Process Consultant — Process & Productivity Improvement

Waterloo, Ontario

Winter 2015

- Supported a metrics framework for upper management to track operational efficiency
- Managed the implementation by planning and delivering multiple requirements while collaborating with the clients

## SCHOLARSHIPS AND AWARDS

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| • NSERC Undergraduate Research Award    | 2017 |
| • Faculty of Science Dean's Honour Roll | 2017 |
| • Faculty of Science Dean's Honour Roll | 2016 |

## EXTRACURRICULAR ACTIVITIES

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| • Ice Hockey   | 2003 – Current |
| <i>Newmarket Minor Hockey Association, Laurier Intramural Ice Hockey</i>   |                |
| • Scouts Canada  | 2000 – 2016    |
| <i>Volunteered at youth camps, teaching survival skills. Helped with various fundraisers and community events, including the Scout Tree program.</i> |                |
| • MedVents   | 2008 – 2010    |
| <i>Further developed First Aid and survival skills alongside trained paramedics. Provided First Aid for various camps and community events.</i>      |                |