Axel Jacobsen

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Experience

Chan-Zuckerberg Biohub

R&D Engineer: Mar 2022 - Present

- We are creating a low-cost imaging cytometer for malaria detection. This device uses machine learning to diagnose malaria by imaging unstained blood and classifying blood cells with an object detection model.
- Created a deep learning model for malaria detection. Achieved a detection limit of 0.00038% parasitemia, roughly 1 false positive in every 260,000 predictions. Optimized to run at 120 FPS on Raspberry Pi 4 + Intel NCS2, and 550+ FPS on an A100 GPU. Currently drafting the associated research paper.
- Created a deep learning model to gauge the focus quality of microscope images, aiding in the collection of over 10 TB of data from our deployment to Uganda.
- Architected and optimized software for the microscope. Key contributions include:
  - Created a multiprocessing manager to efficiently move data between processes for heavy calculations, reducing execution times from 16.3 ms to 4.8 ms.
  - Increased data-saving speed, enabling stable operations above 30 FPS.

R&D Engineering Intern: Jun 2020 - Dec 2020, Jul 2021 - Dec 2021

- Overhauled the codebase of the Opentrons OT-2 pipetting robot, greatly simplifying its API and reducing its size by 60% without sacrificing functionality.
- Wrote an ADC driver for a luminometer to detect COVID-19 antigens, currently deployed in Bangladesh. Link to research.

Wildlife Computers

Engineering Intern: May 2019 – Aug 2019

- Engineered a PCB to protect digital lines from interference, ensuring precision voltage measurements.
- Developed C++ software for automated PCB component verification, boosting production efficiency.

Control Mobile

Data Science Co-op: Jan 2018 – Apr 2018

- Optimized SQL database operations by evaluating and improving 300+ SQL queries, achieving a 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.
- Wrote signal processing software for rapid IR frequency detection and control software for the subsystems of the robot (e.g. the claw).

Education

University of British Columbia **Graduated May 2022**
B.ASc Engineering Physics

Denmark Technical University **Winter 2019**
Exchange Semester. Won DTU OS Course Competition with the fastest reverse hash server.