

# Gaurav Jain

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## Research Interests

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*Leveraging AI for Accessibility:* Human-computer interaction (HCI), computer vision, accessibility, deep learning

## Education

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| 2020–Present | <b>Columbia University, Graduate School of Arts and Sciences</b> , New York, NY<br><b>Ph.D.</b> in Computer Science   GPA: 4.06/4.00<br>Specialization: Human-Computer Interaction<br>Advisor: Dr. Brian A. Smith<br><i>Featured Coursework:</i> User Interface Design, Human-Computer Interaction, Computational Aspects of Robotics, Representation Learning |
| 2016–2020    | <b>Delhi Technological University</b> , New Delhi, India<br><b>B.Tech</b> in Computer Science   GPA: 9.38/10.0<br><i>Featured Coursework:</i> Computer Vision, Soft Computing, Machine Learning, Artificial Intelligence, Digital Image Processing, Swarm Intelligence, Distributed Systems.   |

## Skills

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*Proficient* with C, C++, Python (TensorFlow, PyTorch, Keras, OpenCV), MATLAB,  $\text{\LaTeX}$ , Linux, ROS, Swift, Unity, Balsamiq, Figma. *Familiar* with R, Hive, Cloudera, Docker, Blender, Paraview, HTML, CSS, Javascript, Affinity Photo.

## Research Experience

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| 2020–   | <b>Columbia University</b> , New York, NY<br><i>Graduate Research Assistant</i> , Computer-Enabled Abilities Lab (CEAL) <ul style="list-style-type: none"><li>• Beyond Guidance: A qualitative study to investigate how navigation assistance systems should support exploration in navigation for people who are blind and visually impaired.<br/><i>Techniques:</i> Grounded theory, Open coding, Critical incident technique</li><li>• Map-A11y: A wearable camera system for blind and low vision people to create personalised maps of indoor spaces and navigate independently using a smartphone application.<br/><i>Frameworks:</i> Robot Operating System (ROS), Swift, Unity, Python</li><li>• Sports Accessibility from Pixels: Enhancing gameplay understanding of tennis for blind and low vision viewers using computer vision-based gameplay recognition and immersive audio design.<br/><i>Frameworks:</i> Python (Tensorflow, PyTorch, OpenCV), Unity</li></ul> |
| 2020    | <b>Université Clermont Auvergne</b> , Clermont-Ferrand, France<br><i>Summer Research Intern</i> , Endoscopy and Computer Vision (EnCoV) <ul style="list-style-type: none"><li>• Patient-specific organ tracking in laparoscopic images by deep learning (<a href="#">GitHub</a>).<br/><i>Frameworks:</i> Blender, Gmsh, Elmer, Paraview, Python (PyTorch)</li></ul>  |
| 2019–20 | <b>Delhi Technological University</b> , New Delhi, India<br><i>Undergraduate Research Assistant</i> , Machine Learning Research Lab <ul style="list-style-type: none"><li>• Designed and implemented a Transformer-based deep neural network architecture for sketch recognition. Published paper at ECAI 2020 (<a href="#">Paper</a>), and IEEE Trans. CDS (<a href="#">Paper</a>).<br/><i>Frameworks:</i> Python (TensorFlow)</li></ul>  |

- 2018–20 **Indian Institute of Technology (IIT)**, New Delhi, India  
*Research Intern*, School of Information Technology
- Developed a deep learning based breast cancer detection model for scale invariant detection of masses and calcifications. Supported by All India Institute of Medical Sciences (AIIMS).  
*Frameworks*: Python (TensorFlow), MATLAB
- 2019 **Indian Institute of Science (IISc)**, Bangalore, India  
*Summer Research Fellow*, Department of Computational and Data Sciences
- Deep Neural-Network Based Sinogram Super-resolution and Bandwidth Enhancement for Limited Data Photoacoustic Tomography. Paper published in IEEE Transactions ([Paper](#)).  
*Frameworks*: Python (PyTorch), MATLAB (k-Wave Toolbox)
- 2018–19 **Defense Research & Development Organisation (DRDO)**, New Delhi, India  
*Research Assistant*, Scientific Analysis Group
- Designed a graph based fusion approach for a multimodal biometric system that fuses fingerprint, face and iris scans in a highly secure and cancelable manner. Paper published in IEEE Transactions ([Paper](#)).  
*Frameworks*: MATLAB

