

# Nazreen Shah Ambalath

Ph.D. Candidate

Indraprastha Institute of Information Technology (IIIT Delhi), India

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I am a Ph.D. candidate at IIIT Delhi, a *Prime Minister's Fellow for Doctoral Research* (SERB-FICCI), and a *DAAD AInet Fellow - 2026*, working at the intersection of federated learning, distributed optimization, and representation learning. My research focuses on building theoretically grounded and communication-efficient federated learning algorithms, with contributions spanning personalized federated learning, continual federated learning, decentralized learning, and over-the-air aggregation. I am particularly interested in understanding convergence behavior under practical constraints such as heterogeneity, limited communication bandwidth, and streaming data. My work has been published at venues including ICASSP, AISTATS, CoLLAs, and TMLR. I have also presented a poster at ICDCN 2025, which won the Best Poster Award. I was also recently a Visiting Scholar at Wayne State University, collaborating on continual learning and unlearning techniques in large-scale Neural Networks.

## Education

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**Ph.D., Department of ECE**, Indraprastha Institute of Information Technology (IIIT Delhi), India 2022 – Present  
**Expected graduation: Jan 2027** CGPA: 8.85\*

Thesis supervisor: Dr. Ranjitha Prasad

*Research Areas:* Federated Learning, Personalized Federated Learning, Continual Federated Learning, Unsupervised Federated Learning, Decentralized Federated Learning

**Integrated M.Tech in Computer Science**, University of Hyderabad, Telangana, India 2015 – 2020  
First Class

## Research Interests

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- Federated Learning (Personalized, Continual, Unsupervised, Decentralized)
- Over-the-Air Federated Learning and Robust Aggregation
- Continual Learning-theoretical foundations and distributed settings
- Machine Unlearning in Large Vision-Language Models

## Research Experience

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**Visiting Scholar**, Wayne State University, Detroit, USA Feb 2026 - Jul 2026  
Supervisor: Dr. Prashant Khanduri, Department of Computer Science

**Research Assistant**, Indraprastha Institute of Information Technology, Delhi, India Sep 2021 - Jan 2022  
Supervisor: Dr. Ranjitha Prasad, ECE Department  
Project funded by DST-SERB, India: "Personalized Federated Learning"

**Research Associate**, Indian Statistical Institute, Kolkata, India

Sep 2020 - Jun 2021

Supervisor: Prof. Ashish Ghosh, Machine Intelligence Unit

Project funded by DRDO, India: "Hardware Trojan Detection on PCB using X-ray Images"

**M.Tech Thesis**, Institute for Development and Research in Banking Technologies, Hyderabad, India Jun 2019 - Aug 2020

Supervisor: Dr. Rajarshi Pal, Centre for Excellence in Cyber Security

Project: "Reversible Data Hiding in Color Images"

## Teaching Experience

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**Teaching Assistant - Distributed and Federated Machine Learning**, IIIT Delhi 2023, 2025

**Teaching Assistant - Probability and Random Process**, IIIT Delhi 2024

**Teaching Assistant - Convex Optimization**, IIIT Delhi 2023

## Peer-Reviewed Publications

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Sarker A, **Shah N**, Sultan R, Jang R, Zhu D, Khanduri P. (2026). Partition-Aware Unlearning for Removing Spurious Correlations in Large Vision-Language Models, NeurIPS 2026, Evaluations and Datasets Track.

**Shah N**, Somireddy N, Shaban Z, Prasad R, Bharath B.N. (2026). Federated Continual Learning as a Distributed Drift-Plus-Penalty Control Problem. Conference on Lifelong Learning Agents, CoLLAs 2026 [Oral Presentation (Top 8%)].

**Shah N**, Arya G, Bharath B.N., Prasad R. (2026). Theoretical Foundations of Continual Learning via Drift-Plus-Penalty. *Transactions on Machine Learning Research (TMLR 2026)*.

Chugh S, Prasad R, **Shah N**. (2026). Informative Perturbation Selection for Uncertainty-Aware Post-hoc Explanations. *ECML-PKDD 2026*.

Fathima Z, Shaban Z, Jamala Y, **Shah N**, Bharath B.N., Prasad R. (2026). Channel-Adaptive Robust Aggregation for Over-the-Air Federated Learning in Heterogeneous Networks. *ICASSP 2026 - IEEE International Conference on Acoustics, Speech and Signal Processing*. IEEE.

Arora K\*, **Shah N\***, Sethi A, Prasad R, Uliyar M, Krishna A.G. (2025). Personalized Federated Autoencoders: Unsupervised Representation Learning at the Edge. *16th Indian Conference on Computer Vision, Graphics and Image Processing (ICVGIP 2025)*.

Keshri S.K., **Shah N**, Prasad R. (2025). On the Convergence of Continual Federated Learning Using Incrementally Aggregated Gradients. *28th International Conference on Artificial Intelligence and Statistics (AISTATS)*.

