

Nipun Batra

Harnessing AI to create a sustainable future where technology serves both people and planet

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Current Role

Associate Professor

Computer Science and Engineering
IIT Gandhinagar, Gujarat, India

Nov 2024 - Present

Assistant Professor

Computer Science and Engineering
IIT Gandhinagar, Gujarat, India

July 2018 - Nov 2024

Education

PhD in Computer Science,

IIIT Delhi

Advisor: Amarjeet Singh, Kamin Whitehouse (University of Virginia)

Thesis: Systems and Analytical Techniques Towards Practical Energy Breakdown for Homes

CGPA: 9.3/10.0

Jan 2012 - Mar 2017 (submitted Nov 2016, defended Mar 2017)

B.E. in Computer Engineering,

Delhi College of Engineering, Delhi, India

CGPA: 9/10.0

Aug 2007 - May 2011

Grants

Summary: 9+ sponsored projects, approximately 4.6+ crore INR raised

PI: exploreCSR: Bridging Digital Divides Through Computing
Google Faculty Research Award (Amount: \approx Rs. 64 lacs)

2025

PI: Active Air: Active Learning for Air Quality Station Deployment
GUJCOST (Amount: \approx Rs. 17 lacs)

2022

PI: Fine-grained air quality exposure modeling and forecasting using machine learning
Ministry of Earth Sciences (Amount: \approx Rs. 60 lacs)

2022

PI: Edge Non-intrusive Load Monitoring
Cisco Research (Amount: USD 46,200 \approx Rs. 34 lacs)

2020

PI: Impact of air pollution on COVID-related secondary exacerbations
Google (Amount: USD 50,000 \approx Rs. 37 lacs)

2020

PI: AI and Sensor Networks for Air-quality Monitoring
SERB (Amount: Rs. 30 lacs)

2020

Co-PI: Physics Guided Data Science Approach for Predictive Understanding of Hydrological Processes DST STARS (INR 84 lacs)	2019
PI: Scalable air-quality estimation using multi-modal data Microsoft AI for Earth Grant (USD 30000 (\approx Rs. 22 lacs) in Azure credits)	2018
PI: Scalable Sensing and Analytics for Sustainability IIT Gandhinagar Internal Grant (Rs. 30 lacs)	2018
PI: Machine Learning Approaches for Scalable Air Quality Sensing in India NVIDIA GPU grant (\approx Rs. 1.3 lacs)	2018

Honours, Awards and Recognitions

SIGEnergy Rising Star Award <i>For contributions to reproducible toolkits, scalable models, and uncertainty-aware approaches for practical energy disaggregation</i>	2025
Test of Time Award <i>For significant long-term impact and contributions to the energy disaggregation research community</i>	2025
Excellence in Teaching Award, IIT Gandhinagar <i>Based on contributions and achievements in teaching, as evidenced by students' feedback</i>	2025
Young Alumni Award, IIIT Delhi	2023
Dean's/Director's letter of appreciation for excellent teaching at IIT Gandhinagar Machine Learning 2023, Probabilistic Machine Learning 2022, Computing 2022, Machine Learning 2021, Computing 2020, Machine Learning 2019, Operating Systems 2019	
Best video nominee (acceptance rate: 3.1%) at KDD	2016
Finalist in UChicago Delhi urban challenge (acceptance rate: 3.6%)	2016
3 rd position in IoT Hackathon at MSR Summer School	2016
Best presentation award at SenSys Doctoral Colloquium	2015
Best demo award at Buildsys	2014
TCS PhD fellowship	2012
Systems engineering prize barrel, AUVSI's student UAS competition	2010
Director's award for best effort, AUVSI's student UAS competition	2009
Travel grants AAAI grant for AAAI 2017; Google, MSR and ACM travel grant for KDD 2016; ACM travel grant for SenSys 2015; ACM travel grant for e-Energy 2014; Young scientist travel grant for AUVSI UAS competition from DST (Govt. of India) 2009.	

Students: Honours, Awards and Recognitions

Commendation for Outstanding Research (PhD) – Dr. Rishiraj Adhikary (PhD Alumnus) <i>IIT Gandhinagar Convocation 2025</i>	<i>June 2025</i>
Ph.D. student Rishiraj Adhikary is a finalist at Gaetano Borriello Outstanding Student Award	2023
M.Tech. student Ankita Jain awarded Gold Medal for the Outstanding Research at IITGn convocation	2023
Ph.D. student Rishiraj Adhikary awarded Fullbright Nehru Doctoral Fellowship to visit CMU	2022
Ph.D. student Rishiraj Adhikary awarded PMRF fellowship	2021

