# Nipun Batra

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

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## Current Role

**Associate Professor** *Nov 2024 - Present*
Computer Science and Engineering
IIT Gandhinagar, Gujarat, India

**Assistant Professor** *July 2018 - Nov 2024*
Computer Science and Engineering
IIT Gandhinagar, Gujarat, India

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## Education

**PhD in Computer Science**, *Jan 2012 - Mar 2017 (submitted Nov 2016, defended Mar 2017)*
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

**B.E. in Computer Engineering**, *Aug 2007 - May 2011*
Delhi College of Engineering, Delhi, India
CGPA: 9/10.0

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## Grants

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

**PI:** exploreCSR: Bridging Digital Divides Through Computing *2025*
Google Faculty Research Award (Amount: ≈ Rs. 64 lacs)

**PI:** Active Air: Active Learning for Air Quality Station Deployment *2022*
GUJCOST (Amount: ≈ Rs. 17 lacs)

**PI:** Fine-grained air quality exposure modeling and forecasting using machine learning *2022*
Ministry of Earth Sciences (Amount: ≈ Rs. 60 lacs)

**PI:** Edge Non-intrusive Load Monitoring *2020*
Cisco Research (Amount: USD 46,200 ≈ Rs. 34 lacs)

**PI:** Impact of air pollution on COVID-related secondary exacerbations *2020*
Google (Amount: USD 50,000 ≈ Rs. 37 lacs)

**PI:** AI and Sensor Networks for Air-quality Monitoring *2020*
SERB (Amount: Rs. 30 lacs)

**Co-PI:** Physics Guided Data Science Approach for Predictive Understanding of Hydrological Processes *2019*
DST STARS (INR 84 lacs)

**PI:** Scalable air-quality estimation using multi-modal data *2018*
Microsoft AI for Earth Grant (USD 30000 ($\approx$ Rs. 22 lacs) in Azure credits )

**PI:** Scalable Sensing and Analytics for Sustainability *2018*
IIT Gandhinagar Internal Grant (Rs. 30 lacs)

**PI:** Machine Learning Approaches for Scalable Air Quality Sensing in India *2018*
NVidia GPU grant ($\approx$ Rs. 1.3 lacs)

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## Honours, Awards and Recognitions

SIGEnergy Rising Star Award *2025*
*For contributions to reproducible toolkits, scalable models, and uncertainty-aware approaches for practical energy disaggregation*

Test of Time Award *2025*
*For significant long-term impact and contributions to the energy disaggregation research community*

Excellence in Teaching Award, IIT Gandhinagar *2025*
*Based on contributions and achievements in teaching, as evidenced by students' feedback*

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.

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## Students: Honours, Awards and Recognitions

Commendation for Outstanding Research (PhD) – Dr. Rishiraj Adhikary (PhD Alumnus) *June 2025*
*IIT Gandhinagar Convocation 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*

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## Selected Research & Industrial Experience

**Postdoctoral Scholar** *Mar 2017 - Jun 2018*
University of Virginia, Charlottesville.
Advisors: Kamin Whitehouse, Hongning Wang

**Graduate Research Assistant** *Jan 2012 - Mar 2017*
IIIT Delhi

**Visiting Research Scholar** *Jun 2014 - Apr 2015*
University of Virginia (with Kamin Whitehouse)

**Software Analyst** *Jun 2011 - Nov 2011*
Royal Bank of Scotland, Gurgaon, India

**Undergraduate Researcher** *Dec 2010 - Jun 2011*
Linux Android Network Systems Lab, Delhi College of Engineering

**Software Engineering Intern** *Jun 2010 - Aug 2010*
Goldman Sachs, Bangalore

**Undergraduate Research Intern** *Dec 2008 - Jul 2010*
Unmanned Aircraft Systems Lab, Delhi College of Engineering

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## 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

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## Publications (Google Scholar profile)

Citation Summary (as of 2025)
Total citations - 3000, h-Index - 21, i10-Index: 25

### Selected Peer-reviewed articles[1]

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 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**
    *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

[1] 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*

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## 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

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## 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

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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

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## Selected Invited Talks

ACM SIGEnergy Rising Star Award talk *2025*

ACM Compass Doctoral Colloquium Keynote *2024*

IIT Gandhinagar, Chaitanya Khoj *AI for school children (300+ students from multiple schools attended)* *2018*

IIT Gandhinagar, Delhi, Bombay, Kanpur; IIIT Hyd; IISC, MSR India *The Billion Building Challenge* *2018*

Aspiring Minds Research, Delhi *The Billion Building Challenge* *2016*

IBM Research, Delhi *Towards practical energy breakdown* *2016*

Stanford University *Towards energy disaggregation for a 100 million homes* *2016*

University of Pennsylvania *If you can measure it, can you improve it?* *2015*

Carnegie Mellon University *If you can measure it, can you improve it?* *2015*