

Nicolas Carpenter

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EDUCATION

- **University of Alberta** Edmonton, AB
BSc in Computing Science, Minor in Mathematics Graduated: 2024
 - **Course Highlights:** Clinical Neuroscience, Computer Algorithms, Computer Vision, Database Management, Linear Optimization, Linear Algebra II, Machine Learning, Ordinary 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, C/C++	PyTorch, OpenCV
Deep Learning	MATLAB, SQL, Bash	NumPy, Matplotlib, Linux
Back-end Development	RISC-V Assembly	Git, Docker, Jira, CI/CD