

# Nipun Batra

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

Date of Birth: 15 Nov 1989  
Nationality: Indian  
Website: <https://nipunbatra.github.io>  
Email: [nipun.batra@iitgn.ac.in](mailto:nipun.batra@iitgn.ac.in)  
ORCID: 0000-0002-0736-7169

Address: 13/401C, Academic Block  
IIT Gandhinagar, Gujarat, India - 382355  
Github: <https://github.com/nipunbatra>  
Lab: Sustainability Lab  
Phone: +91 079 2395 2539

## 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

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

---

## Honours, Awards and Recognitions

|                                                                                                                                                                                                                                                            |      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| SIGEnergy Rising Star Award<br><i>For contributions to reproducible toolkits, scalable models, and uncertainty-aware approaches for practical energy disaggregation</i>                                                                                    | 2025 |
| Test of Time Award<br><i>For significant long-term impact and contributions to the energy disaggregation research community</i>                                                                                                                            | 2025 |
| Excellence in Teaching Award, IIT Gandhinagar<br><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<br><br>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<br><br>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)<br><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

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

---

## Teaching Experience

|                                                                                                                               |
|-------------------------------------------------------------------------------------------------------------------------------|
| <b>AI for Social Good:</b> Spring 2025                                                                                        |
| <b>Probability, Statistics, and Data Visualization:</b> Spring 2025                                                           |
| <b>Machine Learning:</b> Spring 2025, Fall 2024, Spring 2024, Spring 2023, Spring 2022, Spring 2021, Spring 2020, Spring 2019 |
| <b>Probabilistic Machine Learning:</b> Fall 2023, Fall 2022                                                                   |
| <b>Introduction to Computing:</b> Winter 2022, Winter 2021, Winter 2020                                                       |
| <b>Ubiquitous Computing:</b> Fall 2021                                                                                        |
| <b>Operating Systems:</b> 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
9. Hetvi Shashtri, **Nipun Batra**  
*Neural network approaches and dataset parser for NILM toolkit*  
\* Buildsys 2021
10. Rishiraj Adhikary, Zeel Patel, Tanmay Srivastava, **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 Bhagatani, 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**  
*Naqaab: 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

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

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
- 

## 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, EdgeImpulse
-

## 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 |