Chirag Manchanda

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EDUCATION

University of California, Berkeley	Berkeley, CA
Ph.D. in Environmental Engineering, Advisor: Prof. Joshua S. Apte	2021–Present

University of California, Berkeley	Berkeley, CA
M.S. in Civil and Environmental Engineering, GPA: 4.0/4.0	2021–2022

PUBLICATIONS

1. J. Apte, and **C. Manchanda**, "High-resolution urban air pollution mapping", *Science*, **385**, 380-385, **2024**

2. **C. Manchanda**, R. Harley, J. Marshall, A. Turner, and J. Apte, "Integrating mobile and fixed-site black carbon measurements to bridge spatiotemporal gaps in urban air quality", *Environmental Science & Technology*, **58**, 12563–12574, **2024**

3. **C. Manchanda**, M. Kumar, V. Singh, N. Hazarika, M. Faisal, V. Lalchandani, A. Shukla, J. Dave, N. Rastogi, and S. N. Tripathi, "Chemical speciation and source apportionment of ambient $PM_{2.5}$ in New Delhi before, during, and after the Diwali fireworks", *Atmospheric Pollution Research*, **13**, 101428, **2022**

4. **C. Manchanda**, M. Kumar, and V. Singh, "Meteorology governs the variation of Delhi's high particulate-bound chloride levels", *Chemosphere*, **291**, 132879, **2021**

5. **C. Manchanda**, M. Kumar, V. Singh, M. Faisal, N. Hazarika, A. Shukla, V. Lalchandani, V. Goel, N. Thamban, D. Ganguly, and S. Tripathi, "Variation in chemical composition and sources of $PM_{2.5}$ during the COVID-19 lockdown in Delhi", *Environment International*, **153**, 106541, **2021**

6. A. Saxena, E. Ng, **C. Manchanda**, and T. Canchi, "Cardiac thermal pulse at the neck-skin surface as a measure of stenosis in the carotid artery", *Thermal Science and Engineering Progress*, **19**, 100603, **2020**

7. A. Saxena, E. Ng, M. Mathur, **C. Manchanda**, and N. Jajal, "Effect of carotid artery stenosis on neck skin tissue heat transfer", *International Journal of Thermal Sciences*, **145**, 106010, **2019**

RESEARCH EXPERIENCE

University of California, Berkeley | Graduate Student Researcher	Berkeley, CA
Apte Research Group	Fall 2021 - Present

Data-Driven Modeling and Assimilation Methods for Enhancing Urban Air Quality

– Designs a statistical framework that integrates mobile and fixed-site pollutant measurements to generate high-resolution and comprehensive pollutant concentration fields, enhancing spatial density and temporal completeness.

– Implements an innovative inverse modeling routine that leverages diverse pollutant monitoring techniques to improve the accuracy of pollutant emission flux estimates, refining and constraining the emission sources.

– Develops a dynamical controllability framework to assess optimal control strategies for reducing pollution exposure levels and disparities, providing valuable insights into achieving targeted air quality goals.

Indian Institute of Technology Delhi | Research Associate   Delhi, India
Air Quality Research Group   Summer 2018 - Summer 2021

Source Apportionment Analysis for Quantifying Variation in Sources of Ambient PM$_{2.5}$ during Periods of Marked Variation in Anthropogenic Activities in New Delhi, India

- Investigated the variation in chemical composition and sources contributing to ambient PM2.5 during a major firework event (Diwali) and the COVID-induced lockdown, utilizing near-real-time elemental and organic particulate measurements.
- Source apportionment analysis identified fireworks as the primary contributor, responsible for over 95 percent of total metallic PM$_{2.5}$, reaching concentrations exceeding 500 µg/m^3 during Diwali.

On-Road Exposure to Particulate Matter in New Delhi

- Carried out on-road measurements to investigate in-vehicle exposure to particulate matter in Delhi, examining the influence of congestion intensity, land-use patterns, and vehicular speed on particulate levels.

Nanyang Technological University Singapore | Research Assistant   Singapore
School of Mechanical and Aerospace Engineering   Spring 2018 - Summer 2018

Non-Invasive Detection of Stenosis in Human Carotid Arteries

- Conducted high-resolution transient simulations of blood flow through a computational model of human carotid arteries to investigate stenosis detection. Discovered that the Strouhal number associated with a vortex in the shear layer downstream of the stenosed region varied with the degree of stenosis. This variation was identified as a distinct thermal signature that could be extracted from the neck surface.
- Investigated causality between flow irregularities and thermal patterns on the neck surface, employing a combination of numerical simulations and experimental methods. Utilized thermography and a Support Vector Machine (SVM) algorithm to distinguish between patients with and without stenosis.

Scholarships and Awards

- **Outstanding Graduate Student Instructor Award**   2024
  Recognized among the top 5 percent of teaching assistants at UC Berkeley for excellence in instruction.
- **STEM*FYI Graduate Diversity Fellow**   2023
  Awarded USD 500 technology grant by the Office of Graduate Diversity, UC Berkeley.
- **Founder's Gold Medal for the Best Outgoing Student**   2018
  Ranked First (out of 270 students) in the graduating class of 2018, Manipal University.
- **NTU India Connect Scholar**   2018
  Selected among 3 students from India for conducting thesis research at Nanyang Technological University, Singapore.
- **Avery Dennison InvEnt Scholarship**   2015
  Awarded USD 1300 for innovative skills and academic performance.
- **Academic Excellence Award**   2014 - 2018
  Recipient of the Academic Excellence Award for each academic year consecutively throughout the bachelor's degree.

Teaching

- **Graduate Student Instructor** at UC Berkeley   Fall 2023
  Air Quality Engineering (CE 218A)