Axel Jacobsen

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Experience

Mar 2022 — Present **R&D Engineer**, *Chan-Zuckerberg Biohub*
We are creating a low-cost imaging cytometer for malaria diagnosis, which images fresh blood and finds malaria parasites with my object detection model (YOGO, manuscript in-progress)

- Designed and developed YOGO, an object detection model with a limit of detection of 0.00038% parasitemia. Reached 1680 FPS on an A100 GPU for (772, 1032) px images
- Created a convolutional neural network to predict distance and direction from focal center for the cytometer's autofocus. Successfully deployed to collect over 10 TB of data from Uganda
- Organized, pre-processed, and analyzed the 10 TB of clinical data. This included writing many tools (Python + Bash) to manage and analyze the data which our team uses daily
- Architected and optimized software for the microscope. Key contributions included creating a multiprocessing manager to efficiently move data between processes for heavy calculations, reducing execution times from 16.3 ms to 4.8 ms

Jun 2020 — Dec 2021 **R&D Engineering Intern**, *Chan-Zuckerberg Biohub*

- Rewrote the entire codebase for the Opentrons OT2 (an open-source liquid handling robot) in 6 months to allow more complex protocols and to simplify the software
- Developed an ADC driver for a luminometer detecting COVID-19 antigens, deployed in Bangladesh. https://doi.org/10.1101/2023.05.18.23290120.

May 2019 — Aug 2019 **Engineering Intern**, *Wildlife Computers*

- Designed a PCB to protect digital lines from interference
- Wrote embedded C++ for automatic PCB component verification

Jan 2018 — Apr 2018 **Data Science Co-op**, *Control Mobile*

- Improved 300+ SQL queries, achieving a mean 65% reduction in data retrieval time
- Worked on bug fixes, code development, and refactoring

Other

Engineering Physics Autonomous Robot Competition

- Engineered an autonomous robot over 8 weeks, capable of navigating an obstacle course and collecting objects. https://axel-jacobsen.github.io/ENPHRobot/
- Wrote control software for subsystems and Goertzel filter for frequency detection

Small Fun Projects

- Huffman compressor in C, trading bot in Rust for Manifold Markets, FIXME-roulette in Rust

Education

Graduated Dec 2021 **B.ASc Engineering Physics**, *University of British Columbia*

Winter 2019 **Exchange Semester**, *Denmark Technical University*

- Won the DTU OS Course Competition with the fastest reverse hash server
- Developed an LSTM-based Deep Q-Network for a machine learning course