Shaban Z, **Shah N**, Prasad R. (2025). Robust Over-The-Air Federated Learning In Heterogeneous Networks. *ICASSP 2025 - IEEE International Conference on Acoustics, Speech and Signal Processing*, pp. 1–5. IEEE.

**Shah N**, Prasad R. (2024). Federated Probabilistic Representation Learning using Information Geometric Approach. *Proceedings of the 8th International Conference on Data Science and Management of Data (12th ACM IKDD CODS and 30th COMAD)*, pp. 341–343.

Keshri S.K., **Shah N**, Prasad R. (2024). Continual Federated Learning with Aggregated Gradients. *Proceedings of the 8th International Conference on Data Science and Management of Data (12th ACM IKDD CODS and 30th COMAD)*, pp. 347–349.

**Shah N\***, Goyal P\*, Prasad R. (2024). Importance Sampling Based Federated Unsupervised Representation Learning. *ICASSP 2024 - IEEE International Conference on Acoustics, Speech and Signal Processing*, Seoul, Korea, pp. 7565–7569.

Madhan-Sohini A, Dominic D, **Shah N**, Prasad R. (2023). Over-the-air clustered wireless federated learning. *IEEE Globecom Workshops (GC Wkshps)*, pp. 203–208. IEEE.

## Preprints and Manuscripts Under Review

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Shaban Z, **Shah N**, Prasad R. (2026). Unified Robust and Convergent Over-The-Air Federated Learning under Channel Noise and Heterogeneity. *[Under Review]*

Arya G, **Shah N**, Bharath B.N., Prasad R. (2026). Stochastic Gradient Drift-Plus-Penalty for Replay-based Continual Learning. *[Under Review]*

Chugh S, Prasad R, **Shah N** (2026). CERTAIN: Certification-Aware Predictive Information for Local Explanations. *[Under Review]*

**Shah N**, Khanduri P, Somireddy N.K.R, Bharath B.N., Prasad R. (2026), Unified Continual Learning and Unlearning with Adaptive Constraints. *[Under Review]*

## Fellowships, Awards, and Honors

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### FELLOWSHIPS

|                                                                                                         |      |
|---------------------------------------------------------------------------------------------------------|------|
| <b>DAAD AInet Fellowship</b> , German Academic Exchange Service (Postdoc-NeT-AI, Reliable AI cohort)    | 2026 |
| <b>Prime Minister’s Fellowship for Doctoral Research</b> , SERB-FICCI (Industry partner - LightMetrics) | 2023 |
| Overseas Research Fellowship, IIIT Delhi (International Lab Visit)                                      | 2026 |
| Junior Research Fellowship, DST-SERB                                                                    | 2021 |

### HONORS AND AWARDS

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|---------------------------------------------------------------------|------------|
| Recognized among <b>India’s Top 100 AI/ML Researchers</b> by Amazon | 2026       |
| <b>Best Poster Award</b> , ICDCN 2025                               | 2025       |
| Dean’s List of Best Teaching Assistant, IIIT Delhi                  | 2025, 2026 |

### COMPETITIVE SELECTIONS AND GRANTS

|                                                                                                                                                                                                                            |           |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| Summer schools, selected with funding: MLSS 2026 (financial aid; Columbia University, NYC), M2L 2025 (full grant; Croatia), EEML 2024 (full grant; Serbia)                                                                 | 2024–2026 |
| Travel grants: WiCV (CVPR 2026, Denver, USA), IEEE TCPP (IPDPS 2026, New Orleans, USA), WiML Corporate (NeurIPS 2024, Vancouver, Canada), IEEE SPS (ICASSP 2024, Seoul, South Korea), Qualcomm (ICDCN 2025, IIT Hyderabad) | 2024–2026 |
| Conference financial aid: ECML-PKDD 2026 (Naples, Italy), CoLLAs 2026 (Bucharest, Romania), AISTATS 2025 (Thailand), CODS-COMAD Dec 2024 (IIT Jodhpur), CODS-COMAD 2024 (IIIT Bangalore)                                   | 2024–2026 |

### EARLIER

GATE Qualified; UGC-NET Qualified

2019

Gold Medals: Mathematics School Topper; Computer-Maths Stream Topper

2014

## Conference Presentations & Professional Activities

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Selected to attend and present at **MLSS** Machine Learning Summer School 2026, Columbia University (acceptance rate: 16.67%), NYC, USA. Jun 15–26, 2026.

Selected to attend and present at **CVPR** Women in CV (WiCV) Workshop 2026, Denver, USA. Jun 3–7, 2026.

Selected to attend and present at **IPDPS** PhD Forum 2026, New Orleans, USA. May 25–29, 2026.

Selected to attend and present a poster at **IndoML** Summer School 2025, BITS Pilani. Dec 19–21, 2025.

Selected to attend **M2L** Summer School 2025 (acceptance rate <18%), Split, Croatia. Sep 8–12, 2025.

