# **Curriculum Vitae**

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LinkedIn **(**) Webpage



### **Education**

2018 – 2024	Ph.D., Intelligent Systems Engineering, Indiana University Bloomington, USA Thesis: Building Efficient Computation and Communication Models for Dis- tributed Deep Learning Systems Advisor: Martin Swany Major: Computer Engineering CGPA: 3.8/4.0 Expected graduation date: June 2024
2009 – 2013	Bachelor of Technology (B. Tech.), Electrical and Electronics Engineering, Guru Gobind Singh Indraprastha University, New Delhi, India. <i>GPA</i> : 7.6/10.0

### **Research Interests**

- Large-scale ML systems
- Deep Learning and Federated Learning
- Edge, Cloud and High-performance computing (HPC)
- Distributed systems
- Big Data Analytics

## **Research Publications**

#### **Journal Articles**

- **S. Tyagi** and P. Sharma, "OmniLearn: A Framework for Distributed Deep Learning over Heterogeneous Systems," (*in preparation*), 2024.
- 2 S. Chaturvedi, **S. Tyagi**, and Y. Simmhan, "Cost-Effective Sharing of Streaming Dataflows for IoT Applications," *IEEE Transactions on Cloud Computing*, vol. 9, no. 4, pp. 1391–1407, 2021. *O* DOI: 10.1109/TCC.2019.2921371.

### **Conference Proceedings**

- **S. Tyagi**, "Scavenger: A Cloud Service for Optimizing Cost and Performance of DL Training," in 2023 IEEE/ACM 23rd International Symposium on Cluster, Cloud and Internet Computing Workshops (CCGridW), Los Alamitos, CA, USA: IEEE Computer Society, May 2023, pp. 349–350. *O* DOI: 10.1109/CCGridW59191.2023.00081.
- 2

**S. Tyagi** and P. Sharma, "Scavenger: A Cloud Service for Optimizing Cost and Performance of ML Training," in *2023 IEEE/ACM 23rd International Symposium on Cluster, Cloud and Internet Computing* (*CCGrid*), Accept. Rate: 21%, 2023, pp. 403–413. *P* DOI: 10.1109/CCGrid57682.2023.00045.

**S. Tyagi** and M. Swany, "Accelerating Distributed ML Training via Selective Synchronization," in *IEEE International Conference on Cluster Computing, CLUSTER 2023, Santa Fe, NM, USA, October 31 - Nov. 3, 2023,* Accept. Rate: 25%, IEEE, 2023, pp. 1–12. *P* DOI: 10.1109/CLUSTER52292.2023.00008.

S. Tyagi and M. Swany, "Accelerating Distributed ML Training via Selective Synchronization (Poster Abstract)," in 2023 IEEE International Conference on Cluster Computing Workshops (CLUSTER Workshops), 2023, pp. 56–57. ODI: 10.1109/CLUSTERWorkshops61457.2023.00023.

**S. Tyagi** and M. Swany, "Flexible Communication for Optimal Distributed Learning over Unpredictable Networks," in *2023 IEEE International Conference on Big Data (Big Data), Sorrento, Italy,* Accept. Rate: 17.5%, Dec. 2023.



**S. Tyagi** and M. Swany, "GraVAC: Adaptive Compression for Communication-Efficient Distributed DL Training," in *16th IEEE International Conference on Cloud Computing, CLOUD 2023, Chicago, IL, USA, July 2-8, 2023,* Accept. Rate: 20%, IEEE, 2023, pp. 319–329. *9* DOI: 10.1109/CL0UD60044.2023.00045.

 S. Tyagi and M. Swany, "ScaDLES: Scalable Deep Learning over Streaming Data at the Edge," in *2022 IEEE International Conference on Big Data (Big Data)*, Accept. Rate: 19.2%, Los Alamitos, CA, USA: IEEE Computer Society, Dec. 2022, pp. 2113–2122. *O* DOI: 10.1109/BigData55660.2022.10020597.

S. Tyagi and P. Sharma, "Taming Resource Heterogeneity in Distributed ML Training with Dynamic Batching," in 2020 IEEE International Conference on Autonomic Computing and Self-Organizing Systems (ACSOS), Accept. Rate: 25%, Los Alamitos, CA, USA: IEEE Computer Society, Aug. 2020, pp. 188–194.
Ø DOI: 10.1109/ACS0S49614.2020.00041.

C. Widanage, J. Li, **S. Tyagi**, *et al.*, "Anomaly Detection over Streaming Data: Indy500 Case Study," in 2019 IEEE 12th International Conference on Cloud Computing (CLOUD), Accept. Rate: 20%, 2019, pp. 9–16. *O* DOI: 10.1109/CLOUD.2019.00015.

J. Qiu, B. Peng, R. Teja, **S. Tyagi**, C. Widanage, and J. Koskey, "Real-Time Anomaly Detection from Edge to HPC-Cloud," in *2018 Big Data and Exascale Computing Workshop (BDEC2)*, 2018. *O* URL: https://exascale.org/bdec/sites/exascale.org.bdec/files/whitepapers/Qiu\_BDEC2\_WP.pdf.

