Gaurav Jain

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Research Interests

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

Education

2020–Present **Columbia University, Graduate School of Arts and Sciences**, New York, NY
Ph.D. in Computer Science | GPA: 4.06/4.00
Specialization: Human-Computer Interaction
Advisor: Dr. Brian A. Smith
Featured Coursework: User Interface Design, Human-Computer Interaction, Computational Aspects of Robotics, Representation Learning

2016–2020 **Delhi Technological University**, New Delhi, India
B.Tech in Computer Science | GPA: 9.38/10.0
Featured Coursework: Computer Vision, Soft Computing, Machine Learning, Artificial Intelligence, Digital Image Processing, Swarm Intelligence, Distributed Systems.

Skills

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

Research Experience

2020– **Columbia University**, New York, NY
Graduate Research Assistant, Computer-Enabled Abilities Lab (CEAL)

- Beyond Guidance: A qualitative study to investigate how navigation assistance systems should support exploration in navigation for people who are blind and visually impaired.
  Techniques: Grounded theory, Open coding, Critical incident technique
- Map-A11y: A wearable camera system for blind and low vision people to create personalised maps of indoor spaces and navigate independently.
  Frameworks: Robot Operating System (ROS), Swift, Unity, Python
- Sports Accessibility from Pixels: Enhancing gameplay understanding of tennis for blind and low vision people using computer vision-based gameplay recognition and immersive audio design.
  Frameworks: Python (Tensorflow, PyTorch, OpenCV), Unity

2020 **Université Clermont Auvergne**, Clermont-Ferrand, France
Summer Research Intern, Endoscopy and Computer Vision (EnCoV)

- Patient-specific organ tracking in laparoscopic images by deep learning (GitHub).
  Frameworks: Blender, Gmsh, Elmer, Paraview, Python (PyTorch)

2019–20 **Delhi Technological University**, New Delhi, India
Undergraduate Research Assistant, Machine Learning Research Lab

- Designed and implemented a Transformer-based deep neural network architecture for sketch recognition. Published paper at ECAI 2020 (Paper), and IEEE Trans. CDS (Paper).
  Frameworks: Python (TensorFlow)

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

Publications

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 2023 CHI Conference on Human Factors in Computing Systems (CHI 2023).

2022 **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*" Under Review at ACM Conference On Computer-Supported Cooperative Work And Social Computing (CSCW 2022).
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 **Gaurav Jain***, Shivang Chopra*, Suransh Chopra*, Anil Singh Parihar. "*TransSketchNet: attention-based Sketch Recognition using Transformers*" (Highlight Paper) To appear at 24th European Conference on Artificial Intelligence, ECAI 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

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

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

Coummunity & Professional Services

2021–Present **Peer Reviewer for Academic Conferences**

- ACM CHI 2022

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

Brian A. Smith
Assistant Professor,
Computer Science
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Senior Scientist,
Defense Research & Development Organization (DRDO)
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Phaneendra K. Yalavarthy
Associate Professor,
Computational & Data Sciences
Indian Institute of Science
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Anil Singh Parihar
Associate Professor,
Computer Science
Delhi Technological University
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