Microsoft Research India Academic Summit 2025, Virtual.

Work accepted at sister conference track, **CoLLAs 2025**, Philadelphia, USA.

Paper presented at **AISTATS 2025**, Phuket, Thailand.

Paper presented at **ICASSP 2025**, Hyderabad.

Poster presented at **ICASSP 2025** Pre-conference Event, IIT Delhi.

Poster accepted at **ICDCN 2025**, IIT Hyderabad.

Paper accepted at **CODS-COMAD Dec '24**, IIT Jodhpur - YRS Track.

Abstract selected as a poster at **WiML Workshop - NeurIPS 2024**, Vancouver, Canada.

Selected to attend **EEML** Summer School 2024 (acceptance rate <30%), Novi Sad, Serbia, Jul 15–21, 2024. Work presented as poster.

Selected to attend **OxML** Summer School virtually, Jul 1–5, 2024.

Attended **IEEE ICASSP 2024**, Seoul, South Korea. Presented “Importance Sampling Based Federated Unsupervised Representation Learning.” Apr 14–19, 2024.

Attended **CODS-COMAD**, January 2024, IIIT Bangalore.

Attended **IEEE GlobeCom Workshops**, Kuala Lumpur, Malaysia. Presented “Over-the-air clustered wireless federated learning.” Dec 3–8, 2023.

Presented poster on “Clustered wireless federated learning” at **RIISE 2023** Research Expo.

Presented at **IEEE SPS Seasonal School** on AI for Optimisation in Signal Processing Research Symposium on “Decentralized Federated Learning.”

Took part in Annual Cyber Drill for Banks at **IDRBT** (2020).

Co-organized a **Hackweek** in SCIS, University of Hyderabad (2019).

Participated in workshops for System Lab Administration and Campus Network Facilities (2017).

## Service

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|--------------------------------------------------------|------------|
| Reviewer - AISTATS                                     | 2027       |
| Reviewer - IEEE Transactions on Mobile Computing (TMC) | 2026       |
| Reviewer - IEEE Signal Processing Letters (SPL)        | 2026       |
| PC Member - MLSys (Artifact Evaluation)                | 2026       |
| Reviewer - Doctoral Symposium, MMSys                   | 2026       |
| Reviewer - IEEE ICC                                    | 2026       |
| Reviewer - IEEE ICASSP                                 | 2026       |
| Program Committee Member - AAAI FLCA Workshop          | 2025       |
| Reviewer - WiML-NeurIPS                                | 2024, 2025 |
| Volunteer Organizer - NCC 2025, IIT Delhi              | 2025       |

## Community Service

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| Joint Secretary, Student Organization                                                           | 2020 |
| Hostel Chairperson, University of Hyderabad                                                     | 2019 |
| Mess Secretary, University of Hyderabad                                                         | 2018 |
| Department Website Developer, Department of Sociology, University of Hyderabad                  | 2018 |
| Co-ordinator, University Fest (Sukoon) and Community Fest (Keraleeyam), University of Hyderabad | 2017 |
| Co-organizer, Hackweek, SCIS, University of Hyderabad                                           | 2019 |

## Professional Affiliations

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|----------------------------------------------|----------------|
| IEEE, Member                                 | 2023 - Present |
| IEEE Signal Processing Society (SPS), Member | 2024 - Present |
| IEEE Women in Engineering (WIE), Member      | 2024 - Present |
| IEEE Young Professionals, Member             | 2024 - Present |

## Skills

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| <ul style="list-style-type: none"><li>• <b>Programming:</b> Python, PyTorch, SciPy, MATLAB, <math>\LaTeX</math>, C/C++</li><li>• <b>Technical:</b> Convex Optimization, Bayesian Machine Learning, Classification, Deep Learning, Linear Algebra, Federated Learning</li><li>• <b>Tools:</b> Git, Linux, Weights &amp; Biases, Chameleon, Docker</li><li>• <b>Soft Skills:</b> Team Work, Agile, Observant, Responsible, Hard-Working</li></ul> |
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## Languages

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- English - Proficient
- Malayalam - Native
- Tamil - Intermediate
- Hindi - Intermediate
- Arabic - Basic

## Referees

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**Dr. Ranjitha Prasad**

Assistant Professor, ECE  
IIIT Delhi, India  
Federated Learning,  
Continual Learning  
[ranjitha@iiitd.ac.in](mailto:ranjitha@iiitd.ac.in)

**Dr. Prashant Khanduri**

Assistant Professor, CSE  
Wayne State University, USA  
Large-Scale Models,  
Federated Learning  
[prashant.khanduri@wayne.edu](mailto:prashant.khanduri@wayne.edu)

**Dr. Bharath B.N.**

Assistant Professor, EE  
IIT Dharwad, India  
Federated Learning,  
Optimization  
[bharathbn@iitdh.ac.in](mailto:bharathbn@iitdh.ac.in)

**Additional references available upon request.**

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