# Daniel Fritsch

412-230-7387 | djf122@pitt.edu | Pittsburgh PA

## SUMMARY

Computer Science Student and Researcher with experience applying machine-learning and data analysis to problems in biology and human-computer interaction. Project experience in front-end and back-end development for managing data-driven student learning applications. Skilled in building evaluation pipelines, analyzing language and biological data, and implementing applied ML models. Seeking an internship to bridge research and industry applications building innovative software.

## EXPERIENCE

Student Researcher, Department of Biological Sciences, University of Pittsburgh, May 2025 - current
Pittsburgh, PA

- Applied biological deep learning models (e.g., Borzoi, AlphaGenome) to predict cell- and tissue-specific RNA-seq coverage from DNA sequences.
- Designed and implemented a gene-level grading framework to quantify prediction accuracy. Adapted and validated prediction models for multiple non-human organisms to examine potential of cross-species generalizability.
- Performed comparative analyses to identify patterns in model performance across species and tissue types.

Student Researcher, Learning Research and Development Center, University of Pittsburgh, January 2024 - current
Pittsburgh, PA

- Helped design and build a programming interface for middle school students, allowing users to construct code segments with a block-based architecture and receive feedback through a chatbot interface.
- Developed a dialogue measurement system to track lexical alignment, capturing patterns in word choice and repetition across student-student-agent interactions to analyze rapport and speaker engagement.
- Leveraged semantic vector representations derived from LLM's to capture conceptual similarity between dialogue turns, integrating these representations with theories of knowledge construction and transactivity to model latent conversational states in the collaborative knowledge building process.
- Designed and implemented a gestural alignment framework enabling a robotic agent to observe and replicate human gestures from video recordings, linking gesture representations with meaningful domain words or semantic constructs to support student learning.

Research Assistant in Chemistry Lab, University of Pittsburgh, October 2022 - May 2023
Pittsburgh, PA

- Designed and conducted experiments to test the influence of magnetic fields on enantioselectivity through the crystallization process in a variety of amino acids. Used Circular Dichroism spectroscopy to study the structure of resulting crystals.
- Formulated research papers and presented results at the Pittsburgh Regional Science & Engineering Fair

## EDUCATION AND TRAINING

Bachelor of Science
Computer Science, University of Pittsburgh, Pittsburgh, Expected in June 2027

- 3.52 GPA

High School Diploma
Taylor Allderdice High School, Pittsburgh, June 2023

- 4.82 Weighted GPA

## PUBLICATIONS

Sharma, P., Fritsch, D., Asano, Y., King-Shepard, Q., Langley, T., Maidment, T., ... & Walker, E. (2025, July). Beyond Static Measures: Temporal Analysis of Lexical Alignment in Human-Human Learning With a Teachable Robot. In *International Conference on Artificial Intelligence in Education* (pp. 277-291). Cham: Springer Nature Switzerland.

Asano, Y., Litman, D., Sharma, P., Fritsch, D., King-Shepard, Q., Nokes-Malach, T., ... & Walker, E. (2025, July). Multi-party Lexical Alignment in Collaborative Learning with a Teachable Robot. In *International Conference on Artificial Intelligence in Education* (pp. 123-131). Cham: Springer Nature Switzerland.

## PROJECTS

- Low German Translation System: Developed a translation system addressing the lack of accessible tools for Low German by constructing a comprehensive lexical database through large-scale web scraping and utilizing this data base in combination with LLM-based contextualization to generate semantically informed translations into German or English.
- Variable Star Detection: Scanned large astronomical surveys utilizing Astroquery to retrieve multi-spectral data and applying deep learning models to classify objects based on photometric variability and structural features. Developed pipelines for future applications in star and galaxy classification.

## SKILLS

**Programming Languages:**
Python, Java, C, C++, JavaScript, TypeScript, SQL, R, Assembly, Bash

**Machine Learning & Data Science Tools:**
PyTorch, TensorFlow, Scikit-learn, Pandas, NumPy, Matplotlib, Seaborn, Hugging Face Transformers, LM Studio, Keras, OpenAI API, Azure Machine Learning, Docker, Git/GitHub

**Web & Application Development:**
HTML, CSS, React, Node.js, Express.js, Flask, Next.js