

Varenja Jain

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EDUCATION

University of Illinois Urbana-Champaign

2020-2024

Bachelor of Science in Integrative Biology, Minor in Computational Science and Engineering

Urbana, IL

- Dean's List (Spring 2024)

EXPERIENCE

Research Assistant | [Robinson Lab](#)

Feb. 2025 - Present

Rahel Hirsch Center for Translational Medicine, Berlin Institute of Health Charité

Berlin, Germany

- Develop a federated genotype-phenotype database for the Fetal Sequencing Consortium to study Rare Mendelian diseases across Columbia University, The Broad Institute, and the University of New South Wales
- Train large language models on Charité servers to construct machine-readable, ontology-aware phenotype representations
- Write software to transform raw prenatal sonography data into standardized GA4GH Phenopackets

Contract Bioinformatician

Dec. 2022 - Present

Advanced Genomics Institute and Laboratory Medicine

Paramus, NJ

- Optimize Illumina ICA and BaseSpace workflows, adding SFTP integration to streamline WGS/WES analyses
- Perform targeted enrichment, structural variant detection, and CNV calling to improve clinical interpretation of germline samples
- Utilize Franklin by Genoox database to prioritize causal variants for clinical reporting

Student Researcher

Aug. 2023 - Dec. 2024

Illinois Natural History Survey - Tan Lab of Biodiversity Genomics

Urbana, IL

- **Morphological Diversity Project (2023):**
 - * Researched adaptation in Sisoridae and Amphiliidae catfishes within fast-water environments.
 - * Presented findings showing significant shape disparity linked to adhesive organ presence, providing insights into evolutionary constraints on morphology.
- **Phylogenomics Project (2024):**
 - * Investigated ultraconserved elements (UCEs) in zebrafish genomes using low-coverage whole-genome sequencing (lc-WGS) to study evolutionary relationships.
 - * Built and optimized phylogenomic assembly workflows using QC utilities, De Novo Assembly, and the CAPTUS toolkit.

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.
- Supported for data processing on LC-MS Untargeted Metabolite Profiling.

SLC Conference Planning Committee | [IEEE](#)

Jan 2022 - Jan 2023

The Institute of Electrical and Electronics Engineers

Chicago, IL

- Managed conference logistics, scheduling, and coordinating with stakeholders.
- Worked with Midwest Region 4 Committee members to develop and implement strategies for a successful conference.

SPIN Research Intern | [The NEAT Project v4.0](#)

Aug. 2021 – Sep. 2022

National Center for Supercomputing Applications

Urbana, IL

- Developed an NGS toolkit on the HAL cluster, improving parallel processing performance by 7%.
- Implemented alignment algorithms (Smith-Waterman, BLAST, localized string alignment) to enhance mutation and sequencing model pipelines.
- Presented research at the NCSA Exhibition, Engineering Open House, and FoDOMMaT/SPIN Showcase.

Outreach Committee Lead | [Pulse 2022](#)

Aug 2021 - Aug 2022

Department of Electrical and Computer Engineering

Urbana, IL

- 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, IL*

- 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**Phenopacket Processor | Personal**

July. 2025 – Aug. 2025

- Construct extensible CLI for working with clinical data and the Human Phenotype Ontology
- Convert existing digital phenotypic records into GA4GH Phenopackets
- Enable genotype-phenotype database curation by partners at the University of New South Wales

BadgeDev | SIGPWNY

Aug. 2024 – Dec 2024

- Aid in software development for FallCTF participant, sponsor, and staff badges
- Assemble and perform QC on Pico soldering and test firmware before distribution
- Fix and replace badge firmware/hardware during event

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

LoopKit | Personal

July. 2020 – Sep. 2021

- Adapt the LoopKit source code to customize a program for personal monitoring functionalities
- Modify Swift code to circumvent authentication requisites for bolus delivery within the Loop system
- Implement precision adjustments to default carb absorption parameters, optimizing glycemic control dynamics

LEADERSHIP AND INVOLVEMENTS

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), 2024
- ISPD 28th International Conference on Prenatal Diagnosis and Therapy (Westin Copley Place, Boston), 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)

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

TECHNICAL SKILLS

Wet Lab Experience: Flow Cytometry, PCR, RT-qPCR, Western blotting, recombinant DNA techniques, cell culture (bacterial and mammalian), microscopy (fluorescence, confocal), ELISA, protein purification, CRISPR/Cas9 gene editing, histology, and immunohistochemistry.

Bioinformatics / Computational Biology: BLAST+, Smith-Waterman algorithm, RStudio, Biopython, Chromosome Analysis Suite (ChAS), OMIM, UCSC Genome Browser, Ensembl, Illumina Connected Analytics, BaseSpace SequenceHub (DRAGEN), GATK, PLINK, VCFtools, and STAR aligner. Familiar with RNA-seq and single-cell RNA-seq data analysis, differential expression and pathway enrichment analysis, and genome assembly and annotation.

Biostatistics / Data Analysis: Experience with R (statistical modeling, ANOVA, regression, PCA, clustering, and Generalized Procrustes Analysis [GPA]) and Python (NumPy, pandas, seaborn, scikit-learn, TensorFlow). Familiarity with experimental design and power analysis, and applied statistical interpretation of biological data.

Developer Tools: Git, GitHub, GitLab, Docker, VirtualBox, Kernel-based Virtual Machines (KVMs), Digital Ocean Droplets, VSCode, IntelliJ

Programming / Computational Skills: Exposure to C/C++, CUDA, Python (including Biopython and data analysis libraries), R, and MATLAB. Experience with data wrangling and visualization (pandas, ggplot2) and applying machine learning methods to biological datasets (scikit-learn, TensorFlow). Proficient with developer tools such as Git, GitHub, GitLab, Docker, VirtualBox, KVMs, VSCode, and IntelliJ.

Systems / Hardware and Electronics: Experience with breadboards, Raspberry Pi (Zero/3b/4), Arduino UNO, and Intel MAX 10 FPGA. Familiarity with oscilloscopes, network analyzers, RLC circuits, operational amplifiers, band-pass filters, Quartus Prime utility, ModelSim utility, and SystemVerilog.

General Research / Professional Skills: Scientific writing and data presentation; familiarity with reproducible research practices; knowledge of FAIR data principles; collaboration in interdisciplinary teams; literature review and hypothesis generation; AGILE development and project management.

GNU/Linux: Debian, Fedora, CentOS, AlmaLinux, Arch Linux, Ubuntu Server, EndeavorOS