

# 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 <sup>rd</sup> 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>	June 2025
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

<b>Postdoctoral Scholar</b> University of Virginia, Charlottesville. Advisors: Kamin Whitehouse, Hongning Wang	Mar 2017 - Jun 2018
<b>Graduate Research Assistant</b> IIIT Delhi	Jan 2012 - Mar 2017
<b>Visiting Research Scholar</b> University of Virginia (with Kamin Whitehouse)	Jun 2014 - Apr 2015
<b>Software Analyst</b> Royal Bank of Scotland, Gurgaon, India	Jun 2011 - Nov 2011

**Undergraduate Researcher**  
Linux Android Network Systems Lab, Delhi College of Engineering

Dec 2010 - Jun 2011

**Software Engineering Intern**  
Goldman Sachs, Bangalore

Jun 2010 - Aug 2010

**Undergraduate Research Intern**  
Unmanned Aircraft Systems Lab, Delhi College of Engineering

Dec 2008 - Jul 2010

## 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 2025)

Total citations - 3000, h-Index - 21, i10-Index: 25

### Selected Peer-reviewed articles<sup>1</sup>

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*  
ACM Journal on Computing and Sustainable Societies (JCSS), 2025
2. 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
3. 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
4. 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
5. 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
6. Karm Patel, Rishiraj Adhikary, Zeel B Patel, **Nipun Batra**, Sarath Guttikunda  
*Samachar: print news media on air pollution in India*  
ACM COMPASS 2022
7. Zeel B Patel, Palak Purohit, Harsh Patel, Shivam Sahni, **Nipun Batra**  
*Accurate and Scalable Gaussian Processes for Fine-grained Air Quality Inference*  
\* AAAI 2022
8. 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

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<sup>1</sup>A\* or A conferences as per 2018 CORE CS rankings are highlighted using \*

9. Hetvi Shashtri, **Nipun Batra**  
*Neural network approaches and dataset parser for NILM toolkit*  
\* Buildsys 2021
10. Rishiraj Adhikary, Zeel Patel, Tanmay Srivasatava, **Nipun Batra**, Mayank Singh, Udit Bhatia  
*Vartalaap: What Drives #AirQuality Discussions: Politics, Pollution or Pseudo-science?*  
\* CSCW 2021
11. Rithwik Kukunuri, Anup Aglawe, Jainish Chauhan, Kratika Bhagtani, Rohan Patil, Sumit Walia, **Nipun Batra**  
*EdgeNILM: towards NILM on edge devices*  
\* Buildsys 2020
12. Rishiraj Adhikary, Tanmay Srivastava, Prerna Khanna, Aabhas Asit Senapati, **Nipun Batra**  
*Naaqab: towards health sensing and persuasion via masks*  
Ubicomp 2020 Adjunct
13. Apoorv Agnihotri, **Nipun Batra**  
*Exploring Bayesian Optimization*  
Distill 2020
14. Yiling Jia, **Nipun Batra**, Hongning Wang, Kamin Whitehouse  
*Active Collaborative Sensing for Energy Breakdown*  
\* CIKM 2019
15. **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
16. Yiling Jia, **Nipun Batra**, Hongning Wang, Kamin Whitehouse  
*A Tree-Structured Neural Network Model for Household Energy Breakdown*  
\* WWW 2019
17. Haroon Rashid, **Nipun Batra**, Pushpendra Singh  
*Rimor: Towards Identifying Anomalous Appliances in Buildings*  
\* Buildsys 2018
18. **Nipun Batra**, Yiling Jia, Hongning Wang, Kamin Whitehouse  
*Transferring Decomposed Tensors for Scalable Energy Breakdown across Regions*  
\* AAAI 2018. New Orleans, USA (**Acceptance rate: 25%**)
19. **Nipun Batra**, Hongning Wang, Amarjeet Singh, Kamin Whitehouse  
*Matrix Factorisation for Scalable Energy Breakdown*  
\* AAAI 2017. San Francisco, USA (**Acceptance rate: 25%**)
20. **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%**)
21. **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%**)
22. **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**)
23. **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**)
24. 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:

#### 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

## 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