# Sahil Khose

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## RESEARCH INTERESTS

Computer Vision, Domain Generalization, Continual Zero-Shot Learning, Semi-Supervised Learning and NLP. Solving deep learning problems using a limited amount of supervision is what piques my interest.

## EDUCATION

**Georgia Institute of Technology, Atlanta, USA** Aug 2022 – May 2024
*M.S. in Computer Science (Specialization: Machine Learning)* *GPA: 4.0/4.0*

**Manipal Institute of Technology, Manipal, India** 2018 – 2022
*B.Tech. in Computer and Communication Engineering (Minor: Big Data | GPA: 10.0)* *CGPA: 8.56/10*

## RESEARCH EXPERIENCE

**Georgia Institute of Technology, Atlanta, USA** Jan 2023 – Present
*Graduate Research Assistant at **Hoffman Lab*** *Thesis Advisor – Prof. Judy Hoffman*

- Developing an end-to-end architecture for transfer learning for synthetic datasets to real-world datasets for robust semantic segmentation for aerial imagery.
- Spearheading the generation of a synthetic aerial imagery dataset with varying weather, daytime, height, and pitch variations using the CARLA simulator and studying the effects of domain shift due to varying semantic conditions. [C4]

**Georgia Institute of Technology, Atlanta, USA** Jan 2023 – May 2023
*Graduate Research Assistant at **Neural Data Science Lab** (NerDS)* *Advisor – Prof. Eva Dyer*

- Led the development of a distribution-aware latent augmentation technique to address challenges in DG. [C3]
- The technique demonstrated significant performance in domain generalization and long-tailed recognition tasks.

**Indian Institute of Science, Bangalore, India** Jul 2021 – Jul 2022
*AI Research Assistant at **Artificial Intelligence and Robotics Lab** (AIRL) Advisors – Prof. Suresh Sundaram & Dr. Chandan Gautam*

- Innovated solutions for various problems in the **Continual Generalized Zero-Shot Learning (CGZSL)** setting.
- Worked on my B.Tech. Thesis: ***Zero-Shot Domain Generalization: Unseen Classes in Unseen Domains***.

**Manipal Institute of Technology, Manipal, India** Apr 2021 – Jul 2022
*Medical AI Research Assistant* *Advisor – Prof. Harish Kumar JR*

- Developed a medical diagnosis system for **fovea segmentation** using semi-supervised segmentation. [C2]
- Worked on **macular degeneration classification** with interpretability for ophthalmology diagnosis. [C1]

**Project MANAS – AI Robotics Research Team, MIT, Manipal, India** Feb 2019 – May 2021
*AI Perception Developer GitLab | Website*

- Built a UGV robot for the **27th Intelligent Ground Vehicle Competition** held in Michigan, USA.
- Worked on developing a **level 2-3 autonomy** car on Indian roads for the **Mahindra $1Million Challenge.**
- Implemented **Lane Detection, Speed Bump Detection, Driving Imitation System, Depth Map Generation** using multiple cameras and LiDAR input using Deep Learning for our UGV and the self-driving car.

## ACHIEVEMENTS

- **Project MANAS** stood **World Rank 1** at the **27th Intelligent Ground Vehicle Competition** (IGVC 2019).
- **Project MANAS IGVC 2019 Awards:** Grand Award - 1st (Lescoe Cup), Interoperability - 1st, Design - 2nd, Cybersecurity - 3rd.
- **Project MANAS** won the the **Mahindra $1Million Challenge (top 13 out of 153 teams in India)**.
- **Top performer** on Task 1 & 6 with special recognition on multi-task performance at SMM4H, **NAACL 2021**.
- Received the **Best Paper Award** at New In ML, **ICML 2022**.

## CONFERENCE PAPERS

**C4.** SkyScapes: A High-Resolution Aerial Image Dataset for Sim2Real Generalization
*Under submission to **CVPR 2024***
***Sahil Khose**, Anisha Pal, Aayushi Agarwal, Deepanshi, Prithvijit Chattopadhyay, Judy Hoffman*

**C3. WACV 2024:** LatentDR: Improving Model Generalization Through Sample-Aware Latent Degradation & Restoration
*Winter Conference on Applications of Computer Vision **(WACV) 2024*** *GitHub | Paper*
*Ran Liu, **Sahil Khose**, Jingyun Xiao, Lakshmi Sathidevi, Keerthan Ramnath, Zsolt Kira, Eva L. Dyer*

## Conference Papers

**C2. INDICON 2023:** Fovea Segmentation Using Semi-Supervised Learning
***Sahil Khose****, Ankita Ghosh*, Yogish Kamath, Neetha Kuzhuppilly, Harish Kumar J. R.*

