Rohan Butani

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Education

- **Johns Hopkins University**, Baltimore, MD — Anticipated May 2028
  B.S. in Computer Science and Chemical & Biomolecular Engineering
- **The Overlake School**, Redmond, WA — Aug 2021 – Jun 2025
  4.00 GPA • 1580 SAT
- **Lake Washington Institute of Technology**, Kirkland, WA — Sep 2024 – Mar 2025
  4.00 GPA, President's List (Fall 2024, Winter 2025)
  Completed Calculus III: Multivariate and Matrix Algebra with Applications

Research Experience

Johns Hopkins University School of Medicine – Division of Infectious Diseases — Baltimore, MD
Research Assistant, Advised by Prof. Tornheim — Sep 2025 – Present

- Process clinical MDR-/XDR-tuberculosis databases in R and Python, restructuring relational data into wide- and long-format tables for analysis.
- Compute mutual information and other dependency metrics for feature extraction across patient and pathogen-level covariates.
- Develop machine learning pipelines for hazard function estimation of tuberculosis risk using scikit-learn, lifelines, and R's `survival` package.

Johns Hopkins University – Institute for Computational Medicine — Baltimore, MD
Research Assistant, Advised by Prof. Bader — Sep 2025 – Present

- Analyze HEK cell protein–protein interaction (PPI) networks using Python and R, mapping HGNC symbols and expanding cross-reactive antibodies into distinct interactions.
- Process interaction archives containing AlphaFold batch inputs and generate multi-chain protein complex predictions using the AlphaFold web portal.
- Integrate predicted protein structures into downstream network analyses for cross-validation of experimental PPI evidence.

The Wharton School AI and Analytics Initiative — Remote
Student Researcher, Lead and Corresponding Author — Jun 2025 – Present

- Scraped and cleaned NFL performance, demographic, and health data using Python (Selenium, Pandas) to construct a unified player-season dataset.
- Engineered features capturing demographic, travel, workload, and surface-exposure variables, enabling season-ahead injury risk modeling.
- Trained and evaluated machine learning models (scikit-learn, XGBoost, TabNet, TensorFlow) to predict injured reserve placement, reporting balanced accuracy and preparing feature importance analysis.
- Manuscript accepted for paper presentation at the 2025 IEEE MIT Undergraduate Research and Technology Conference, advised by Prof. Bradlow.

University of California, San Diego – Knight Lab — Remote
Research Assistant — Jun 2025 – Present

- Collected and standardized microbiome study metadata across diverse repositories, ensuring completeness of genomic-sequence availability records using Python.
- Generated reproducibility metrics for published microbiome studies, supporting the lab's reproducibility initiatives.

- Manuscript under preparation; anticipated co-authorship on publications under Dr. Degregori.

Independent Natural Language Processing Research Remote
Co-Author and Corresponding Author May 2025 – Present

- Designed experiments probing the decision-making behavior of modern large language models under partial-input ablations for multiple-choice reading comprehension benchmarks.
- Identified artifacts and spurious cues exploited by modern LLMs, contributing to discussions of dataset bias and evaluation reliability.
- Manuscript accepted for presentation at NeurIPS 2025 Workshop on Efficient Reasoning (ER), NeurIPS 2025 Workshop on Evaluating the Evolving LLM Lifecycle (LLM-Eval).
- Under preparation for formal conference submission.

Seattle University – Human Performance Lab Seattle, WA
Research Assistant Feb 2025 – May 2025

- Designed and executed data collection protocols for a biomechanics study of taekwondo athletes under Dr. Watkins.
- Assisted with motion and physiological measurement setup, ensuring accurate and consistent experimental conditions.
- Contributed to lab discussions on experimental design refinements and data integrity.

Georgia Institute of Technology – School of Mathematics Remote
Student Researcher, Lead and Corresponding Author May 2024 – Jun 2025

- Led development of nine machine learning models predicting UCL reconstruction in baseball pitchers, achieving 79.2% predictive accuracy.
- Published first-author paper to IEEE Xplore in *Proceedings of the 2025 International Conference on Healthcare Informatics*; findings accepted to multiple international conferences.
- Secured NSF Student Travel Grant ($3,500) to support presentation and dissemination of results; advised by Prof. Goldsztein.

Independent Bioethics Research Remote
Lead and Corresponding Author Mar 2024 – Apr 2025

- Conducted a comprehensive review of ethical and safety concerns associated with medical implant miniaturization, including biocompatibility, infection risk, and mechanical durability.
- Analyzed regulatory frameworks and policy debates on balancing innovation with patient safety and equitable access to emerging implant technologies.
- Evaluated literature on informed consent, data privacy, and end-of-life considerations in the clinical use of miniaturized devices.
- Manuscript reviewed by Prof. Richmond (USC) and Prof. Antaki (Cornell). Submitted and under review for publication.

CORE Institute – Biomechanics Lab Phoenix, AZ
Research Assistant Jul 2024 – Aug 2024

- Processed and analyzed human motion-capture data using Cortex and OrthoTrak software to derive biomechanics metrics.
- Refined MATLAB scripts for automated metric extraction, reducing average analysis time by 25%.
- Manuscripts under preparation; anticipated co-authorship on publications under Dr. McCamley.

