Zilin Dai

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EDUCATION

Worcester Polytechnic Institute (WPI), Worcester, MA

- Undergraduate **Computer Science** major, GPA: 3.95 August 2021 – May 2025*

Related Courses at WPI:

- Machine Learning, Artificial Intelligence, Digital Image Processing, Algorithms, Operating Systems, Data Science II: Modeling and Data Analysis, Human-Computer Interaction, AI for Robotics, Object-Oriented Programming

SKILLS

Programming & tools: Python, Java, C, C++, Assembly, PyTorch, TensorFlow, Scikit-learn, Git, Linux, SQL, R, MATLAB, SolidWorks, Blender, html, CSS, G-code

Mathematical Knowledge: Calculus, Differential Equation, Matrices and Linear Algebra, Statistics, Probability

EXPERIENCE

Research Assistant under Professor Ziming Zhang, *WPI, MA* December 2023 – Present

- Optimizing the recurrent neural network architecture through integration with diffusion model.

Research Student under Dr. Feng Tian, *Harvard University @ BIDMC* September 2023 – Present

- Examining the underlying relationship between gene ontology and ALS through the evaluation of motor neuron vulnerability using set topological graphical CNN and matrix factorization.
- Visualizing single cell sequencing bioinformatics data using Seurat packet in RStudio.
- Reimplemented stereotaxic apparatus through custom designed 3D printed components with SolidWorks.

Research Assistant under Professor Markus P. Nemitz, *WPI, MA* April 2023 – December 2023

- Design of a closed-loop FDM printing system optimized for real-time detection and remediation of permeability-related defects and formulation of a software architecture capable of executing layer-wise defect detection and correction through whole-layer ironing techniques.
- **Publication: Zilin Dai***, Yijia Wu*, Haotian Liu, Lehong Wang. 2024. **Vision-based FDM printing for fabricating airtight soft actuators**. International Conference on Soft Robotics. (under review for publication)

R&D Co-Op, *Olympus Corporation of the Americas, Westborough, MA* January 2023 – July 2023

- Developing and incorporating machine learning models to differentiate between human tissue, endoscope, and stones with laser spectral data, enabling smart features for the medical device; currently achieving nearly 100% sensitivity and specificity on all testing data under different data collection conditions.
- Implemented data logger processor program with tkinter and seaborn to filter and visualize data from thermocouples.

Research Assistant under Professor Jacob Richard Whitehill, *WPI, MA* May 2022 – January 2023

- Developed a classroom emotions analytics system using Speech Emotion Recognition, Google Cloud NLP APIs, and face emotions detection on OpenCV.
- Utilized Pandas and NumPy to achieve an AUC score of *83.3%* with semi-automatic system on *~1000GB datasets*.
- Proposed and implemented an automatic and semi-automatic negativity filter technique that can help teachers and learning science researchers find critical moments within classrooms, which is essential to improve teaching quality.
- **Publication: Zilin Dai**, Andrew McReynolds, Jacob Richard Whitehill. 2023. **In Search of Negative Moments: Multi-Modal Analysis of Teacher Negativity in Classroom Observation Videos.** International Conference on Educational Data Mining 2023, founded by National Science Foundation.

Intern under Professor Chris Bailey-Kellogg, *Dartmouth College, NH* August 2019 – May 2020

- Gathered and processed Episcore, potential, mutation, and sequence design data with Python.
- Developed a program using Plotly to visualize the frequency of point mutation data over sub-selected protein sequences.

PROJECTS

Speaker Recognition System July 2023 – Aug 2023

- Implemented and modified SpeechBrain into a real-time speech activity and speaker recognition system based on PyTorch with user interface to process identification every second based on existing voice samples; system achieved *86.7%* accuracy.
- Enabled a client-server data transfer pipeline to accelerate the speech processing speed from ~1.5 seconds to ~0.14 second.

Age Estimation Tool April 2023

- Developed a 3-layer neural network with data augmentation, SGD, forward/backward propagation, and SoftMax regression to estimate people's age in a dataset of images; achieved a testing halfMSE loss of ~80.

Pizza Delivery Robot January 2022 – March 2022

- Designed and controlled an autonomous and teleoperated VEX robot in corporation that can deliver wood blocks to specified locations on racks with a 4-part system design.

COMMUNITY ASSOCIATIONS

Secretary, Association for Computing Machinery, WPI	January 2022 – January 2023
Organizer, GoatHacks@WPI	January 2022 – January 2023
Member, Cybersecurity Club, WPI	August 2021 – May 2022

AWARDS/HONORS

WPI Dean's List	2021 Fall, 2022 Spring, 2022 Fall
MIT Math Prize for Girls Award	October 2021
American Mathematic Competition: National top 5%, Score: 102	January 2021