Varenya Jain

646-306-1672 | varenya3@illinois.edu | Linkedin | Github | Website

Education

University of Illinois Urbana-Champaign — Champaign, IL
Bachelor of Science in Integrative Biology, Minor in Computational Science and Engineering — *December 2024*

Experience

Student Researcher — Jan 2024 - December 2024
Illinois Natural History Survey - Tan Lab of Biodiversity Genomics — *Urbana, IL*

- Engaged in a phylogenomic study focusing on homology and ultraconserved elements within zebrafish genomes, enhancing understanding of evolutionary relationships.
- Managed and optimized bioinformatics workflows for high-throughput sequencing data analysis, involving quality control with FastQC, data trimming with BBDuk, and sequence assembly using SPAdes, Phyluce, Scipio, and MEGAHIT to enhance phylogenomic reconstruction accuracy using the CAPTUS toolkit.
- Contributed to developing and refining a streamlined protocol for phylogenomic data assembly, extraction, and analysis, while actively engaging in lab meetings to address technical challenges and strategize research methodologies.

Student Researcher — Aug 2023 - Dec 2023
Illinois Natural History Survey - Tan Lab of Biodiversity Genomics — *Urbana, IL*

- Conducted comprehensive research on morphological diversity in Sisoridae and Amphilidae catfish adaptation to fast water environments.
- Utilized Geometric Morphometrics in R Studio for precise quantification of body shape differences. Applied PCA and GPA statistical methods to explore correlations and variations.
- Presented comprehensive results, highlighting significant differences in shape disparity in relation to adhesive organ presence. Provided insights into the evolutionary constraints on body shape in fastwater-adapted catfishes.

Student Researcher | **Metabolomics & Proteomics Core Facilities** — June 2023 – Aug. 2023
Roy J. Carver Biotechnology Center — *Urbana, IL*

- Developed an untargeted metabolomics pipeline for post-processing, Quality Assurance/Quality Control, and data analysis.
- Provide support for data processing on LC-MS Untargeted Metabolite Profiling.
- Refine untargeted analyses to support various biomedical studies at the Carver Metabolomics Core.

SLC Conference Planning Committee | **IEEE** — Jan 2022 - Jan 2023
The Institute of Electrical and Electronics Engineers — *Chicago, Illinois, United States*

- Assisted in organizing and managing conference logistics, scheduling, and coordinating with stakeholders.
- Worked with Midwest Region 4 Committee members to develop and implement strategies for a successful conference.
- Proactively identified and addressed potential challenges during the planning process.

SPIN Research Intern | **The NEAT Project v4.0** — Aug. 2021 – Sep. 2022
National Center for Supercomputing Applications — *Champaign, IL*

- Designed NGS toolkit for HAL Cluster, increasing Parallel Processing speed by 7%, and streamlined Empirical Mutation and Sequencing Models. Revised bash scripts and input flags.
- Managed genomic pipeline (FASTA, FASTQ, SAM, BAM, VCF) and implemented relevant Bioinformatics algorithms: Smith–Waterman, BLAST, Localized String Alignment.
- Presented HPC for Computational Genomics findings at the NCSA Exhibition during UIUC's Engineering Open House and the REU FoDOMMaT/SPIN Showcases.

Outreach Committee Lead | **Pulse 2022** — Aug 2021 - Aug 2022
Department of Electrical and Computer Engineering — *Champaign, Illinois, United States*

- Coordinated materials and event location logistics with the ECE department during COVID-19.
- Develop Software to exhibit Computer Engineering principles: C++ Data Structures, Polymorphism, Command-Line Interface, Stack/Heap Memory Management, Address Space, etc.
- Design Hardware activities to guide freshmen through simulated Electrical Engineering projects: series vs parallel circuits, Pulse Width Modulation motor control, Thermistor and LDR implementation

Phys 211 Experienced Learning Assistant — Jan 2021 - Dec 2021
Loomis Laboratory Of Physics — *Urbana-Champaign Area*

- Continued the study of Physics pedagogy by instructing PHYS 211 labs, providing guidance to 30+ students.
- Answered student questions, clarified critical lecture material, and built/corrected IOLab setups.
- Developed advanced teaching, communication, and leadership skills through interactions with students and seminar presentations alongside lab staff.

