

Hasnain Irshad Bhatti

<http://hasnainirshad.github.io>

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Ph.D. candidate in Electrical Engineering developing efficient and privacy-preserving AI for on-device and distributed systems, with emphasis on model merging, optimization, federated learning, and active learning.

EDUCATION

- Korea Advanced Institute of Science and Technology** Daejeon, KR
• *Ph.D. in Electrical Engineering (Advisor: Prof. Jaekyun Moon)* Mar. 2022 – Aug 2026 (Exp.)
Dissertation Title: A Study on Model Merging in Real-World Applications of Deep Learning
- Korea Advanced Institute of Science and Technology** Daejeon, KR
• *M.S. in Electrical Engineering (Advisor: Prof. Jaekyun Moon)* Sept. 2020 – Feb. 2022
Dissertation Title: Decoupled Training of Neural Networks with Periodic Knowledge Distillation
- University of Engineering and Technology, Lahore** Lahore, PK
• *Bachelor of Science in Electrical Engineering; Double Gold Medalist* Oct. 2016 – July. 2020

EXPERIENCE

- MoonLab, KAIST** Daejeon, KR
• *Lab Researcher* Jan 2021 - Present
 - **Efficient Active Learning:** Proposed PruneFuse, which combines structured pruning and weight-aligned model merging to warm-start target training after data selection, reducing selection-phase compute by up to 96%.
 - **Model Merging in Sparse Networks:** Developed Ada-HiSS, a spectral-sparse decomposition for data-free merging of pruned FM experts, enabling storage-efficient serving of experts in resource-constrained environments.
 - **Federated and Split Learning:** Devised communication and computational efficient frameworks for distributed learning setups under heterogeneous clients using model merging, local loss and evolutionary algorithms.
 - **Decoupled Training of Neural Networks:** Formulated a decoupled training strategy for layer-wise training of deep neural networks with periodic knowledge distillation.
- Al-Khawarizmi Institute of Computer Science, UET Lahore** Lahore, PK
• *Research Intern* April 2019 - Dec 2019
 - **Edge deployment:** Built a real-time accident detection and forensic scene-analysis pipeline using deep learning and computer vision; deployed the system on NVIDIA Jetson Nano.
 - **3D scene understanding:** Developed monocular vehicle depth estimation using vanishing-point geometry and blur-based cues for road-scene analysis.
- Advanced Communication Laboratory, LUMS** Lahore, PK
• *Research Intern* July 2019 - Dec 2019
 - **Wireless sensing:** Modeled WiFi RSS-based breathing-rate estimation in complex environments and extended the framework to multi-person scenarios.

PUBLICATIONS AND PREPRINTS

- **Hasnain I. Bhatti***, H. Kousar and J. Moon, “Merging in the Small Room: A Spectral-Sparse Decomposition for Pruned Experts”, in preparation for Neural Information Processing Systems (NeurIPS) 2026.
- **Hasnain I. Bhatti***, and J. Moon, “Drift-aware Few Round Model Merging in Heterogeneous Federated Learning”, in preparation for Neural Information Processing Systems (NeurIPS) 2026.
- M. M. Rahimi, Y Park, H. Kousar, **Hasnain I. Bhatti**, Dong-Jun Han, J. Moon, ”Reshape-then-Factorize: Communication-Efficient FL via Model-Agnostic Projection Optimization”, (preprint) under review at International Conference on Machine Learning (ICML), 2026.
- H. Kousar*, **Hasnain I. Bhatti*** and J. Moon, “PruneFuse: Efficient Data Selection via Weight Pruning and Network Fusion,” Featured Certification (Spotlight) in Transactions on Machine Learning Research, Mar. 2026. (* indicates equal contribution)
- H. Kousar*, **Hasnain I. Bhatti*** and J. Moon, “Pruning-based Data Selection and Network Fusion for Efficient Deep Learning,” Attributing Model Behavior at Scale (ATTRIB) workshop at Neural Information Processing Systems (NeurIPS), Dec. 2024. (* indicates equal contribution)

