

# Nipun Batra

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## CURRENT ROLE

### Assistant Professor

Computer Science and Engineering  
IIT Gandhinagar, Gujarat, India

July 2018 - Present

## 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: 7 sponsored projects, approximately 3.2 crore INR raised

**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

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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

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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

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<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
<b>Undergraduate Researcher</b> Linux Android Network Systems Lab, Delhi College of Engineering	Dec 2010 - Jun 2011
<b>Software Engineering Intern</b> Goldman Sachs, Bangalore	Jun 2010 - Aug 2010
<b>Undergraduate Research Intern</b> Unmanned Aircraft Systems Lab, Delhi College of Engineering	Dec 2008 - Jul 2010

## TEACHING EXPERIENCE

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Probabilistic Machine Learning: 2022, 2023

Introduction to Programming: 2020, 2021, 2022

Machine Learning: 2019, 2020, 2021, 2022, 2023

Advanced Machine Learning: 2019

Operating Systems: 2018, 2019, 2020

Graduate Systems: 2018, 2019, 2020

Ubiquitous Computing: 2021

## PUBLICATIONS (GOOGLE SCHOLAR PROFILE)

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Citation Summary

Total citations - 2108, h-Index - 22, i10-Index: 20

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

1. 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
2. Rishiraj Adhikary, Dhruvi Lodhavia, Chris Francis, Rohit Patil, Tanmay Srivastava, Perna Khanna, **Nipun Batra**, Joseph Breda, Jacob Peplinski, Shwetak Patel  
*SpiroMask: measuring Lung function using consumer-grade masks*  
ACM Transactions on Health
3. 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
4. Karm Patel, Rishiraj Adhikary, Zeel B Patel, **Nipun Batra**, Sarath Guttikunda  
*Samachar: print news media on air pollution in India*  
ACM COMPASS 2022
5. Zeel B Patel, Palak Purohit, Harsh Patel, Shivam Sahni, **Nipun Batra**  
*Accurate and Scalable Gaussian Processes for Fine-grained Air Quality Inference*  
\* AAAI 2022
6. 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
7. Hetvi Shashtri, **Nipun Batra**  
*Neural network approaches and dataset parser for NILM toolkit*  
\* Buildsys 2021
8. Rishiraj Adhikary, Zeel Patel, Tanmay Srivastava, **Nipun Batra**, Mayank Singh, Udit Bhatia  
*Vartalaap: What Drives #AirQuality Discussions: Politics, Pollution or Pseudo-science?*  
\* CSCW 2021
9. Rithwik Kukunuri, Anup Aglawe, Jainish Chauhan, Kratika Bhagatani, Rohan Patil, Sumit Walia, **Nipun Batra**  
*EdgeNILM: towards NILM on edge devices*  
\* Buildsys 2020
10. Rishiraj Adhikary, Tanmay Srivastava, Perna Khanna, Aabhas Asit Senapati, **Nipun Batra**  
*Naqaab: towards health sensing and persuasion via masks*  
Ubicomp 2020 Adjunct
11. Apoorv Agnihotri, **Nipun Batra**  
*Exploring Bayesian Optimization*  
Distill 2020

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

12. Yiling Jia, **Nipun Batra**, Hongning Wang, Kamin Whitehouse  
*Active Collaborative Sensing for Energy Breakdown*  
\* CIKM 2019
13. **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
14. Yiling Jia, **Nipun Batra**, Hongning Wang, Kamin Whitehouse  
*A Tree-Structured Neural Network Model for Household Energy Breakdown*  
\* WWW 2019
15. Haroon Rashid, **Nipun Batra**, Pushpendra Singh  
*Rimor: Towards Identifying Anomalous Appliances in Buildings*  
\* Buildsys 2018
16. **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%**)
17. **Nipun Batra**, Hongning Wang, Amarjeet Singh, Kamin Whitehouse  
*Matrix Factorisation for Scalable Energy Breakdown*  
\* AAAI 2017. San Francisco, USA (**Acceptance rate: 25%**)
18. **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%**)
19. **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%**)
20. **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%, 500+ citations**)
21. **Nipun Batra**, Manoj Gulati, Amarjeet Singh, and Mani Srivastava  
*It's Different: Insights into home energy consumption in India*  
\* Buildsys 2013, Rome, Italy (**180+ citations**)
22. 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*  
🏆 Sensys 2015 (**Best presentation award**)

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*  
🏆 Buildsys 2014 (**Best demo award**)
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

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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

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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