## Selected Publications

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- 2023 **Gaurav Jain**, Basel Hindi, Connor Courtien, Conrad Wyrick, Xin Yi Therese Xu, Michael Malcolm, Brian A. Smith. “*Sports Accessibility from Pixels: Enhancing Tennis Gameplay Understanding of Blind and Low Vision Viewers*” Under Review at Proceedings of the SIGCHI Conference on Human Factors in Computing Systems 2023 (CHI 2023)
- 2023 **Gaurav Jain**, Yuanyang Teng, David Cho, Yunhao Xing, Maryam Aziz, Brian A. Smith. “*I want to Figure Things Out: Supporting Exploration in Navigation for People with Visual Impairments*” (to appear) Published in Proceedings of the ACM on Human-Computer Interaction (CSCW 2023)  
[PDF](#)
- 2020 **Gaurav Jain\***, Shivang Chopra\*, Suransh Chopra\*, Anil Singh Parihar. “*Attention-Net: An Ensemble Sketch Recognition Approach using Vector Images*” Published in IEEE Transactions on Cognitive and Developmental Systems, 2020.  
[PDF](#) • [DOI](#)
- 2020 Navchetan Awasthi\*, **Gaurav Jain\***, S. K. Kalva, Manojit Pramanik, Phaneendra K. Yalavarthy. “*Deep Neural-Network Based Sinogram Super-resolution and Bandwidth Enhancement for Limited Data Photoacoustic Tomography*” Published in IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control (Special issue on Deep Learning in Medical Ultrasound), 2020.  
[PDF](#) • [DOI](#) • [CODE](#)
- 2019 Gurjit Singh Walia, **Gaurav Jain**, Nipun Bansal, Kuldeep Singh. “*Adaptive Weighted Graph Approach to Generate Multimodal Cancelable Biometric Templates*” Published in IEEE Transactions on Information Forensics and Security, vol. 15, pp. 1945-1958, 2020.  
[PDF](#) • [DOI](#)

\* Indicates Equal Contribution

## Awards & Honors

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- 2020 **Greenwoods Fellowship**, Department of Computer Science, Columbia University  
 Received funding of \$15,400 + tuition fee for the fall semester (2020).
- 2019 **Summer Research Fellowship**, Indian Academy of Sciences, Govt. of India  
 Received funding for summer research internship at the Indian Institute of Science, Bangalore.

## Teaching Experience

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- 2021–Present     **Teaching Assistant**, Columbia University  
*Graduate Level Courses:*
- COMS W4170: User Interface Design (Fall 2021, Fall 2022)  
Instructor: Prof. Brian A. Smith
  - COMS E6178: Human-Computer Interaction (Spring 2021, Spring 2022)  
Instructor: Prof. Brian A. Smith

## Community & Professional Services

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- 2021–Present     **Peer Reviewer for Academic Conferences**
- ACM CHI 2022
  - ACM CHI 2023
- 2022     **Women in Science (WISC) Undergraduate Mentoring Program**, Barnard University  
*Mentor, Semester-wise career mentorship for undergraduates*
- Mentored two undergraduates to help orient them towards their career goals.
- 2020     **Grad Application Mentor**, Department of Computer Science, Columbia University  
*Volunteer, Pre-Submission Application Review Program (2020)*
- Reviewed PhD application material for students with less access to research mentoring.

## References

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### **Brian A. Smith**

Assistant Professor,  
Computer Science  
Columbia University  
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### **Gurjit Singh Walia**

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Defense Research & Development  
Organization (DRDO)  
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### **Phaneendra K. Yalavarthy**

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Computational & Data Sciences  
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### **Anil Singh Parihar**

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