Nicolas Carpenter

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EDUCATION

University of Alberta — Edmonton, AB
BSc in Computing Science, Minor in Mathematics — *Graduated: 2024*
- **Course Highlights:** Cellular Neuroscience, Clinical Neuroscience, Algorithms, Computer Vision, Database Management, Linear Optimization, Linear Algebra II, Machine Learning, Differential Equations, Reinforcement Learning, Statistics I

WORK EXPERIENCE

Fatigue Science — Vancouver, BC
Junior Software Engineer — *Sept 2021 - Aug 2022*
- Specialized in back-end development of a web application for management of large workforce scheduling and metric reporting from wearable devices. Currently used by organizations such as NASA and the US Air Force.
- Developed and deployed APIs using Ruby and PostgreSQL, notably leading the integration of Fitbit device syncing with our platform.
- Created Python scripts to automate the modification of sleep actigraphy data.

Blueberry — Toronto, ON
Junior Researcher — *Jul 2021 - Sept 2021*
- Processed functional near-infrared spectroscopy (fNIRS) data retrieved from a mobile headset using Python scripts.
- Analysed data to map stress and exertion levels to fluctuations in mental states.

APPLab – University of Alberta — Edmonton, AB
Undergraduate Research Assistant — *May 2019 - Sept 2019*
- Collaborated on the creation of a Python-based solution for synchronizing data from a portable Electroencephalography (EEG) system with physical button inputs.
- Facilitated the integration of Raspberry Pi devices for mobile EEG data collection during physical activities, such as biking.

PROJECTS AND LEADERSHIP EXPERIENCE

CMRxRecon — Edmonton, AB
Research Project — *May 2024 - present*
- Devised a Transformer-based model capable of general reconstruction of undersampled cardiac MRI across various contrasts, views, and acceleration trajectories.
- Utilized an unrolled optimization method to simultaneously learn from both the k-space and image domains.
- Embedded low-rank Hankel matrix representations of the image space into the network to draw attention to important areas.

FieldVision — Edmonton, AB
Computer Vision Capstone — *Feb 2024 - Apr 2024*
- Developed a real-time tennis player tracker using Python, integrating Meanshift tracking with an Adaptive Kalman Filter.
- Adapted parameter adjustments in the Kalman Filter based on detection confidence and occlusion conditions to improve accuracy in dynamic environments.
- Leveraged homography transforms to map player positions onto a top-down representation of the field.

Automated 3D Breast Ultrasound Segmentation — Edmonton, AB
Research Project — *Jun 2023 - Feb 2024*
- Created a nnUNet framework in PyTorch to automate tumor segmentation in 3D breast ultrasound volumes.
- Utilized bash scripts to parallelize the training process on Compute Canada's high-performance computing resources.

Artificial Intelligence in Medical Systems Society — Vancouver, AB
Treasurer / Event Operations Manager — *Dec 2019 - Feb 2021*
- Collaborated in the creation of the club's inaugural Artificial Intelligence in Medicine Symposium.
- Set up info sessions and workshops with professors and local medical companies throughout the year.

SKILLS

Topics	Languages	Libraries & Tools
Scientific Computing	Python, Ruby, MATLAB	PyTorch, Linux
Deep Learning	SQL, Bash, C/C++	Git, NumPy, Matplotlib
Back-end Development	RISC-V Assembly	Docker, OpenCV, Jira