Zeel B Patel

Date of Birth: 04 Aug 1996 (29 years old)
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Education

- **PhD in Computer Science**, *Jan 2020 - Feb 2026 (Expected)*
  Thesis: AI for Air Quality: Modeling, Sensor Placement and Source Detection
  Advisor: Nipun Batra
  CPI: 9.7/10
  IIT Gandhinagar, Gujarat, India
- **M.Tech. in Smart Manufacturing**, *Aug 2017 - May 2019*
  CGPA: 9.17/10
  IIITDM Kancheepuram, Chennai, India

Work Experience

- **PostDoc Researcher, Microsoft Research India** *Jul 2025 - Present*
- **Software Engineering Intern, Google Summer of Code** *Jun 2022 - Sep 2022*
  Mentor: Kevin P Murphy
  Project: Develop JAX examples and demos for the ProbML textbook
  GitHub repo: https://github.com/probml/pyprobml
  Final report: https://patel-zeel.github.io/gsoc22
- **Data Scientist, R&D Team** *Jun 2019 - Dec 2019*
  Inspirisys Solutions Ltd., Chennai, India

Open Source Libraries

BIJAX (7★): Bayesian Inference in JAX; used in Kevin Murphy's Probabilistic Machine Learning book

GPAX (6★): Gaussian processes in JAX, developed for my PhD research

skgpytorch (3★): Scikit-learn interface for GPyTorch enabling rapid GP model prototyping

ASTRA (3★): AI for Sustainability Toolkit, developed for my research group at IIT Gandhinagar

Selected Open Source Contributions

supervision (Roboflow): Added Oriented Bounding Boxes support to this popular object detection library (PR #1502)

matplotlib: Fixed slow plotting for PyTorch/JAX arrays; required cross-library coordination (NumPy, Matplotlib, PyTorch, JAX) (PR #25887)

Stheno: Implemented FITC, one of the most widely-used sparse Gaussian process methods (PR #17)

GPyTorch: Added probabilistic metrics module; essential for proper evaluation of probabilistic models beyond RMSE (PR #1870)

Last updated: Sunday 18th January, 2026

Publications (Google Scholar profile)

Journal articles

1. **Zeel B Patel**, Rishabh Mondal, Shataxi Dubey, Suraj Jaiswal, Sarath Guttikunda, Nipun Batra
   Space to Policy: Scalable Brick Kiln Detection and Automatic Compliance Monitoring with Geospatial Data
   Accepted in ACM Journal on Computing and Sustainable Societies and to be presented in ACM COMPASS 2025 conference.
   Project page: https://sustainability-lab.github.io/brick-kilns/

Selected peer-reviewed articles

1. **Zeel B Patel**, Vinayak Rana, Nipun Batra
   Scalable Air-Quality Sensor Placement via Gradient-Based Mutual Information Maximization
   AAAI 2026 (CORE A*, Oral Presentation - 24.1% acceptance rate)
   GitHub repo: https://github.com/sustainability-lab/gdmi-aqs
2. **Zeel B Patel**, Palak Purohit, Harsh Patel, Shivam Sahni, Nipun Batra
   Accurate and Scalable Gaussian Processes for Fine-grained Air Quality Inference
   AAAI 2022 (CORE A* - 15% acceptance rate)
   GitHub repo: https://github.com/patel-zeel/AAAI22
3. Sachin Chauhan, **Zeel B Patel**, Sayan Ranu, Rijurekha Sen, Nipun Batra
   Fine-Grained Spatio-Temporal Particulate Matter Dataset From Delhi For ML based Modeling
   In NeurIPS 2023 Datasets and Benchmarks (CORE A* - 32.7% acceptance rate)
4. Rishiraj Adhikary, **Zeel B Patel**, Tanmay Srivasatava, Nipun Batra, Mayank Singh, Udit Bhatia, Sarath Guttikunda
   Vartalaap: What Drives #AirQuality Discussions: Politics, Pollution or Pseudo-science?
   CSCW 2021 (CORE A)
   GitHub repo: https://github.com/rishi-a/Vartalaap
5. Karm Patel, Rishiraj Adhikary, **Zeel B Patel**, Nipun Batra, Sarath Guttikunda
   Samachar: News Media on Air Pollution in India
   COMPASS 2022
   GitHub repo: https://github.com/karm-patel/Samachar-News-media-on-air-pollution

