Axel Jacobsen

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PROGRAMMING Advanced in Python, experienced in C, Javascript, learning Julia, Lisp, Rust
ELECTRICAL / MECHANICAL Experience with PCB design, mechanical prototyping and CAD software, fluid system design

RELEVANT EXPERIENCE

R&D ENGINEERING INTERN | Chan-Zuckerberg Biohub | Jun 2020 - Dec 2020, Jul 2021 - Present

Owner of the Biohub's reprogramming project of the Opentrons OT-2, an open-source pipetting robot for lab automation

- Wrote code base with a focus on simplicity, reliability, and speed - current code base has doubled speed of certain frequent operations, with a reduction of the code base size by ~75% while expanding the capabilities of the robot
- Designed and implemented architecture so any software-controlled instrument can be used during protocols (e.g. cameras, GPUs, thermocyclers)
- Designed and implemented cross-correlation tests on the OT-2 hardware, accurate to the µm range

ENGINEERING INTERN | Wildlife Computers | May 2019 – Aug 2019

Wildlife Computers is the leading provider of advanced wildlife telemetry solutions

- Wrote C++ to test PCBs that arrive from fabrication - autonomously verifies PCB component placmeent to increase production throughput
- Designed an isolator PCB to isolate digital lines from sensitive measurement devices, allowing low-noise and accurate voltage measurements

DATA SCIENCE CO-OP | Control Mobile | Jan 2018 – Apr 2018

Control Mobile aggregated and displayed transaction data for over 100 companies that used Stripe/Square/Paypal

- Wrote Python scripts to analyze and rank order over 300 individual SQL queries by their runtime to optimize the SQL database; reduced the runtime to fetch and display customer data by 65%
- Worked with the backend team to fix existing bugs, write new code, and refactor current code

PROJECTS

DEEP LEARNING

- Asynchronous Advantage Actor-Critic Model written in Pytorch, optimized for multicore CPUs via multiprocessing
- LSTM-based Deep Q-Network, trained on Denmark Technical University's High-Performance Computing Cluster
- Feed-forward neural net written with Numpy solves MNIST with 97.2% accuracy, vectorized for fast training

16-WEEK AUTONOMOUS ROBOT COMPETITION | Engineering Physics

- Deployed a real-time object detection algorithm on Raspberry Pi
- Created signal processing software to detect IR signals with sub-millisecond detection time
- Wrote C controls software and created circuits to control the mechanical subsystems

EDUCATION

UNIVERSITY OF BRITISH COLUMBIA | Expected May 2022

B.ASc Engineering Physics
Coursework includes Lagrangian Mechanics, Computational Modelling (currently with fluids), Digital Systems and Microcomputers, Signals and Systems, Applied Quantum Mechanics, Linear Algebra, Honours Multivariable and Vector Calculus, Complex Analysis, Optics, Statistical Mechanics

DENMARK TECHNICAL UNIVERSITY | Winter 2019

Exchange Semester
Coursework includes Operating Systems, Deep Learning, Robotics, Computationally Hard Problems.
Won DTU OS Course Competition for writing the fastest reverse hash server in C