

BEN MORCOS

full(er) stack developer

HARDWARE

EMBEDDED

SOFTWARE

AI/ML

SYSTEM DESIGN

CONTACT

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LANGUAGES

English, French

PROGRAMMING

Python, C/C++, Golang
OpenCL, CUDA
VHDL, Verilog, HLS
JavaScript, TypeScript
L^AT_EX, shell, Tcl, Make

TOOLS

Git, Github Actions
Jenkins, Harness
Docker, Kubernetes
AWS, Postgres
REST, GraphQL
Kafka, Hazelcast
Prometheus, Grafana
pytest, GTest
TensorFlow, TFMOT
NNI, Hyperopt
Vivado, Quartus
MATLAB, Simulink

OPEN IP

zynq-axi-dna
c5soc-ocl-id
pre-commit-hooks-cpp
discord-downloader

CONTRIBUTOR

nengo
nengo-fpga

HOBBIES

Climbing
Hiking & Canoeing
Woodworking
Music
Cooking
Foodbank of Waterloo

ABOUT ME

My academic and work experience has given me skills and knowledge at many levels of abstraction. I have worked on gate-level hardware, embedded software, distributed cloud backends, frontend clients, and everything in between! This breadth of experience led me to the label *full(er) stack developer* and it lends me perspective when designing systems or working in multidisciplinary teams. I am always looking for new challenges to hone my skills.

WORK EXPERIENCE

2022–Now **Arctic Wolf**

Waterloo, ON

Senior Developer - platform/asset-management

- Influence architecture and design across multiple teams in ground-up redesign of critical asset-management services.
- Coordinate high-level designs and implementation plans across teams and services to avoid blockers and ensure success.
- Implement fuzzy asset matching algorithm using sparse inputs and establish plan for long term training and continuous improvement.
- Ensure stability and maintenance of hyperscale services as part of the mission critical 24/7 data pipeline (billions of inputs/day).
- Steer creation and adoption of new fast, local end-to-end test and build infrastructure to streamline development.
- Champion code best practices to improve maintainability and readability (especially git!).
- Ensure code and practices comply with data security and privacy standards (e.g. GDPR).
- Personally improve endpoint performance by 2× within first few weeks of employment.
- Continue education through AWS courses and best practices.

2016–2022 **Applied Brain Research**

Waterloo, ON

Neuromorphic Software-Hardware Co-Developer

- Explore, optimize, and implement neural applications on various standard, embedded, and neuromorphic hardware platforms.
- Establish a common high-level interface, via GUIs and APIs, for deploying neural networks across various hardware platforms.
- Provide low-level libraries, interfaces, and protocols for modular embedded neural deployments.
- Bring to market edge AI web platform.
- Devise AI/ML solutions and benchmarking for dynamical tasks.
- Leverage model pruning and quantization techniques.
- Collaborate with leading scientists pushing the boundaries of computational neuroscience applications including autonomy, vision, speech, and more.
- Single handedly develop run-time flexible FPGA design to efficiently run dynamic neural networks with a user-friendly interface.
- Manage and mentor co-op and Mitacs students.

2014–2015 **Teledyne DALSA** *Mechanical Designer, Sustaining Engineer*

Waterloo, ON

2014 **Toyota Motor Manufacturing Canada** *QC Engineer - Lexus*

Cambridge, ON

2013 **Intellijoint Surgical** *Medical Device Designer*

Waterloo, ON

2012–2013 **IKO Industries** *Mech. Engineer, Electrical & Systems Engineer*

Madoc, ON

EDUCATION

2017–2019 **MASc** — Computer Hardware Engineering (research based)

The University of Waterloo

Developed a neuromorphic hardware accelerator on FPGAs with a focus on run-time flexibility and accessibility. The hardware is conveniently connected to Python via the Nengo development framework and is run-time configurable to support a wide range of neural networks with a static hardware design.

2011–2016 **BASc** — Mechatronics Engineering, with distinction

The University of Waterloo

The Mechatronics program covers a broad base of mechanical, electrical, computer, and system design engineering while my elective courses leaned towards philosophy, machine intelligence, and neuroscience. My capstone design project was a small-scale portable hydro-electric generator built from scratch.

PUBLICATIONS

Peter Blouw, Gurshaant Malik, **Benjamin Morcos**, Aaron R. Voelker, and Chris Eliasmith (2021). *Hardware Aware Training for Efficient Keyword Spotting on General Purpose and Specialized Hardware*

TinyML Research Symposium

Benjamin Morcos. NengoFPGA: an FPGA Backend for the Nengo Neural Simulator. MASc thesis. University of Waterloo, 2019. URL: <http://hdl.handle.net/10012/14923>.

Benjamin Morcos, Terrence C Stewart, Chris Eliasmith, and Nachiket Kapre (2018). *Implementing NEF Neural Networks on Embedded FPGAs*

International Conference on Field-Programmable Technology (FPT), Naha, Okinawa, Japan

PATENTS

Benjamin Morcos, Christopher Eliasmith, and Nachiket Kapre. “Digital circuits for evaluating neural engineering framework style neural networks”. U.S. pat. US11537856B2. Applied Brain Research Inc. Dec. 27, 2022. URL: <https://patents.google.com/patent/US11537856B2/en>.