Selected Research & Industrial Experience

Postdoctoral Scholar University of Virginia, Charlottesville. Advisors: Kamin Whitehouse, Hongning Wang	<i>Mar 2017 - Jun 2018</i>
Graduate Research Assistant IIIT Delhi	<i>Jan 2012 - Mar 2017</i>
Visiting Research Scholar University of Virginia (with Kamin Whitehouse)	<i>Jun 2014 - Apr 2015</i>
Software Analyst Royal Bank of Scotland, Gurgaon, India	<i>Jun 2011 - Nov 2011</i>
Undergraduate Researcher Linux Android Network Systems Lab, Delhi College of Engineering	<i>Dec 2010 - Jun 2011</i>
Software Engineering Intern Goldman Sachs, Bangalore	<i>Jun 2010 - Aug 2010</i>
Undergraduate Research Intern Unmanned Aircraft Systems Lab, Delhi College of Engineering	<i>Dec 2008 - Jul 2010</i>

Teaching Experience

AI for Social Good: Spring 2025
Probability, Statistics, and Data Visualization: Spring 2025
Machine Learning: Spring 2025, Fall 2024, Spring 2024, Spring 2023, Spring 2022, Spring 2021, Spring 2020, Spring 2019
Probabilistic Machine Learning: Fall 2023, Fall 2022
Introduction to Computing: Winter 2022, Winter 2021, Winter 2020
Ubiquitous Computing: Fall 2021
Operating Systems: Fall 2020, Fall 2019, Fall 2018

Publications (Google Scholar profile)

Citation Summary (as of Saturday 20th September, 2025)

Total citations - 3100, h-Index - 21, i10-Index: 26

A*, A conferences or Q1 journals are highlighted using *

Selected Peer-reviewed articles

1. Rishabh Mondal, Jeet Parab, Heer Kubadia, Shataxi Dubey, Shardul Junagade, Zeel B Patel, **Nipun Batra**
SentinelKilnDB: A Large-Scale Dataset and Benchmark for OBB Brick Kiln Detection in South Asia Using Satellite Imagery
* Advances in Neural Information Processing Systems (NeurIPS), 2025
2. **Nipun Batra**, B Coleppa, A Khanna, SK Rai, A Sarkar
Constraining the 3HDM parameter space using active learning
* Physical Review D 112 (1), 015011, 2025
3. Nishchaya Kumar Mishra, **Nipun Batra**, Sameer Patel
Optimizing Pollutant Exposure, Energy Consumption, and Thermal Comfort in a House via Deep Reinforcement Learning Control
* Journal of Building Engineering, 2025
4. Haikoo Khandor, R Yeeshu Dhurandhar, Dhairya Shah, **Nipun Batra**
Distribution-Free Uncertainty Quantification and Calibration for Energy Disaggregation
ACM Journal on Computing and Sustainable Societies (JCSS), 2025
<https://doi.org/10.1145/3748334>
5. 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
ACM Journal on Computing and Sustainable Societies (JCSS), 2025
6. Rishiraj Adhikary, Maite Sadeh, **Nipun Batra**, Mayank Goel
JoulesEye: Energy Expenditure Estimation and Respiration Sensing from Thermal Imagery While Exercising
* ACM Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT), 2024
7. Sachin Chauhan, Zeel Patel, Sayan Ranu, Rijurekha Sen, and **Nipun Batra**
Fine-Grained Spatio-Temporal Particulate Matter Dataset From Delhi For ML based Modeling
* NeurIPS, 2023
8. Rishiraj Adhikary, Dhruvi Lodhavia, Chris Francis, Rohit Patil, Tanmay Srivastava, Prerna Khanna, **Nipun Batra**, Joseph Breda, Jacob Peplinski, Shwetak Patel
SpiroMask: measuring Lung function using consumer-grade masks
* ACM Transactions on Computing for Healthcare, 2023
9. Vibhuti Bansal, Rohit Khoiwal, Hetvi Shastri, Haikoo Khandor, **Nipun Batra**
"I do not know?": Quantifying Uncertainty in Neural Network Based Approaches for Non-Intrusive Load Monitoring
* Buildsys 2022
10. Karm Patel, Rishiraj Adhikary, Zeel B Patel, **Nipun Batra**, Sarath Guttikunda
Samachar: print news media on air pollution in India
ACM COMPASS 2022
11. Zeel B Patel, Palak Purohit, Harsh Patel, Shivam Sahni, **Nipun Batra**
Accurate and Scalable Gaussian Processes for Fine-grained Air Quality Inference
* AAAI 2022
12. Hetvi Shastri, Dhruvi Lodhavia, Palak Purohit, Ronak Kaoshik, **Nipun Batra**
Vastr-GAN: versatile apparel synthesised from text using a robust generative adversarial network
CODS COMAD 2022
13. Hetvi Shastri, **Nipun Batra**
Neural network approaches and dataset parser for NILM toolkit
* Buildsys 2021
14. Rishiraj Adhikary, Zeel Patel, Tanmay Srivastava, **Nipun Batra**, Mayank Singh, Udit Bhatia
Vartalaap: What Drives #AirQuality Discussions: Politics, Pollution or Pseudo-science?
* CSCW 2021
15. Rithwik Kukunuri, Anup Aglawe, Jainish Chauhan, Kratika Bhagtani, Rohan Patil, Sumit Walia, **Nipun Batra**
EdgeNILM: towards NILM on edge devices
* Buildsys 2020