Honors and Awards

Research / Grants

- NSF Student Researcher Travel Grant. Award amount: $3,500. Issued by the National Science Foundation.
- Conference Acceptances for NLP Paper:
  - NeurIPS 2025 Workshop on LLM Evaluation (LLM-Eval)

  - NeurIPS 2025 Workshop on Efficient Reasoning (ER)
  - NeurIPS 2025 Workshop on Preventing Unauthorized Knowledge Use from Large Language Models (Lock-LLM)
  - Recent Advances in Natural Language Processing (RANLP) 2025 Student Research Workshop
  - 2025 IEEE MIT Undergraduate Research and Technology Conference (Poster)
- Conference Acceptances for Football IR Prediction Paper:
  - 2025 IEEE MIT Undergraduate Research and Technology Conference
  - 2025 IEEE Engineering in Medicine and Biology Society (EMBS) International Conference on Biomedical and Health Informatics (Poster)
- Conference Acceptances for Baseball Injury Prediction Paper:
  - 2025 IEEE International Conference on Healthcare Informatics (ICHI)
  - 2024 IEEE International Conference on E-Health and Bioengineering (EHB)
  - 2024 International Symposium on Health Informatics and Bioinformatics (HIBIT)
  - 2024 Midwest Sports Analytics Meeting
- International GENIUS Olympiad Finalist
- Washington State Science and Engineering Fair – Second Place

Academic

- Quiz Bowl. Issued by National Academic Quiz Tournaments
  - 3× Small School National Championship Tournament Qualifier. Ranked 17th nationally
  - 1× High School National Championship Tournament Qualifier
  - Top 10 Individual Placement at 2025 UW Winter Classic Invitational
- AP Scholar with Distinction (2024, 2025)
- National Merit Commended Scholar

Scholarships

- Army ROTC 4-Year Full Tuition Scholarship (Accepted)
- Navy ROTC 4-Year Full Tuition Scholarship
- Jefferson Scholarship National Semifinalist (University of Virginia)
- Lake Washington Youth Soccer Association Student-Athlete Scholarship. Award amount: $2,000

Athletics

- #26 Ranked Soccer Team in the United States. MaxPreps, Spring 2024
- 2024 Washington State Soccer Champion
- 3× Washington State Soccer Qualifier
- 2× Washington State Soccer Finalist
- WA 1A District 1/2 Soccer Finalist
- Emerald Sound Conference Champion (Soccer)
- All-Conference Selection (Soccer)
- President's Cup Washington Champion
- Washington State Basketball Qualifier. Top 12 Finish, 2025
- All-Time School Record – Standing Vertical Jump

Publications

1. R. R. Butani, K. Chintalapati, A. Sridharan, T. I. Oltean, and A. Shastri, "Comparative Machine Learning Analysis Highlights Novel Predictive Capability of Deep Neural Decision Forest for Ulnar Collateral Ligament

Reconstruction in Baseball Athletes," *Proceedings of the 2025 IEEE 13th International Conference on Healthcare Informatics (ICHI)*, Rende, Italy, 2025, pp. 1–10. doi: 10.1109/ICHI64645.2025.00009.

2. R. R. Butani and K. R. Butani, "Developing a Novel Machine Learning Framework for Season-Ahead Prediction of Injured Reserve Placement in Professional Football Wide Receivers and Tight Ends." **In Press**.
3. R. R. Butani, T. I. Oltean, and R. Z.-T. Sun, "Ethical and Safety Considerations in the Miniaturization of Medical Implants: A Comprehensive Review." **Under Review**.
4. A. Cui, R. R. Butani, and T. I. Oltean, "No Question, No Passage, No Problem: Investigating Artifact Exploitation and Reasoning in Multiple-Choice Reading Comprehension." **Under Review**.

Leadership & Activities

- **RoundGlass Foundation Youth Board (Chair)**: Raised $4,000+ for rural Punjab schools through fundraisers and wellness initiatives.
- **Army ROTC, Johns Hopkins University (Contracted Cadet)**: Full-tuition scholarship recipient; trained in leadership and tactical operations with **DoD Secret Clearance**.
- **Epidemic Proportions (Editor)**: Edited and reviewed public health articles; coordinated with authors and editors-in-chief from pitch to publication.
- **JHU Underserved in the Medical Professions (JUMP)**: Engaged in mentorship, service, and professional development programming focused on health equity.
- **Student Advocates for Low Income Health (SALIH)**: Advanced equitable healthcare access through student-led advocacy and outreach.
- **Science Olympiad (Co-Founder and President)**: Founded and led the team, recruiting members, designing lesson plans, and coordinating competitions.
- **Varsity Soccer**: Four-year starting center defender; state champion and nationally top-30 ranked team member.
- **Varsity Basketball**: Competed on varsity team, demonstrating teamwork and resilience.
- **Varsity Quiz Bowl**: Represented school in national academic competitions, applying rapid recall and interdisciplinary knowledge.
- **Red Cross Club (President)**: Directed fundraising drives supporting disaster relief and community health efforts.

Professional Skills

Programming: Python, Pandas, scikit-learn, TensorFlow, PyTorch, Matplotlib, Seaborn, SHAP, Java, MATLAB, LaTeX, Excel
Techniques: Motion Analysis (Cortex, OrthoTrak), Experimental Design, Data Collection, Data Annotation, Sports Analytics, Research Ethics