

Ben Holmes

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Education

University of British Columbia

Sep. 2016 – May 2022

B.ASc. of Applied Science, Engineering Physics (81%/A-)

Vancouver, BC

- **Courses:** Object-Oriented Programming; Microcontrollers; Linear Algebra; Probability; Complex Analysis; Applied Differential Equations; Computational Physics; Game Theory

Technical University of Denmark

Sep. 2019 – Dec. 2019

Exchange Semester

Copenhagen, DK

- **Courses:** Deep Learning; Computationally Hard Problems; Robotics; Computational Multibody Dynamics.

Experience

Software Engineer Co-op

Jan. 2020 – Present

Specialized Bicycle Components

Morgan Hill, CA

- Wrote several production web APIs in Go, hosted as AWS Lambda functions using CircleCI to test and deploy.
- Designed and built custom authentication service to secure and manage permissions for many internal applications.
- Reduced runtime of a physics based numerical solver from 3s to under 100ms, allowing the full algorithm to run in real time on the website, replacing a pre-computed lookup table.
- Pioneered a data-driven approach for human performance studies by using a dataset of over 6000 Strava rides to examine temperature's effect on rider performance.
- Developed a general algorithm for solving full-suspension bicycle kinematics using Newton-Raphson iteration, allowing the algorithm to analyze prototype or competitor bikes with no additional development time.
- Improved accuracy of E-bike range estimates by tuning physics model to match dataset of 200,000 real world rides.
- Created MongoDB database with an API for efficient merging and querying, speeding up common R&D tasks.

Quantitative Analyst Co-op

May 2019 – Aug. 2019

Castleton Commodities

Calgary, AB

- Performed data exploration on an over 100GB dataset of geospatial weather data and natural gas production.
- Developed, trained, and validated machine learning models using Scikit Learn and Keras to predict natural gas production as a function of various weather features.

Software Engineer Co-op

Jan. 2018 – May 2018

Blue Willow Systems

Vancouver, BC

- Explored emerging localization technologies and wrote a custom backend in Python that allowed development kits to be used with the existing front-end application.
- Reduced indoor location error from 4 meters to less than 1 meter by adding a rolling average filter to distance data.
- Added new features to production web and mobile applications by implementing front-end, back-end, and SQL database changes.

Projects

AlphaFour | Python, Keras

Mar. 2021 – Present

- Currently building a lightweight implementation of DeepMind's AlphaZero algorithm to play ConnectFour.
- Implemented agents using minimax with alpha-beta pruning and Monte Carlo tree search as test opponents.

WikiGame Bot | Python, Go

Feb. 2021 – Mar. 2021

- Used a Wikipedia data dump to build a directed graph of all links between articles.
- Wrote a bot in Go to play an online game where players race between two Wikipedia pages by following links.
- Uses a multithreaded breadth-first search to find dozens of paths per second. Outperforms human opponents.

Autonomous Robot | C++, Python, OpenCV

June 2018 – Aug. 2018

- Built an autonomous robot from scratch, in just 8 weeks, capable of navigating a complex and dynamic course.
- Uses the YOLO object detection algorithm running on a Raspberry Pi to navigate towards and retrieve targets.

Technical Skills

Languages: Experienced Python and Go developer. Familiar with C/C++, Java, and JavaScript/HTML/CSS

Developer Tools: Git, Amazon Web Services, CircleCI, Serverless.

Machine Learning: LSTMs, CNNs, GANs, and RL in PyTorch and Keras. Strong understanding of the underlying math.