- M. M. Rahimi, **Hasnain I. Bhatti**, Y. Park, H. Kousar and J. Moon, “EvoFed: Leveraging Evolutionary Strategies for Efficient and Privacy-Preserving Federated Learning,” Neural Information Processing Systems (NeurIPS), Dec. 2023.
- **Hasnain I. Bhatti** and Jaekyun Moon, “Locally Supervised Learning with Periodic Global Guidance”, Hardware Aware Efficient Training Workshop at ICML 2022.
- Wenchao Dong, Bryan Wong, **Hasnain Irshad Bhatti**, Lanu Kim, Meeyoung Cha. “Analyzing Web data to examine the gender pay gap in STEM fields.” Proceedings of the Korea Computer Congress (KCC). 2022.
- Wenchao Dong, Bryan Wong, **Hasnain Irshad Bhatti**, Lanu Kim, Meeyoung Cha. “Analyzing Gender Pay Gap in STEM Fields by Life Trajectory.” Extended Abstract at the International Conference on Computational Social Science (IC2S2). 2022.
- Dong-Jun Han, **Hasnain I. Bhatti**, Jungmoon Lee, and Jaekyun Moon, ”Accelerating Federated Learning with Split Learning on Locally Generated Losses”, ICML Workshop on Federated Learning for User Privacy and Data Confidentiality, July 2021.

REVIEWING SERVICE

- International Conference on Learning Representations (**ICLR**) 2025, 2026
- Advances in Neural Information Processing Systems (**NeurIPS**) 2024, 2025
- International Conference on Machine Learning (**ICML**) 2025
- Artificial Intelligence and Statistics (**AISTATS**) 2025, 2026

ENGINEERING PROJECTS

- Crime Scene Detection and its analysis (depth estimation, tracking) using deep learning (2020).
- Multipurpose Autonomous Wheelchair with Raspberry Pi (2019).
- Two-wheel self-balancing robot using STM32 micro-controller (2018).
- Smart Switch Board (for Home Automation) using TIVA Launchpad TM4C123G (2017).
- Remote controlled Dimming Circuit using TM4C123G (2017).

TEACHING EXPERIENCE

- **KAIST, School of Electrical Engineering** Daejeon, South Korea
Teaching Assistant, Machine Learning Basics and Practices *Spring 2025*
- **UET Lahore, Department of Electrical Engineering** Lahore, PK
Teaching Assistant, Introduction to Programming *Fall 2019*
- **UET Lahore, Department of Electrical Engineering** Lahore, PK
Teaching Assistant, Digital Systems *Fall 2018*

HONORS AND LEADERSHIP

- **KAIST International Students Representative:** KAIST, 2023-2026.
- **EE International Office Ambassador:** KAIST, 2023-2024.
- **Young Future Energy Leader:** Khalifa University, 2022-2023.
- **Double Gold Medalist:** BS in Electrical Engineering UET Lahore, Batch 2016-2020
- **Vice President Operations:** IET On Campus UET Lahore, 2019-2020.
- **Director Education:** Education for Every Child Society, 2019-2020.
- **Dean’s roll of honor:** Fall 2016, Spring 2017, Fall 2017, Spring 2018, Fall 2019.
- **Best Microprocessor Project Award:** Electrical Engineering Dept, UET Lahore, 2018.
- **Scholarship Recipient:** Pakistan Engineering Congress (2018, 2019).
- **Award:** Laptop from Prime Minister Laptop Scheme based on excellence, 2018.
- **Head Robotics:** IET On Campus UET Lahore, 2018-2019.

PROGRAMMING SKILLS

- **Languages:** Python, Pytorch, C, Java, Verilog, x86 assembly, SQL **Microcontrollers:** RPI, STM32, Tiva-C series, Intel Cyclone-V, Arduino