

Hudson Liu

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EDUCATION

Gilman School

High School Diploma

Baltimore, MD

Aug. 2021 – Jun. 2025

Johns Hopkins University

Visiting Student, Future Scholars

Baltimore, MD

Aug. 2024 – Jun. 2025

Commuity College of Baltimore County

Associate's in Computer Science

Baltimore, MD

Aug. 2020 – Jun. 2025

EXPERIENCE

Intern, Solo Developer of MISST Project — Sleep Staging w/ ResNets

June 2024 – Aug. 2024

Johns Hopkins University School of Medicine

Oct. 2022 – June 2023

- Created MISST; a Python library using 2D Bottleneck CNNs for sleep staging of mouse polysomnograms.
- Developed MISST's End-to-End MLOps Pipeline (NumPy Preprocessor + TensorBoard + MLflow).
- Built custom cross-platform GUI frontend w/ Tkinter for MISST.
- Published MISST as a full Python library on PyPI.
- Presented as First Author at 7th Annual Johns Hopkins Sleep & Circadian Research Day Symposium, June 12th, 2023
- Project GitHub Repo: github.com/Johns-Hopkins-CISRE/MISST

ASPIRE Intern — Image Synthesis of Microstructures w/ DDPMs

June 2023 – Present

JHU Applied Physics Laboratory

- Created data pipeline for simulating grain evolution from pairs of processing parameter via JAX-AM's PFM module. Used Python & Bash scripts.
- Used aforementioned data pipeline for investigating processing-parameter-to-microstructure connections for Inconel-718 undergoing LPBF-AM solidification processes.
- Developed a DDPM-based model (Diff-PFM: Diffusion Probabilistic Field Model) employing the data pipeline, alongside MICRESS and ThermoCalc.
- Trained Diff-PFM on high-performance computing (HPC) cluster using distributed training on 6 H100 GPUs.
- Published paper on Diff-PFM as second author in Journal of "Metallography, Microstructure & Analysis", DOI: doi.org/10.1007/s13632-024-01130-w.
- Presented twice as sole author at ASPIRE Student Showcase.
- Diff-PFM was presented @ APL AI Symposium & Integrated Computational Materials and Engineering (ICME) for Defense conference.
- APL News published an article highlighting Diff-PFM: [\[LINK\]](#).

Member of Team 11695 (DeJava) — Robot Design & Coding

Sep. 2022 – May 2023

FIRST Tech Challenge

Sep. 2021 – May 2022

- Awards, 2022 Season:
 - * CHS-MD Laurel Qualifier: Connect Award (1st Place), Motivate Award (2nd Place).
 - * CHS-MD Laurel Qualifier: Winning Alliance (1st Team Selected).
 - * CHS-VA Mechanicsville Qualifier 2: Design Award (1st Place).
- Awards, 2021 Season:
 - * MD Middle River Qualifier 1: Control Award (1st Place).
 - * MD Laurel Qualifier 3: Connect Award (1st Place), Inspire Award (2nd Place), Think Award (2nd Place).
 - * VA FIRST Chesapeake Regional Championship: Innovate Award (1st Place).
- Individual Contributions:
 - * Solo designer of robot's 3-axis lift mechanism, fully modeled in Fusion 360. Incorporated turntable mechanism with 3 drawer slides rigged in a cascading fashion.
 - * Developed ensemble CNN model with Keras for object detection of game objects from robot's vision sensor.
 - * Worked on sensor fusion system for aggregating neural network predictions with data from ultrasonic sensors and odometers.
 - * Programmed the mechanism chassis' holonomic drive code & autonomous portion of robot movement.

- * Volunteered to teach low-income inner city elementary students about principles of mechanical engineering via the Gilman Bridges program.
- * Demoed robot to Gilman Middle School students, as part of a collaborative outreach initiative. Helped guide multiple teams in the FIRST Lego League competition.

Team Member — Programmer

Mar. 2023 – Oct. 2023

NASA/JAXA 3rd & 4th Kibo Robot Programming Challenge (Kibo-RPC)

Mar. 2022 – Oct. 2022

- 4th Kibo-RPC (Team Salcedo)
 - * Placed 1st in NASA's National Competition, Represented USA on International Level.
 - * International final round was hosted live on the International Space Station.
 - * Footage of the final round on ISS can be found here: [\[LINK\]](#).
- 3rd Kibo-RPC (Team MonkEEEEEE)
 - * Placed 3rd in NASA's National Competition.
- Individual Contributions:
 - * Developed a 3D A* & Dijkstra path optimization algorithm.
 - * Used ArUco tags and mapped landmark detection for determining robot orientation with OpenCV.
 - * Created 3D CAD model of robot's field on the ISS for game strategy testing.

NASA App Development Challenge 2022

Oct. 2022 – Dec. 2022

Member of Team Solstice

- Trained neural network on predicting rover paths on lunar terrain.
 - * Outperformed A* & other pathfinding algorithms.
 - * Allowed real-time generation of optimal paths.
- Partnered with Bridges program to teach inner city kids about basics of designing simulation softwares.

Team Member — ML Developer

Feb. 2022 – Apr. 2022

Kaggle Happywhale Competition

- Used OpenCV for detecting contours of whale fins.
- Developed a contrastive loss CNN for contour classification.
- Created a novel K-Medoids algorithm that utilized iterative outlier removal for unbiased clustering of image vectors.

Volunteer

Feb. 2022 – Apr. 2022

CME Classification for NASA Heliophysics Division

- Identified and labeled coronal mass ejections for ML models.
 - * Dataset was part of the larger helioanalytics effort at NASA.

Intern

June 2022 – Aug. 2022

I&I Tech Internship at Gilman School

- Configured device management system (Jamf Pro).
- Worked with CTY program to provide IT support.

PROJECTS

RCM Layer | *Python, TensorFlow, Keras, Matplotlib, Sphinx*

Feb. 2023 – Apr. 2023

- Created a novel architecture, RCM (Recurrent Complete Multidigraph), outperforming dense layers
- Developed a Keras implementation of RCMs as a layer
- Wrote script for generating 10-Gigapixel diagram of trained RCM for MNIST
- Designed a 3D Model of RCM for K6 in Fusion 360
- Auto-generating documentation via ReadTheDocs Sphinx, hosted on GitHub Pages

++C Esolang (PostC) | *C++*

Jul. 2022 – Aug. 2022

- Created a new esolang, ++C: a postfix-based esolang based on C++ syntax
- Wrote ++C article on Esolang wiki, [\[LINK\]](#)

Fleat | *Python, Sphinx*

July 2022 – Aug. 2022

- Created a Python library, Fleat (Fast LEarning rate Tuner)
- Employed a 2D CNN for predicting ideal learning rates from images of NN architectures
- Auto-generating documentation via ReadTheDocs Sphinx, hosted on GitHub Pages

ACTIVITIES/EXTRACURRICULARS

JV Cross Country/JV Indoor Track/JV Outdoor Track, Gilman School	Nov. 2021 – Nov. 2022
2nd Chair Alto Saxophone, Peabody Wind Orchestra	Aug. 2021 – June 2022
Co-Founder & Co-President of AI Club, Gilman School	Aug. 2022 – May 2023
Phi Theta Kappa Honors Society, CCBC	Oct. 2024 – Present

TECHNICAL SKILLS

Languages: Python, Java, C/C++, HTML/CSS, Lua
Developer Tools: Git, Anaconda, Docker, Neovim, Arch Linux
Libraries: Keras, PyTorch, TensorFlow, Pandas, NumPy, Matplotlib, DearPyGUI