# PATRICK BIEL

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## EDUCATION

**University of Toronto** *September 2019 - May 2024*
Bachelor of Applied Science in Computer Engineering Cumulative GPA: **3.47**/**4.0**

## SKILLS

**Programming Languages:** C, C++, Python, Rust, Javascript, PHP Swift, Bash/Shell, Matlab

**Hardware**/**Electronics:** Raspberry Pi, Arduino, Embedded Programming, ARM Assembly

**Topics:** Software Engineering, Git, Algorithms and Data Structures, Object-oriented Programming, Computer Architecture, Drivers, Machine Learning, Full-stack Web Development

## PROFESSIONAL EXPERIENCE

**Software Engineering Intern** Toronto, Canada
*AMD* *May 2022-May 2023*

- Debugged power management issues in GPUs using Kernel Mode Debugging (Windbg)
- Implemented fixes in the **kernel-side Driver** and **firmware** using **C**/**C++**
- Received recognition for creating a command line tool that reduces debug time
  - Reduced number of incorrectly assigned issues by **30%**
- Implemented a unit test framework with different simulated ASICs
- Maintained a **Jenkins** testing suite, using **Python** to automate many tasks
- Resolved $\sim$ **40** issues in JIRA, keeping track of progress with SCRUM
- Managed source control using **Git**
- Received a Certificate of Recognition for outstanding performance from manager

**Research Assistant** Toronto, Canada
*Middleware Systems Research Group - University of Toronto* *May 2021-September 2021*

- Source code available at Cairo Verifier. Has **almost 40** stars on Github
- Implemented a cryptographic zero-knowledge proof verification system in **Rust**
- Developed proper documentation and testing for a large code-base ($\sim$**10k** lines)
- Outlined a zero-knowledge proof system to be implemented on the OpenLibra blockchain
- Coauthored the paper “Zero-Knowledge Proof System in Open Libra” with Prof. Jacobsen and Shiquan Zhang
- Received **$6000 NSERC grant**

## ENGINEERING PROJECTS

**Mood Lights—2021 MakeUofT Hackathon and Audio Visualizer**
*Available at: DEVPOST Mood Lights Project and Pi Audio Visualizer*

- Displays LEDs patterns depending on the weather and voice commands
- Won the **$250** “Smartest Unsmart Hack” (Uses no Machine Learning) Award
- Maps the frequencies for a song onto an LED strip using **Python**

**Image Recolourizer**
*Available at: Training Pipeline and Demo*

- Designed a machine learning algorithm with **Python**, and **pyTorch** that re-colourizes a greyscale image
- Trained, tuned the hyperparameters, and collected data for a **CNN** encoder-decoder network
- Improved the QoR by more than **100%** from the baseline

**GIS Mapper**

*Demo available at: GIS Mapper Presentation*

- Designed a program in **C++** that displays a road map, and allows users to find routes between places
- Implemented path finding using A* with multi threading, 2-opt solution for a travelling salesman problem

**Relic Race — iOS Game**

*Available at: Relic Race on the App Store*

- Designed a 5-star iOS game in **Swift** with 50 downloads
- Implemented randomly generated mazes for player to explore
- Managed user data in Google Firebase

**Patrick Biel Games Forum — Web Tool**

*Source code available at: Games Forum*

- Created an online app using **PHP**, and **SQL** that allows users to anonymously post feedback.
- Checked for security vulnerabilities like cross-site scripting (XSS) and SQL injection.

**Othello Game AI**

*Source code available upon request*

- AI written in **C** that uses a Mini-max algorithm with alpha-beta pruning
- Ranked #14 in competition with over 200 submissions

**Productive Pupil**

*Available at: Productive Pupil on the Chrome Web Store*

- Chrome extension written in **Javascript**
- Designed to help people to study better and minimize distractions

## DESIGN TEAMS

**Autonomous Rover Team** Toronto, Canada

*University of Toronto Robotics Association* *September 2020-January 2021*

- Trained a lightweight **Image Detection model** for traffic sign localization using **Python**
- Created training data using simulations in **Unity**

**SUMO** Toronto, Canada

*University of Toronto Robotics Association* *September 2019-April 2020*

- Led a team of 3 people to design a robot that competes in sumo wrestling
- Programmed the **Arduino** with **C++** and soldered the board, sensors together
- Created an protective housing with **CAD**

## RELEVANT COURSES

Computer Networks, Operating Systems, Control Systems, Communication Systems, Algorithms and Data Structures, Fundamentals of Machine Learning, Electronics, Computer Architecture, Compilers and Interpreters, Deep Learning Specialization

## AWARDS

2019, 2020, 2021 Dean's Honour List

## INTERESTS

Scuba Diving, Rock climbing, Brazilian Jiu Jitsu, Powerlifting