Hafeez Khan

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Education

- **Florida Institute of Technology** — Florida, USA
  Masters & Ph.D. in Computer Science (GPA: 3.84, PhD Advisor: Prof. Siddhartha Bhattacharyya) — *Expected 2027*
- **Birla Institute of Technology and Science, Pilani** — Dubai, UAE
  Bachelors of Engineering in Computer Science (GPA: 3.70, Thesis Advisor: Prof. Raja Muthalaghu) — *2023*

Recent Publications

∗ equal contribution

Test-time Prompt Refinement for Text-to-Image Models [PDF]
M.A. Hafeez Khan*, Yash Jain*, Siddhartha Bhattacharyya, Vibhav Vineet
[Oral Presentation] Workshop on Multimodal Reasoning and Slow Thinking in Large Model Era at **ICCV**, 2025

Adapt, But Don't Forget: Fine-Tuning and Contrastive Routing for Lane Detection under Distribution Shift [PDF]
M.A. Hafeez Khan, Parth Ganeriwala, Sarah M. Lehman, Siddhartha Bhattacharyya, Amy Alvarez, Natasha Neogi
Workshop on Out Of Label Hazard Detection in Autonomous Driving at **ICCV**, 2025

Few-Shot Classification and Anatomical Localization of Tissues in SPECT Imaging [PDF]
M.A. Hafeez Khan, Samuel M. Boddepalli, Siddhartha Bhattacharyya, Debasis Mitra
[Oral Presentation] Medical Imaging Conference (**MIC**), 2025

ALINA: Advanced Line Identification and Notation Algorithm [PDF]
M.A. Hafeez Khan, Parth Ganeriwala, Siddhartha Bhattacharyya, Natasha Neogi, Raja Muthalagu
Workshop on Vision Datasets Understanding at **CVPR**, 2024

A Hybrid BiLSTM-CNN Approach for Intrusion Detection for IoT Applications [PDF]
M.A. Hafeez Khan, Sapna Sadhwani, Raja Muthalagu, Pranav Pawar, K. Suresh
Scientific Reports, Springer, 2024

Research and Work Experience

Research Assistant at ASSIST Lab (Florida Tech) — Fall 2023 – Present

- **NASA-Funded Research** — Fall 2024 – Present
  Guide: Natasha Neogi, Sarah Lehman, Siddhartha Bhattacharyya — ***NASA Langley Research Center, USA***
  - Topics: Few Shot Learning, Contrastive Learning, Unsupervised Learning, Multi-modal learning (Text and Vision)
  - Developed 2D vision algorithms for automated labeling of lane and taxiway datasets, improving detection accuracy by **8.04%** and reducing processing latency by **58.38%**.
  - Designed continual learning methods for lane detection, reaching high accuracy using just **41%** of parameters.
  - Created test-time architecture for few-shot lane segmentation using COCO/PASCAL-pretrained models, achieving a **433.82%** improvement over baseline.
- **Microsoft-Volunteer Research** — Spring 2025
  Guide: Yash Jain, Vibhav Vineet, Siddhartha Bhattacharyya — ***Microsoft Research, USA***
  - Topics: Multi-modal Reasoning (Text and Vision), Diffusion Models, Test-time Adaptation, Prompt Optimization
  - Developed a closed-loop test-time prompt refinement framework using multimodal LLMs, improving text-to-image generation by **+20.34%** on DALL-E 3, **+22.75%** on Flux, and upto **+39.36%** on Stable Diffusion models.
- **Defense Advanced Research Projects Agency (DARPA)-Funded Research** — Summer 2025
  Guide: Junaid Babar, Isaac Amundson, Siddhartha Bhattacharyya — ***Collins Aerospace, USA***
  - Topics: Formal Verification, Model Checking, Language Translation
  - Built an automated Soar-to-PRISM translator in ANTLR/Java to enable formal verification of cognitive models.
- **AHA-Funded Research** — Summer 2024
  Guide: Venkat Keshav Chivukula — ***UTHealth Houston, USA***

- Topics: Self-Supervised Learning, Representation Learning, 3D Reconstruction, Computational Fluid Dynamics
- Designed LVADNet3D, an autoencoder for intraventricular velocity reconstruction across x, y, and z directions, outperforming UNet3D with **34.13%** lower error and **10.55%** higher fidelity.
- Generated and labeled CFD hemodynamic data from LVAD patients to train and validate 3D deep learning models.