16. Rishiraj Adhikary, Tanmay Srivastava, Prerna Khanna, Aabhas Asit Senapati, **Nipun Batra**
Naqaab: towards health sensing and persuasion via masks
Ubicomp 2020 Adjunct
17. Apoorv Agnihotri, **Nipun Batra**
Exploring Bayesian Optimization
Distill 2020
18. Yiling Jia, **Nipun Batra**, Hongning Wang, Kamin Whitehouse
Active Collaborative Sensing for Energy Breakdown
* CIKM 2019
19. **Nipun Batra**, Rithwik Kukunuri, Ayush Pandey, Raktim Malakar, Rajat Kumar, Odysseas Krystalakos, Mingjun Zhong, Paulo Meira, Oliver Parson
Towards reproducible state-of-the-art energy disaggregation
* Buildsys 2019
20. Yiling Jia, **Nipun Batra**, Hongning Wang, Kamin Whitehouse
A Tree-Structured Neural Network Model for Household Energy Breakdown
* WWW 2019
21. Haroon Rashid, **Nipun Batra**, Pushpendra Singh
Rimor: Towards Identifying Anomalous Appliances in Buildings
* Buildsys 2018
22. **Nipun Batra**, Yiling Jia, Hongning Wang, Kamin Whitehouse
Transferring Decomposed Tensors for Scalable Energy Breakdown across Regions
* AAI 2018. New Orleans, USA (**Acceptance rate: 25%**)
23. **Nipun Batra**, Hongning Wang, Amarjeet Singh, Kamin Whitehouse
Matrix Factorisation for Scalable Energy Breakdown
* AAI 2017. San Francisco, USA (**Acceptance rate: 25%**)
24. **Nipun Batra**, Amarjeet Singh, Kamin Whitehouse
Gemello: Creating a Detailed Energy Breakdown from just the Monthly Electricity Bill
* KDD 2016. San Francisco, USA (**Acceptance rate: 19%**)
25. **Nipun Batra**, Amarjeet Singh, Kamin Whitehouse
If You Measure It, Can You Improve It? Exploring The Value of Energy Disaggregation
* Buildsys 2015. Seoul, Korea (**Acceptance rate: 29%**)
26. **Nipun Batra**, Jack Kelly, Oliver Parson, Haimonti Dutta, William Knottenbelt, Alex Rogers, Amarjeet Singh, and Mani Srivastava
NILMTK: An Open Source Toolkit for Non-intrusive Load Monitoring
ACM eEnergy 2014. Cambridge, UK (**Acceptance rate: 20%**, 🏆 **710 citations**)
27. **Nipun Batra**, Manoj Gulati, Amarjeet Singh, and Mani Srivastava
It's Different: Insights into home energy consumption in India
* Buildsys 2013, Rome, Italy (**242 citations**)
28. Pandarasamy Arjunan, **Nipun Batra**, Haksoo Choi, Amarjeet Singh, Pushpendra Singh, and Mani Srivastava
SensorAct: A Privacy and Security Aware Federated Middleware for Building Management
* Buildsys 2012, Waterloo, Canada, (**60+ citations**)

Other Peer-reviewed articles

1. Oliver Parson, Grant Fisher, April Hersey, **Nipun Batra**, Jack Kelly, Amarjeet Singh, William Knottenbelt, Alex Rogers
Dataport and NILMTK: A Building Data Set Designed for Non-intrusive Load Monitoring
GlobalSip, Orlando, FL, USA (**60+ citations**)
2. **Nipun Batra**, Haimonti Dutta and Amarjeet Singh
INDiC: Improved Non-Intrusive load monitoring using load Division and Calibration
ICMLA 2013, Miami, USA
3. **Nipun Batra**, Pandarasamy Arjunan, Amarjeet Singh and Pushpendra Singh
Experiences with Occupancy Based Building Management Systems
ISSNIP 2013, Melbourne, Australia