1) S. Chaturvedi, **S. Tyagi**, and Y. Simmhan, "Collaborative Reuse of Streaming Dataflows in IoT Applications," in *2017 IEEE 13th International Conference on e-Science (e-Science)*, Accept. Rate: 36%, 2017, pp. 403–412. *9* DOI: 10.1109/eScience.2017.54.

### **Teaching Experience**

#### Associate Instructor

- High-Performance Computing: Spring 2024
- Computer Networks: Fall 2023, Fall 2022
- **Operating Systems**: Spring 2023
- **Engineering Distributed Systems**: Spring 2022, Spring 2021
- Cloud Computing: Fall 2021, Fall 2020, Fall 2019

### Miscellaneous

#### Awards and Achievements

- **NSF Student Grant:** To present research at IEEE CLUSTER 2023, Santa Fe, New Mexico.
- Luddy Dean's Graduate Student Award: In Fall 2023 for outstanding research.
- NSF Travel Award: To present research at IEEE/ACM CCGrid 2023, Bengaluru, India.
- **Best early-career researcher poster award:** Awarded at IEEE/ACM CCGrid 2023.
- **Google Cloud Student Researcher (2021, 2022):** Received GCP credits for research.
- **Student Research Award:** Funded via grant NSF Data Infrastructure Building Blocks (DiBBS) 17-500, for academic year 2018-2019.

#### **Professional Services**

USENIX OSDI/ATC 2024: Artifact Evaluation Committee

IEEE CLUSTER 2024: Technical Program Committee

#### Presentations and Talks

- **4/24**: Guest lectures, "Parallel Computing with GPUs for Distributed ML Applications", High-Performance Computing (HPC) course, Indiana University Bloomington, USA.
- **12/23**: Paper presentation, "Flexible Communication for Optimal Distributed Learning over Unpredictable Networks." 2023 IEEE International Conference on Big Data, Sorrento, Italy.
- **11/23**: Paper presentation, "Accelerating Distributed ML Training via Selective Synchronization." 2023 IEEE International Conference on Cluster Computing, Santa Fe, New Mexico, USA.
- **11/23**: Poster presentation, "Accelerating Distributed ML Training via Selective Synchronization." 2023 IEEE International Conference on Cluster Computing, Santa Fe, New Mexico, USA.
- **07/23**: Paper presentation, "GraVAC: Adaptive Compression for Communication-Efficient Distributed DL Training." 2023 IEEE International Conference on Cloud Computing, Chicago, Illinois.
- **05/23**: Paper presentation, "Scavenger: A Cloud Service for Optimizing Cost and Performance of ML Training." 2023 IEEE/ACM International Symposium on Cluster, Cloud and Internet Computing, Bengaluru, India.
- **05/23**: Poster presentation, "Scavenger: A Cloud Service for Optimizing Cost and Performance of ML Training." 2023 IEEE/ACM International Symposium on Cluster, Cloud and Internet Computing, Bengaluru, India.
- 12/22: Paper presentation, "ScaDLES: Scalable Deep Learning over Streaming Data at the Edge." 2022 IEEE International Conference on Big Data, Osaka, Japan.
- **07/20**: Paper presentation, "Taming Resource Heterogeneity in Distributed ML Training with Dynamic Batching." 2020 IEEE International Conference on Autonomic Computing and Self-Organizing Systems, virtual.
- **11/18**: "Real-Time Anomaly Detection from Edge to HPC-Cloud", Intel Speakerships at SC18 (Proceedings of the International Conference for High Performance Computing, Networking, Storage, and Analysis 2018), Dallas, Texas, USA.

### Skills

Programming	Python, C, C++, Bash, MPI, OpenMP, CUDA, Java, Scala, SQL, MATLAB, R
Frameworks/Tools	PyTorch, TensorFlow, MXNet, Keras, Hadoop, Spark, Kafka, Slurm, Cloud APIs
Miscellanoeus	Academic research, grant writing, teaching, Large X typesetting and publishing.

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### **Employment History**

2018 – 2024	<b>Graduate Researcher</b> and <b>Associate Instructor</b> , Luddy School of Informatics, Computing and Engineering, Indiana University Bloomington, USA.
2017 – 2018	<b>Research Staff Member</b> , Dept. of Computational and Data Sciences (CDS), Indian Insti- tute of Science (IISc), Bengaluru, India.
2016 – 2016	Data Scientist, HT Media Limited, Gurugram, Haryana, India.
2015 - 2015	Data Engineer, Stayzilla, Bengaluru, Karnataka, India.
2013-2015	Software Engineer, Tatras Data Limited, New Delhi, India.

## **Employment History (continued)**

2009-2013 📕 Undergraduate student, Guru Gobind Singh Indraprastha University, New Delhi, India.