JAKE PENCHARZ

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Personal Statement

I am a deeply curious person who intends to make a positive and widespread change to the world. Based on innovators whom I admire, it seems that one of the most effective paths to reaching this goal is to be proficient in multiple disciplines. With this in mind I have tried to attain knowledge from an array of disciplines, focusing on Electrical Engineering, Computer Science, and Neuroscience.

Relevant Experience

05.2022 - present   **Masters Thesis Intern**, *Bayer AG, Machine Learning Research Group*

To help modernise Bayer's antibody design pipeline I am researching methods to predict the 3D structure of antibodies from their amino acid sequence. Specifically, I am investigating how structural understanding emerges through the unsupervised training of state of the art Protein Language Models. This requires an intimate knowledge of the relevant biology, and an ability to implement and train cutting edge deep learning based methods.

`Antibody Design` `python` `pytorch` `language models`

07.2021 - 03.2022   **Research Intern**, *Bayer AG, Machine Learning Research Group*
(6 months)

As a full-time research intern, I contributed to the development of open source Python tools for managing and visualising whole slide microscope images. To sort these images by lesion severity I trained a semantic segmentation model. Integrating the models predictions into the software stack effectively streamlined pathologist's workflows, speeding up the drug discovery pipeline.

`Digital Pathology` `python` `Flask` `pytorch`

03.2021 - 06.2021   **Computational Neuroscience Intern**, *Max Planck Institute for Brain Research*
(4 months)

Working in the Computation in Neural Circuits Group supervised by Shuai Shao and Julijana Gjorgjieva. I worked on modelling the relationship between dopaminergic neurons and Mushroom body output neurons in the Drosophila mushroom body. I built and compared linear models and a recurrent model of the circuit. The results were compared to recently published connectomics data.

`Computational Modelling` `pandas` `seaborn` `scikit-learn` `pytorch`

02.2021 - 04.2021   **Research Assistant**, *Technical University of Munich - Institute for Cognitive Systems*
(2 months)

Wrote tutorials for a course on Brain Computer Interfaces using EEG (g.tec Unicorn Hybrid Black). The tutorials included using the Unicorn C API to log data to the lab streaming layer (C++), filtering techniques, visualisation, and a primer on motor imagery. These tutorials were used as a crash course for students competing in the BR41N.IO Hackathon (where I competed with my team as well).

`EEG Analysis` `scipy` `mne` `numpy`

01.2020 - 09.2020   **Full Stack Engineer and Data Scientist**, *Isazi Consulting*
(9 months)

Isazi is a South African startup specialising in applied machine learning and optimisation. I was tasked with building a data curation pipeline to generate, tag, and manage new training datasets that would be used to tune their optical character recognition (OCR) system.

`Data Curation` `Flask` `Vue.js` `Docker` `PostgreSQL`

06.2018 01.2019 (1 month each)	**Software Engineering Intern**, *Isazi Consulting* In two separate internships I worked as a full stack software developer. I mainly worked in Python (building an API with Flask) and in Android Studio (Java) to create a data labelling mobile application.

App Development   Flask   SQL   Android Studio   Java

Relevant Skill Set

Programming Skills

Proficient in: `Python`

Flask, NumPy, PyTorch, Pandas

Comfortable with: `C++` `HTML` `CSS` `Javascript` `Matlab`

Language Skills

English	Native	*Capable of conveying complex concepts through writing or speech*
German	Basic (A1)	*Just getting started*

Education

10/2020 - present	**MSc Neuroengineering**, *Technical University of Munich* The program is interdisciplinary and combines experimental and theoretical neuroscience with profound training in engineering. I have focused my electives around building a strong mathematical grounding and exploring deep learning with some focus on computer vision.

Research   Neuroscience   Data Analysis   Deep Learning

2017–2019	**BSc in Electrical and Computer Engineering (w. distinction)**, *University of Cape Town* Strong focus on signal processing, control engineering and embedded system design. My thesis project involved developing a machine learning approach to translate English to South African Sign Language.

Signal Processing   Embedded Systems   Control Engineering   Computer Science

2014–2016	**BEngSc in Biomedical Engineering (w. distinction)**, *University of the Witwatersrand* Balanced content between Electrical Engineering, human anatomy and physiology. ○ Selected for Deans List in 2015, 2016 (top 10% of students, with a minimum of 75% aggregate) ○ Awarded the 'Undergraduate University Council Merit Scholarship' in 2015 and 2016 ○ Awarded the 'University Entrance Scholarship' in 2014

Human Anatomy   Biomedical Devices   Analogue Circuits

2001–2012	**IEB High School Certificate**, *King David Victory Park*, Johannesburg ○ Top 1% countrywide for English, Mathematics, Visual Arts and top 5%in at least five subjects

Other Interests

Effective Altruism	To aid my pursuit of doing the most good possible, I have attended seminars and conferences, read books, and spoken to many fascinating people in the EA community. I am particularly focused on building a strong network with EAs involved in biosecurity.
Youth Movement	**(2008-2017)** Active member of Habonim Dror Youth Movement from 2008-2012, and a counsellor from 2012-2017.
Sports	Running (Two Oceans Half Marathon 2017, 2018) and rock climbing.

References

Ruben Portugues	✉ Professor at the TUM school of medicine - mentored me throughout my masters program
Floriane Montanari	✉ Research Scientist and head of XAI at Bayer AG