IOT Research Lab Assistant | **Caesar Lab** Jan. 2021 – Jun. 2021
Coordinated Science Laboratory *Urbana, IL*

- Remodeled a Reinforcement Learning System intended for UAV-Assisted Emergency Response.
- Upgraded the fully-distributed communication environment for USAF usage.
- Implemented communication trees via Python Message Passing Interface (MPI) standard in under 6 months.

Research Intern | **Drs. Spitalnik, Hod, La Carpia** June 2018 - Aug 2018
Columbia University Medical Center - Lab of Transfusion Biology *New York, NY*

- Investigated the effects of transfusional iron overload on gut microbiota due to intravenous infusion.
- Conducted initial studies with a mouse model to retrieve data on iron-deficient erythropoiesis in blood donors and red blood cell recovery after transfusion of hematopoietic red blood transplant.
- Utilized basic Spearman Correlation meta-analysis of bacteria communities, performed blood analysis tests, and used Flow Cytometry to collect sample cell data.

Projects and Involvement

AM Radio | *ECE 210* Jan. 2022 – May 2022

- Construct a functioning AM Radio using a Superheterodyne Receiver; Convert digital .wav audio input to analog 3.5mm speaker output
- Utilize Fourier Transforms to convert Time domain signals to Frequency domain responses

Virtual Gloves | ***ECE 120 Honors*** Jan. 2021 – May 2021

- Develop a "virtual keyboard" by moving fingers attached to flex sensors and provide haptic feedback
- Collect data from flex resistors in Arduino Studio and use C++ to send output confirmations to LEDs

Membership: IEEE@UIUC, iRobotics, MRDC, Vex Robotics, ACM, SIGPWNY

Leadership

Conferences

- NCSA Letter of Outstanding Student Leadership Recognition (2023-2024)
- NCSA 2nd Annual Student Research Conference - Planning Committee, Panel Moderator, and Industry Chair (2024)
- ACMG Annual Clinical Genetics Meeting (Metro Toronto Convention Center) - Attendee, 2024
- ISPD 28th International Conference on Prenatal Diagnosis and Therapy (Westin Copley Place, Boston) - Attendee, 2024
- NCSA Student Research Conference - Planning Committee and Panel Moderator (2023)
- IEEE Nexus Region 4 Student Leadership Conference - Conference Planning Lead (2022-2023)

Presentations

- University of Illinois - Undergraduate Research Symposium (2024)
- National Center for Supercomputing Applications - SPIN Lightning Talks (2021-2022
- National Center for Supercomputing Applications - Engineering Open House (2021)

Teaching

- ECE PULSE - Outreach Committee Lead (2022)
- Loomis Laboratory Of Physics - "Expert Learning Assistant" for Mechanics (2021)

Volunteering

- UIUC ACM SIGPWNY - Contributed to solving cybersecurity "Capture the Flag" competitions and developed badge software for FallCTF
- De Dilse Charitable Inc. - Co-Founder and Lead Volunteer (2019-2022)
- Kaplen Jewish Community Center on the Palisades - Senior Science Counselor (2019)
- American Wheat Mission - Volunteer (2018)

Technical Skills

Lab Equipment: Flow Cytometer, Clinical Benchtop Centrifuge, ThermoFisher Q-Exactive Mass Spectrometer
Bioinformatics: BLAST+, Smith-Waterman, Biopython, Chromosome Analysis Suite (ChAS), Rstudio, OMIM, UCSC Genome Broswer, Ensembl, Illumina Connected Analytics, BaseSpace SequenceHub (DRAGEN)
Analytics Tools: Google Cloud (SDK, Analytics, BigQuery), HPC Clusters (Delta, Blue Waters)
Developer Tools: Git, GitHub, GitLab, Docker, VirtualBox, Kernel-based Virtual Machines (KVMs), Digital Ocean Droplets
Programming Experience: Bash, C/C++, CUDA, Python MPI, R
Hardware and Electronics: Breadboards, Raspberry Pi (Zero/3b/4), Arduino UNO, Intel MAX 10 FPGA
Electrical Engineering Fundamentals: Oscilloscope, Network Analyzer, RLC circuits, Operational Amplifiers, Band-Pass Filters, Quartus Prime utility, ModelSim utility, SystemVerilog