

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

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: Continual Learning, Self-Supervised Learning, Vision Language Models, Generative Modeling
 - Implemented and fine-tuned Stable Diffusion models to generate synthetic data for lane markings in minority scenarios (e.g., rain, fog), and improved detection performance on underrepresented classes by **+12.1%**.
 - Developed multi-modality (camera + lidar) perception algorithms for automated labeling of over **300,000** lanes and taxiways images, improving detection accuracy by **8.04%** and reducing GPU latency per frame by **58.38%**.
 - Designed a continual learning approach for lane detection, reaching high accuracy using just **41%** of parameters.
 - Created test-time architecture for few-shot segmentation of lanes using COCO/PASCAL-pretrained models, achieving a **+433.82%** improvement over baseline. Additionally applied GRAD-CAM to provide explainability.
- Microsoft-Volunteer Research** Spring 2025
Guide: Yash Jain, Vibhav Vineet, Siddhartha Bhattacharyya **Microsoft Research, USA**
 - Topics: Image Generation, Multi-modal Large Language Models, Text-to-Image, Prompt Optimization
 - Developed a closed-loop test-time prompt refinement framework using multimodal LLMs, improving text-to-image alignment by **+20.34%** on DALL-E 3, **+22.75%** on Flux, and upto **+39.36%** on Stable Diffusion 1.5/2.1/3.0.
- Defense Advanced Research Projects Agency (DARPA)-Funded Research** Summer 2025
Guide: Junaid Babar, Isaac Amundson, Siddhartha Bhattacharyya **Collins Aerospace, USA**
 - Topics: Trust and Safety, Formal Verification, Reinforcement Learning, 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 Chivrukula **UTHealth Houston, USA**
 - Topics: 3D/4D Reconstruction, Self-Supervised Learning, Representation Learning, 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%** PSNR.
 - Generated CFD hemodynamic datasets of **250 LVAD patients** for training 3D models.
- Software Engineer Intern at Sentient Labs** Summer 2023
Guide: Anshul Singhal, Nilesch Goel **Sentient Labs, UAE**

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

AWARDS

- Awarded **1st place** and won **\$1000** in the **Meta**-hosted competition at ICCV 2025, on Computationally Optimal Gaussian Splatting (COGS). 2025
- 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 Robotics Competition**, for project 3D Object Detection and Tracking for Road Safety. 2023

SKILLS

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

ML Frameworks & Libs: PyTorch, TensorFlow, 3D Gaussian Splatting (3DGS), FlashGS, gsplat, Diffusers, scikit-learn, rLLm, VeRL, ray tracing, MMDetection, OpenCV

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

PUBLICATIONS

* equal contribution

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
[\[Oral Presentation\]](#) Workshop on Out Of Label Hazard Detection in Autonomous Driving at **ICCV**, 2025

Test-time Prompt Refinement for Text-to-Image Models [\[PDF\]](#)

[M.A. Hafeez Khan*](#), Yash Jain*, Siddhartha Bhattacharyya, Vibhav Vineet
[\[Invited Talk\]](#) Workshop on Multimodal Reasoning and Slow Thinking in Large Model Era 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

IVADNet3D: A Deep Autoencoder for Reconstructing 3D Intraventricular Flow from Sparse Data [\[PDF\]](#)

[M.A. Hafeez Khan](#), Marcello Mattei, Ben Diaz, Ruth White, Siddhartha Bhattacharyya, Venkat Keshav Chivukula
[\[Oral Presentation\]](#) International Conference on Machine Learning and Applications (**ICMLA**), 2025

NORA: A Nephrology-Oriented Representation Learning Approach Towards CKD Classification [\[PDF\]](#)

[M.A. Hafeez Khan](#), T. Bhattacharyya, O. Khan, Noorah Khan, Alina Khan, M.Q. Khan, Sujoy Hajra
[\[Spotlight Paper\]](#) International Conference on Machine Learning and Applications (**ICMLA**), 2025

ALINA: Advanced Line Identification and Notation Algorithm [\[PDF\]](#)

[M.A. Hafeez Khan](#), Parth Ganeriwala, Siddhartha Bhattacharyya, Natasha Neogi, Raja Muthalagu
IEEE / CVF Computer Vision and Pattern Recognition Conference **CVPR**, 2024

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

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

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.