Software Engineer Intern at Sentient Labs Summer 2023
Guide: Anshul Singhal, Nilesh Goel ***Sentient Labs, UAE***

- Built fleet management and health monitoring solutions for **50+** commercial drones and leveraged AWS IoT Services.

Awards

- Awarded for **Outstanding Academic Achievement** at Florida Tech 2025
- **Outstanding Undergraduate Thesis Award** for excellent undergraduate thesis at BITS Pilani Dubai 2023
- **Winners** in **IEEE UAE Computing and Robotics Competition**, for project **Robotics for Road Safety** 2022

Skills

Programming Languages: Python, C/C++, Java, R, SQL

ML Frameworks & Libraries: PyTorch, TensorFlow, Pandas, rLLm, VeRL, OpenCV, MMDetection, Diffusers

Cloud Platforms & Services: Azure (ML Studio, DevOps), AWS (S3, SageMaker), GCP (Google Maps, Cloud Storage),

Other Publications

Modular Test-time Input-Space Refinement for Few-Shot Segmentation
M.A. Hafeez Khan, Parth Ganeriwala, Amy Alvarez, Siddhartha Bhattacharyya
Under submission at NeurIPS conference 2025

LVADNet3D: A Deep Autoencoder for Reconstructing 3D Intraventricular Flow from Sparse Data
M.A. Hafeez Khan, Marcello Mattei, Ben Diaz, Ruth White, Siddhartha Bhattacharyya, Venkat Keshav Chivukula
Under submission at International Conference on Machine Learning and Applications (**ICMLA**), 2025

NORA: A Nephrology-Oriented Representation Learning Approach Towards CKD Classification
M.A. Hafeez Khan, T. Bhattacharyya, O. Khan, Noorah Khan, Alina Khan, M.Q. Khan, Sujoy Hajra
Under submission at International Conference on Machine Learning and Applications (**ICMLA**), 2025

Runway vs. Taxiway: Challenges in Automated Line Identification and Notation Approaches [PDF]
Parth Ganeriwala, Amy Alvarez, Abdullah AlQahtani, Siddhartha Bhattacharyya, M.A. Hafeez Khan, Natasha Neogi
IEEE International Systems Conference (**SysCon**), 2025

AssistTaxi: A Comprehensive Dataset for Taxiway Analysis and Autonomous Operations [PDF]
Parth Ganeriwala, Siddhartha Bhattacharyya, S. Gunther, Brian Kish, M.A. Hafeez Khan, Aknur Dhadoti, Natasha Neogi
International Conference on Machine Learning and Applications (**ICMLA**), 2023

Classification of Microstructure Images of Metals Using Transfer Learning [PDF]
M.A. Hafeez Khan, Hrishikesh Sabnis, J. Angel Arul Jothi, J. Kanishkha, A.D. Prasad
International Conference on Modelling and Development of Intelligent Systems (**MDIS**), 2022

Detection of Cavities from Oral Images using Convolutional Neural Networks [PDF]
M.A. Hafeez Khan, Giri Prasad S., J. Angel Arul Jothi
[Best Paper Award] IEEE International Conference on Electrical, Computer and Energy Technologies (**ICECET**), 2022

Detection of Bicep Form Using Myoware and Machine Learning [PDF]
M.A. Hafeez Khan, Rohan V. Rudraraju, R. Swarnalatha
International Conference on Advances in Data-driven Computing and Intelligent Systems (**ADCIS**), 2022

Teaching Experience

Graduate Teaching Assistant Florida Tech
Primary Instructor: Prof. Philip Chan (FLTech) *Aug '23 – May '24*

- Course: CSE2010 Algorithms & Data Structures; My Rating: 4.9/5.