**C1. INDICON 2023:** Explainable Classification of Macular Degeneration Using Deep Learning
***Sahil Khose****, Ankita Ghosh*, Yogish Kamath, Neetha Kuzhuppilly, Harish Kumar J. R.*

## Workshop Papers

**W7. NeurIPS 2022:** Continual VQA for Disaster Response Systems — Sep 2022
***[Poster]*** *Tackling Climate Change with ML at* ***NeurIPS 2022*** *(Under review at a journal)* — GitHub | Paper
*Aditya Kane*, V Manushree*, **Sahil Khose***

**W6. ICML 2022:** An Efficient Modern Baseline for FloodNet VQA — May 2022
***[Best Paper Award!]*** *New in ML at* ***ICML 2022*** — GitHub | Paper
*Aditya Kane*, **Sahil Khose***

**W5. ACL 2022:** Transformer based ensemble for emotion detection — Mar 2022
***[Oral]*** *WASSA at* ***ACL 2022*** — GitHub | Paper
*Aditya Kane, Shantanu Patankar,* ***Sahil Khose****, Neeraja Kirtane*

**W4. NeurIPS 2021:** A Studious Approach to Semi-Supervised Learning — Sep 2021
***[Poster]*** *ICBINB at* ***NeurIPS 2021*** — GitHub | Paper
***Sahil Khose****, Shruti Jain, V Manushree*

**W3. NeurIPS 2021:** XCI-Sketch — Aug 2021
***[Oral]*** *New in ML,* ***[Paper]*** *ML4CD,* ***[Paper]*** *CtrlGen,* ***[Poster]*** *DGM at* ***NeurIPS 2021*** — GitHub | Paper
*V Manushree, Sameer Saxena, Parna Chowdhury, Manisimha Varma, Harsh Rathod, Ankita Ghosh,* ***Sahil Khose***

**W2. NeurIPS 2021:** Semi-Supervised Classification & Segmentation on High Resolution Aerial Images — May 2021
***[Spotlight Paper!]*** *Tackling Climate Change with ML at* ***NeurIPS 2021*** — GitHub | Paper
***Sahil Khose****, Abhiraj Tiwari, Ankita Ghosh*

**W1. NAACL 2021:** BERT Transformers in Extraction of Health Information from Social Media — Apr 2021
***[Top Performer Award!]*** *Published in proceedings of* ***NAACL 2021*** *at SMM4H workshop* — GitHub | Paper
*S Ramesh*, **Sahil Khose***, Abhiraj Tiwari*, Parthivi Choubey*, S Kashyap*, K Lakara*, N Singh*, Ujjwal Verma*

## Selected Projects

**1. DoGe: Domain Generalization** ***YouTube*** | ***GitHub*** — Oct 2022 - Nov 2022
- ***Course Project:*** *CS 8803 Machine Learning with Limited Supervision [Fall 2022] (**Prof. Judy Hoffman**)*
- Studied two problems we encounter with change in data distribution – **Diversity Shift** and **Correlation Shift**.
- Combined **RSC** and **VREx** to be robust to both the data shifts. Performed best on three datasets and competitive on others.

**2. Zero-Shot Domain Generalization: Unseen Classes in Unseen Domains** — Jan 2022 - Apr 2022
- ***Bachelor's Thesis:*** Developed a **CLIP** based **CNZSL** architecture to address **domain generalized zero-shot learning**.
- Evaluated on **six different unseen domains** under **three different zero-shot** settings and the proposed solution outperforms state-of-the-art models in this problem setting in most of the domains on the **DomainNet dataset**.

## Teaching Experience

**CS 7647 ML with Limited Supervision** — Fall 2023
- **Instructor: Prof. Judy Hoffman** | Guiding and mentoring 50 students as a TA, overseeing 12 research projects. *Website*

## Extracurricular

**Reviewer**: **1. NeurIPS 2023**: ***ICBINB and DGM4H*** | **2. ICCV 2023**: ***WiCV Workshop*** | **3. NAACL 2021**: ***SMM4H Workshop***
**Volunteer:** **NeurIPS 2022**: *Volunteered to help the main conference poster session and workshops run smoothly in* ***New Orleans****.*
**YouTube Channel:** *Conducts* ***explanations*** *on cutting-edge research papers in the field of AI.* ***20+ videos and 9000+ views****.*
**FruitPunch AI – AI Head** : *Established the first international chapter of the non-profit org* ***headquartered in Europe****.*
**Research Society Manipal – AI Mentor** : ***Mentoring*** *several students to pursue research in the field of Deep Learning.*
**Medium** | **WordPress** | **Website Feed**: *Documented my BTech college journey with a series of tech and non-tech* ***blog posts****.*