Symposium, Workshop papers and Posters

1. Yash Bachwana, Khush Shah, Nitish Sharma, **Zeel B Patel**, Nipun Batra, Sarath Guttikunda
   VayuBuddy: LLM-powered natural language interface for exploring and understanding air pollution data
   Live Demo
   ACM COMPASS Posters 2024
2. Aditi Agarwal, Suraj Jaiswal, Madhav Kanda, Dhruv Patel, Rishabh Mondal, Vannsh Jani, **Zeel B Patel**, Nipun Batra, Sarath Guttikunda
   Towards Scalable Identification of Brick Kilns from Satellite Imagery with Active Learning
   NeurIPS Workshop on Adaptive Experimental Design and Active Learning in the Real World 2023 (CORE A*)
3. **Zeel B Patel**, Nipun Batra, Kevin Murphy
   Uncertainty Disentanglement with Non-stationary Heteroscedastic Gaussian Processes for Active Learning
   NeurIPS Workshop on Gaussian Processes, Spatiotemporal Modeling, and Decision-making Systems 2022 (CORE A*)
4. Aadesh Desai, Eshan Gujarathi, Saagar Parikh, Sachin Yadav, **Zeel B Patel**, Nipun Batra
   Deep Gaussian Processes for Air Quality Inference
   Young Researchers' Symposium, CODS-COMAD 2023
5. **Zeel B Patel***, S Deepak Narayanan*, Apoorv Agnihotri, Nipun Batra
   Poster: A toolkit for spatial interpolation and sensor placement
   ACM SenSys 2020 (CORE A*)
   GitHub repo: https://github.com/sustainability-lab/polire
6. **Zeel B Patel**, Nipun Batra
   Active Learning: A Visual Tour
   3rd Workshop on Visualization for AI Explainability, IEEE VIS 2020 (CORE A)
   Weblink: https://patel-zeel.github.io/active-learning-visualization/

Awards

Awards

- Microsoft Research India PhD Award. Unrestricted grant of 1 million INR. *2024*
- Outstanding Graduate Teaching Fellow award in Probabilistic Machine Learning course. *Fall 2022*
  IIT Gandhinagar

Registration grants

- NeurIPS 2022
- GPSS 2022
- AAAI 2022
- ICML 2021
- IEEE VIS 2020

Helped advisor with

- Google PaliGemma Compute Grant 2024 ($5000 credits in Google Cloud Platform)
- Google Compute Grant 2021 ($5000 credits in Google Cloud Platform)

Teaching Experience

Graduate Teaching Fellow (teaching a course along with the instructor)

- **Probabilistic Machine Learning**
  IIT Gandhinagar *Fall 2022*

Teaching Assistant

- **Probabilistic Machine Learning**
  IIT Gandhinagar *Fall 2023*

- **Machine Learning**
  IIT Gandhinagar *Spring 2023*

- **Machine Learning**
  IIT Gandhinagar *Spring 2022*

Guest lectures

- **Introduction to Active Learning**
  Ubiquitous computing, IIT Gandhinagar *Fall 2021*

- **Introduction to Bayesian Machine Learning**
  Machine Learning, IIT Gandhinagar *Spring 2021*

Tools & Skills

PyTorch, JAX, Triton, Unsloth, HuggingFace Transformers, Streamlit, GeoPandas, Xarray, Docker, Git/GitHub, LaTeX, VS Code Agents (for writing ML pipelines at scale)

Book Contributions

- **Probabilistic Machine Learning: Advanced Topics:** https://probml.github.io/pml-book/book2.html
  I co-authored Section 34.7 (Active learning) with Dr. Kevin Murphy
- **Code-First-ML:** https://code-first-ml.github.io/
  This book is a work-in-progress joint effort with my advisor and Prof. Ashish Tendulkar to pragmatically explain ML concepts with interactive codes and visualizations.

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Invited Talks

Google Global Air Quality Summit *13th Nov, 2024*
Topic: AirChat: LLM-Powered Chatbot System to Democratize Urban Air Quality Information
App Demo: https://sustainabilitylabiitgn-vayubuddy.hf.space
Gurugram, India

Air Sensors International Conference *26th Aug, 2022*
Topic: Accurate and Scalable Gaussian Processes for Fine-grained Air Quality Inference
Organized by CSTEP, India and UC DAVIS
Bengaluru, India

Service

Reviewer

- Annual Conference on Neural Information Processing Systems (CORE A*) *2024*
- Association for the Advancement of Artificial Intelligence (AAAI) (CORE A*) *2024*
- Artificial Intelligence and Statistics (AISTATS) (CORE A) *2023*
- ACM COMPASS Posters and Demos *2021*
- The ReScience C journal