

# MADHAV AGARWAL

Edinburgh, UK

Email: [madhav14130@gmail.com](mailto:madhav14130@gmail.com), [madhav.agarwal@ed.ac.uk](mailto:madhav.agarwal@ed.ac.uk),

Google Scholar: [Link](#) ◊ Presonal Webpage: [Link](#) ◊ LinkedIn: [madhav1ag](#)

## EDUCATION

<b>PhD, Computer Science</b> University of Edinburgh, UK	Jan 2025 - Present
<b>MS by Research, Computer Science and Engineering</b> International Institute of Information Technology Hyderabad, India	Jan 2021 - June 2023 CGPA: 9.17
<b>Bachelor of Technology (Hons.), Information Technology</b> Dr. A.P.J. Abdul Kalam Technical University, Lucknow, India	Aug 2014 - June 2018 Percentage: 76.00

## SKILLS

<b>Technical Skills</b>	Computer Vision, Deep Learning, Machine Learning, Pattern Recognition, Natural Language Processing
<b>Programming Languages</b>	Python, C, C++
<b>Deep Learning Framework</b>	PyTorch, TensorFlow
<b>Generative AI</b>	Large Language Models (LLM), Vision Language Models (VLM), Gaussian Splatting, Diffusion Models, Attention & Transformers, GAN, NeRF, CNN

## WORK EXPERIENCE

<b>Applied Machine Learning Engineer</b>   VidLab7 GmbH (now: Moonscale)	April 2024 - Nov 2024
• Synthetic Avatar Generation, LipSync, Voice Cloning, Deep Fake Detection	
<b>Artificial Intelligence Researcher</b>   Technical University of Munich	Sept 2023 - Dec 2023
• 3D Motion Modelling and Generation, Face and Full Body Reenactment.	
<b>Computer Vision Consultant</b>   Gradient Ascent AI, Guise AI, Stealth Startups	Jan 2022 - Aug 2023
• Computer Vision, Deep Learning, Image and Video Segmentation, Model Optimization, Edge AI.	
<b>Senior Data Scientist</b>   CAW Studios	Dec 2019 - Aug 2020
• Document information extraction and digitalization of the tabular data using deep learning and OCR.	
<b>Data Scientist</b>   Innefu Labs Pvt. Ltd.	Jul 2018 - Sept 2019
• Smart Security and Surveillance Solutions using deep learning, deployed at multiple large-scale locations.	
<b>Machine Learning Engineer</b>   Tidyquant Pvt. Ltd.	Jan 2018 - April 2018
• Predictive analytics and forecasting using Machine Learning.	

## PROJECTS

**Spatio-Temporal Understanding in VLMs:** Exploring how VLMs process spatio-temporal information to understand their current behavior and design enhanced models capable of downstream tasks such as emotion recognition in videos and 3D scene understanding.

**3D Talking Heads:** Generate wobble-free 3D talking head videos with accurate lip-sync from audio using Gaussian Splatting, modeling fine-grained head and facial motion for realistic performance.

**Image Manipulation using Diffusion Models** Image synthesis and out-of-distribution image inversion using spherical interpolation in latent space of diffusion models.

**Face Reenactment and Talking Heads:** Transfer motion and expression information on a static image from a video. Proposed various novel techniques to use audio and visual modalities along with facial cues. Build a pipeline to use these methods with face super-resolution and frame interpolation for efficient transmission.

**Page Object Detection and Localization:** Detect Tables, Figures, Charts, etc., in unstructured document images using a cascade architecture and deformable convolutions with high accuracy. Extended this work to incorporate NLP and OCR for end-to-end document digitalization.

**Smart Security and Surveillance Solutions:** Developed AI enabled modules like Facial Recognition, Trespassing Detection, Person Count, Abandon Objects, Group Formation, Heat- Map Generation, etc. These modules have custom object detection and tracking capabilities to handle objects like Weapons, Persons, Faces, Helmets, Shoes, Safety Harnesses, etc.

**Person Attribute Recognition and Classification:** Classifying the attributes of person like age, gender, clothes etc. for identifying customer behavior in retail markets and provide them with personalized experience.

**Satellite Images:** Detection and classification of ships, submarines using real-time satellite images.

## ACHIEVEMENTS & EXTRA-CURRICULAR ACTIVITIES

---

- Graduate Scholarship from IIIT-Hyderabad to cover the full tuition fee for the MS degree.
- Coordinator in 6th Summer School of AI (2022) organized by IIIT-Hyderabad.
- Recipient of IIIT-Hyderabad's Non-Academic Award for spreading Mental Health Awareness on campus.
- Member and Student Head Coordinator (2017-18) of Big Data Centre of Excellence, R&D Lab of AKGEC, for three years (2015-2018).
- Winner of 'BigWar' event of BigDataThon'17 (24-hour hackathon on Big Data technologies) at ABESIT, Ghaziabad (April 2017).
- Organized Workshops on "Machine Learning and Neural Networks" (Feb 2018) and "Data Science" (March 2017) as a Mentor.

## PUBLICATIONS

---

- GaussianHeadTalk: Wobble-Free 3D Talking Heads with Audio Driven Gaussian Splatting. *Winter Conference on Applications of Computer Vision (WACV), 2026*. **Madhav Agarwal**, Mingtian Zhang, Laura Sevilla-Lara, Steven McDonagh. ([Link](#))
- Understanding the Generalization of Pretrained Diffusion Models on Out-of-Distribution Data. *AAAI Conference on Artificial Intelligence (AAAI), 2024*. (**Oral**). Sai Niranjan Ramachandran\*, Rudrabha Mukhopadhyay\*, **Madhav Agarwal**\*, C.V. Jawahar & Vinay Namboodiri. ([Link](#))
- Audio-Visual Face Reenactment. *Winter Conference on Applications of Computer Vision (WACV), 2023*. **Madhav Agarwal**, Rudrabha Mukhopadhyay, Vinay Namboodiri & C. V. Jawahar. ([Link](#))
- Compressing Video Calls using Synthetic Talking Heads. *33rd British Machine Vision Conference (BMVC), 2022*. **Madhav Agarwal**, Anchit Gupta, Rudrabha Mukhopadhyay, Vinay Namboodiri & C. V. Jawahar. ([Link](#))
- Dataset Agnostic Document Object Detection. *Pattern Recognition, 2023*. Ajoy Mondal, **Madhav Agarwal** & C. V. Jawahar. ([Link](#))
- CDeC-Net: Composite Deformable Cascade Network for Table Detection in Document Images. *25th International Conference on Pattern Recognition (ICPR), 2020*. (**Oral**). **Madhav Agarwal**, Ajoy Mondal & C. V. Jawahar. ([Link](#))