

Harkirat Singh Arora  
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## EDUCATION

### Ph.D. in Biomedical Engineering

*University of Michigan*

*Ann Arbor, MI*  
Expected 04/2026

### M.S. in Biomedical Engineering

*University of Michigan*

*Ann Arbor, MI*  
Expected 08/2023

### B.Tech. in Chemical Engineering

*Indian Institute of Technology (IIT) Roorkee*

*Roorkee, India*  
06/2021

## RESEARCH EXPERIENCE

### Graduate Student Research Assistant

08/2021 - Present

*Department of Biomedical Engineering, University of Michigan*

- Applying deep learning and structural biology to design combination therapies for combating antibiotic resistance in *E.coli* and *M. tuberculosis*
- Integrating artificial neural networks with genome-scale metabolic modeling to predict the toxicity of drug combination therapy
- Utilizing the concept of transfer learning to design effective drug combinations in several critical pathogens as listed by WHO and CDC
- Supervised by Dr. Sriram Chandrasekaran

### Undergraduate Research Assistant

12/2018 - 04/2021

*Department of Computer Science and Engineering, IIT Roorkee*

- Utilized Radiomics for feature extraction and various feature selection techniques with machine learning for glioma classification
- Integrated FAMD feature extraction with machine learning for heart disease recognition
- Supervised by Dr. Balasubramanian Raman

### Undergraduate Research Assistant

10/2019 - 03/2021

*Department of Biotechnology, IIT Roorkee*

- Implemented digital signal processing to find the frequency of repeats in DNA sequence
- Incorporated sliding window analysis and exhaustive pattern search algorithm to find the location of repeats
- Supervised by Dr. Deepak Sharma

### Dry Lab member (Machine Learning)

04/2020 - 11/2020

*International Genetically Engineered Machine (iGEM), IIT Roorkee*

- Utilized the machine learning algorithms for understanding genetic mechanisms responsible for antibiotic resistance in *A. baumannii*
- Guided the software team in developing a web server for predicting the secondary structure of our novel engineered anti-bacterial protein

## LEADERSHIP AND VOLUNTEER EXPERIENCE

### Technical Lead

06/2022 - 08/2022

*NSF I-corps National-level program*

- NSF I-corps is an immersive, entrepreneurial training program that facilitates the transformation of the invention to impact
- Evaluated the commercial potential of the technology developed as part of academic research through customer discovery interviews
- Focused on populating Business Model Canvas, especially value propositions and customer segments sections

### General Secretary (Student Head)

08/2017 - 06/2021

*National Service Scheme (NSS), IIT Roorkee*

- NSS is a nationwide student organization focused on social service having its chapters at various institutes across India
- Led NSS chapter at IIT Roorkee and undertaken various social initiatives with the blend of technology and innovation
- Organized 100+ events including Blood Donation Camp, Health check-up Camp, and Cloth and Food distribution drive, for helping the poor and underprivileged

## AWARDS AND SCHOLARSHIPS

Betz Family Doctoral Fellowship Fund in Biomedical Engineering	2021
Kedar Nath Agarwala I.S.E. Memorial Trophy, IIT Roorkee	2021
Merit cum Means scholarship by Senate Committee of Scholarship and Prizes, IIT Roorkee	2018 - 21
Gold Medal at iGEM 2020, the world's largest synthetic biology competition	2020
Indian Biological Engineering grant from the Department of Biotechnology, Govt. of India	2020
Dedicated Volunteer of NSS IIT Roorkee student chapter	2018

## TALKS AND PRESENTATIONS

2022 U-M Annual Drug Discovery Symposium - Research Poster	2022
2022 U-M BME Annual Symposium - Research Poster	2022
2020 iGEM competition - Research Poster and Presentation	2020
2020 U-M MIDAS Symposium - Research Poster	2020
2020 U-M AI and Health Symposium - Research Poster	2020
2020 iGEM Global Meetup - Workshop	2020
2020 All India iGEM Meetup - Research Poster and Presentation	2020

## PUBLICATIONS

### Published

- Gupta, A., Kumar, R., **Arora, H.S.** & Raman, B. (2022) C-CADZ: computational intelligence system for coronary artery disease detection using Z-Alizadeh Sani dataset. *Applied Intelligence*, 52, 2436–2464. <https://doi.org/10.1007/s10489-021-02467-3>
- Kumar, R., Gupta, A., **Arora, H.S.** & Raman, B. (2022) CBSN: Comparative measures of normalization techniques for brain tumor segmentation using SRCNet. *Multimedia Tools and Applications* 81, 13203–13235. <https://doi.org/10.1007/s11042-021-10565-0>
- Kumar, R., Gupta, A., **Arora, H.S.** & Raman, B. (2022) IBRDM: An Intelligent Framework for Brain Tumor Classification Using Radiomics- and DWT-based Fusion of MRI Sequences. *ACM Transactions on Internet Technology* 22(1) Article 9, 1-30. <https://doi.org/10.1145/3434775>
- Kumar, R., Gupta, A., **Arora, H.S.**, Pandian, G.N. & Raman, B. (2020) CGHF: A Computational Decision Support System for Glioma Classification Using Hybrid Radiomics- and Stationary Wavelet-Based Features. *IEEE Access* 8, 79440-79458. <https://doi.org/10.1109/ACCESS.2020.2989193>
- Gupta, A., Kumar, R., **Arora, H.S.** & Raman, B. (2020) MIFH: A Machine Intelligence Framework for Heart Disease Diagnosis. *IEEE Access* 8, 14659-14674. <https://doi.org/10.1109/ACCESS.2019.2962755>

### In-Review

- Sambarey, A. Smith, K., Chung, C., **Arora, H.S.**, Yang, Z., Agarwal, P., Chandrasekaran, S. (2022) Integrative analysis of clinical health records, imaging and pathogen genomics identifies personalized predictors of disease prognosis in tuberculosis. *Cell Reports Medicine* [in review]. Preprint: <https://www.medrxiv.org/content/10.1101/2022.07.20.22277862v1>