Ahsan Bilal

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RESEARCH INTERESTS

Deep Learning for Optimization: Theoretical foundations of deep learning optimization, robust LLM reasoning models, and structured generative models, including discrete diffusion architectures.

Reinforcement Learning: RL-driven reasoning for LLMs, agentic frameworks for test-time compute optimization, and process reward models for mathematical problem-solving.

Wireless Communications & ML: Diffusion-based channel estimation, neural fields for wireless systems, continual learning under distribution shift, and RAG pipelines for multimodal wireless environments.

EDUCATION

University of Oklahoma, Oklahoma, USA 2024–Present
MS in Computer Science (Deep Learning, Reinforcement Learning, & LLMs)

- CGPA: 3.86/4.0
- Advisor: Dr. Dean Hougen: Research on deep learning optimization, robust LLM reasoning, and RL-based agentic systems.

National University of Sciences & Technology (NUST-SEECS), Islamabad, Pakistan Aug. 2020 – June 2024
Bachelor of Engineering in Electrical Engineering

- CGPA: 3.66/4.0 | Specialization GPA: 4.0/4.0 | Merit Scholarship 2020
- Senior Design Thesis: Person identification using gait with fused graph and 3D-convolutional architectures (Presentation)

RESEARCH EXPERIENCE

Graduate Researcher REAL Lab, University of Oklahoma
Advisor: Dr. Dean Hougen *Aug 2024 – Present*

- Research on structured generative models and RL-driven reasoning for LLMs (targeting ICML'26), including discrete diffusion models and agentic RL controllers for test-time compute optimization.
- Contributed to continual-learning and diffusion-based wireless channel prediction models (two ICASSP'26 submissions).

Research Collaborator MLCN Lab, Stanford University
Supervisor: Prof. John M. Cioffi | Collaborator: M. A. Mohsin *Aug 2024 – Present*

- Developed diffusion-based wireless estimation, neural fields (nGRF), continual learning under distribution shift, and RAG pipelines for multimodal wireless systems.
- Publications: ICLR'26 (under review), NeurIPS'25, ICML'25, AAAI'25, ICC'25 (Best Paper).

Undergraduate Researcher Optimal ML Lab, NUST
Supervisor: Dr. Ahmad Salman *Jan 2023 – June 2024*

- Built robust CV/biometric models: boosted-attention ViT for shadow removal and fused GCN + 3D-CNN for gait recognition.
- Papers under review: Shadow Removal with Boosted Attention, Gait ID using Fused Graph + 3D-CNN.

SELECTED PUBLICATIONS

Google Scholar

[PC1] What If We Allocate Test-Time Compute Adaptively? ICML'26 (Submitted)
A. Bilal, A. Mohsin, M. Umer, A. Subhan, H. Rizwan, A. Mohsin, D.F. Hougen

[PC2] Continuous-Utility Direct Preference Optimization ICML'26 (Submitted)
M.A. Mohsin*, M. Umer*, A. Bilal, Z. He, M.U. Rafique, A. Aali, M.A. Jamshed, J.M. Cioffi, E. Fox

[PC3] ITDPDM: Information-Theoretic Discrete Poisson Diffusion Model NeurIPS'25
S. Bhattacharya, A.R. Gorle, A. Bilal, C. Ding, A.K.S. Yadav, T. Weissman

[PC4] On the Fundamental Limits of LLMs at Scale TMLR'26 (Submitted)
A. Mohsin, A. Bilal, W. Zhao, M. Umer, and Researchers from DeepMind and Meta

[PC5] Neural Gaussian Radio Fields for Channel Estimation KDD'26 (Submitted)
M. Umer, M.A. Mohsin, A. Bilal, J.M. Cioffi

[PC6] Channel Prediction Under Network Distribution Shift Using Continual Learning-Based Loss Regularization ICASSP'26
M.A. Mohsin, M. Umer, A. Bilal, M.I. Qadir, M.A. Jamshed, D.F. Hougen, J.M. Cioffi

[PC7] Conditional Prior-Based Non-Stationary Channel Estimation Using Accelerated Diffusion Models ICASSP'26
M.A. Mohsin, A. Bilal, M. Umer, A. Ali, M.A. Jamshed, D.F. Hougen, J.M. Cioffi

[PC8] Transformer-Based Sparse CSI Estimation for Non-Stationary Channels ICC'26
M.A. Mohsin, M. Umer, A. Bilal, H. Rizwan, S. Bhattacharya, M.A. Jamshed, J.M. Cioffi