Posters, Demos, and Doctoral Colloquiums

1. Rishiraj Adhikary, Aryan Varshney, **Nipun Batra**
Towards Continuous Respiration Rate Detection While Walking
ACM Ubicomp 2022
2. **Nipun Batra**
Non Intrusive Load Monitoring: Systems, Metrics and Use Cases
[🏆 **Best presentation award**] Sensys 2015
3. Jack Kelly, **Nipun Batra**, Oliver Parson, Haimonti Dutta, William Knottenbelt, Alex Rogers, Amarjeet Singh, and Mani Srivastava
NILMTK v0. 2: A Non-intrusive Load Monitoring Toolkit for Large Scale Data Sets
[🏆 **Best demo award**] Buildsys 2014
4. **Nipun Batra**, Manoj Gulati, Puneet Jain, Kamin Whitehouse and Amarjeet Singh
Bits and watts: improving energy disaggregation performance using power line communication modems
Buildsys 2014

Technical Reports

1. **Nipun Batra**, Rishi Baijal, Amarjeet Singh, Kamin Whitehouse
How good is good enough? Re-evaluating the bar for energy disaggregation
2. **Nipun Batra**, Amarjeet Singh, Kamin Whitehouse
Neighbourhood NILM: A Big-data Approach to Household Energy Disaggregation
3. **Nipun Batra**, Oliver Parson, Mario Berges, Amarjeet Singh, Alex Rogers
A comparison of non-intrusive load monitoring methods for commercial and residential buildings
(70+ citations)
4. **Nipun Batra**, Amarjeet Singh, Pushpendra Singh, Haimonti Dutta, Venkatesh Sarangan, and Mani Srivastava
Data Driven Energy Efficiency in Buildings

Service

I have served in the program committee of various conferences such as: AAAI, Buildsys, COMPASS, or review committee of various journals such as Nature Scientific Data, Nature Scientific Reports, Energy and Buildings. In the interest of space, I am listing only selected services:

TPC (recent only)

- ACM Buildsys 2025
- AAAI 2026
- ACM CODS 2025

Publicity Chair

- ACM eEnergy 2026

Area/Track Chair

- ACM India ARCS 2023
- ACM COMPASS 2022

Publications Chair

- ACM CODS COMAD 2022
- Buildsys 2018

PC Chair

- 4th International NILM workshop 2018

Steering Committee

- 3rd International NILM workshop 2016

Media Coverage and Outreach

VayuBuddy Project Coverage

2024

- Indian Express, Ahmedabad Mirror, Divya Bhaskar, Chitralekha

JoulesEye Project Coverage

2024

- Hackster.io, Indian Express, Carnegie Mellon University News, ZME Science, TechXplore, EurekaAlert

Fulbright-Nehru Fellowship Coverage

2022

- Education Times, Indian Express, Ahmedabad Mirror, India Education Diary, Careers 360

SpiroMask Project Coverage

2023

- Ahmedabad Mirror, Edgelmpulse
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Computational Infrastructure

High-Performance Computing Servers

- **Ramanujan**: 512 GB RAM, AMD EPYC 7452 32-Core, 4x NVIDIA A100-SXM4 (80GB each), 8TB storage
- **Bhaskar**: 256 GB RAM, Intel Gold ICX 6326, 2x NVIDIA RTX A5000 (24GB each), 5TB storage
- **Sustain**: 192 GB RAM, Intel Xeon Silver 4208, 2x NVIDIA RTX A4000 (16GB each), 2TB storage

Research Workstations

- **Aryabhata**: 32 GB RAM, Intel Core i9-13900, NVIDIA RTX Titan XP (12GB), 2TB storage
- **Vikram**: 64 GB RAM, Intel Core i9-14700, NVIDIA RTX A2000 (12GB), 4TB storage

Total Computing Resources: 1TB+ combined RAM, 400+ GB GPU VRAM, 21TB+ storage

Selected Invited Talks

ACM SIGEnergy Rising Star Award talk	2025
ACM Compass Doctoral Colloquium Keynote	2024
IIT Gandhinagar, Chaitanya Khoj <i>AI for school children (300+ students from multiple schools attended)</i>	2018
IIT Gandhinagar, Delhi, Bombay, Kanpur; IIIT Hyd; IISC, MSR India <i>The Billion Building Challenge</i>	2018
Aspiring Minds Research, Delhi <i>The Billion Building Challenge</i>	2016
IBM Research, Delhi <i>Towards practical energy breakdown</i>	2016
Stanford University <i>Towards energy disaggregation for a 100 million homes</i>	2016
University of Pennsylvania <i>If you can measure it, can you improve it?</i>	2015
Carnegie Mellon University <i>If you can measure it, can you improve it?</i>	2015