[PC9] Continual Learning for Wireless Channel Prediction ICML'25
M.A. Mohsin, M. Umer, A. Bilal, M.A. Jamshed, J.M. Cioffi

[PC10] Task Aware Distributed Source Coding for Correlated Audio Signals Using Perceptual Loss AAAI'25
S. Bhattacharya, M.A. Mohsin, A. Bilal, J.M. Cioffi

[PC11] Retrieval Augmented Generation with Multi-Modal LLM Framework for Wireless Environments ICC'25
M.A. Mohsin, A. Bilal, S. Bhattacharya, J.M. Cioffi

[PC12] HDRL for Spectrum Resource Optimization in Integrated Terrestrial and Non-Terrestrial Networks AAAI'25
M.A. Mohsin, H. Rizwan, M. Umer, S. Bhattacharya, A. Bilal, J.M. Cioffi

[PC13] Abstract – LLM for Explainable AI IEEE DSAA'24
A. Bilal, B. Lin

[PC14] Meta-Thinking in LLMs via Multi-Agent Reinforcement Learning: A Survey IEEE TAI (Submitted)
A. Bilal, M.A. Mohsin, M. Umer, M.A.K. Bangash, M.A. Jamshed

[PC15] On Shadow Removal With Boosted Attention in a Vision Transformer Springer ML (Submitted)
A. Bilal, A. Salman, K. Khurshid, D.F. Hougen

[PC16] Person Identification using Gait with Fused Graph and 3D-Convolutional Architectures ACM TAIS (Submitted)
A. Bilal, A. Salman, K. Khurshid

INDUSTRY EXPERIENCE

Machine Learning Engineer Islamabad, Pakistan
Cowlar Design Studio (Y Combinator 21) — Based in USA *Feb 2024 – Aug 2024*

- Developed Action Recognition system for Smart Carts with 95% accuracy; built dual inference deployment for edge devices and Nvidia cluster.
- Automated fiber cable alignment using computer vision and ML with 96% success, improving precision to 5 micrometers and scaling production 40x.

UI Developer Dubai, UAE (Remote)
SJCurve *March 2023 – Aug 2024*

- Created responsive web applications using WordPress and React.js, customized themes, and integrated frontend with backend.

UX/UI Designer Wah Cantt, Pakistan (Remote)
Meraki-IT *Nov 2022 – Mar 2023*

- Led UI/UX design for multiple projects, analyzing problem statements and designing intuitive interfaces for technology sector.

TEACHING EXPERIENCE

Teaching Assistant University of Oklahoma
CS-1313: Programming for Non-majors in C *Fall 2024 – Present*

- Worked with Dr. Neeman to design weekly lab assignments, grade with clear rubrics, and lead help sessions supporting students with C programming.

REVIEWER AND TALKS

Conference Reviewer: ICASSP, PAKDD.

Journal Reviewer: TMLR, IEEE WCM, Springer MT&A, IP&M, Aquaculture Int., IJIM, IEEE Access, ICES, ISFI.

Talks: Gave a talk on "AI in Healthcare" at Norman Regional Hospital under Dr. Lubna Mirza.

HONORS AND ACHIEVEMENTS

Honorary Certificate of Appreciation: IEEE Communications Society Student Competition 2025 for "Democratizing 6G: AI-Native Wireless Digital Twin for Global Digital Equity and Sustainability."

Best Student Presentation Runner-up Award: IEEE DSAA'24 Student Forum.

Graduate Fellowship: Awarded Gallogly College of Engineering Graduate Fellowship 2025.

Best Paper Award: ICC Workshop 2025 in Montreal.

Student Travel Grant: IEEE DSAA 2024 in San Diego.

Best Adjudged Industrial Project Award: Final Year Project received 1st place at NUST Open House 2024.

UGRIP Selection: Selected as Undergraduate Research Intern for First Cohort by MBZUAI.

IEEE Recognition: Selected as Emerging Young Researcher in IEEE Islamabad Section.

Prime Minister Laptop Scheme: Winner of scholarship program.

CERTIFICATIONS

Google UX Professional Certificate

Deep Learning Specialization Certificate

The Advanced Communication Skills Course

SKILLS

Programming: Python, C/C++, Embedded C, MATLAB.

Deep Learning: PyTorch, TensorFlow (Keras), OpenCV, Docker, Mlflow, EC2 Instance.

Web Development: Javascript (React.js), HTML/CSS, Next.js.

Tools: VS Code, Git, AutoCad, Figma, PyCharm, Raspberry Pi OS, NginX.

Design: Figma, AdobeXD, Adobe Illustrator, Adobe Photoshop, Sketch, WordPress Theme Design.