Shravan Venkatraman

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Summary

Committed to addressing the challenges faced by large, unified multimodal systems in bridging discriminative and generative tasks, particularly in open-world scenarios that demand self-evolution and continual adaptation.

Education

Mohamed bin Zayed University of Artificial Intelligence (MBZUAI) — Abu Dhabi, UAE
Master of Science (M.Sc.) in Computer Vision | *GPA: **3.80/4*** — *Aug 2025 - Present*

- ***Advisor:*** *Dr. Fahad Khan;* ***Co-Advisor:*** *Dr. Salman Khan*
- ***Leadership & Service:*** *Student Representative, Computer Vision Department*
- ***Awards & Honors:*** *Awarded a* ***fully-funded scholarship*** *by the UAE Government*

Vellore Institute of Technology (VIT) — Chennai, India
Bachelor of Technology (B.Tech) in Computer Science & Engineering | *GPA: **9.23/10*** — *Sep 2021 - Jul 2025*

- ***Advisor:*** *Dr. Joe Dhanith P. R.;* ***Co-Advisor:*** *Dr. Pandiyaraju V.*
- ***Awards & Honors:*** *Sir C.V. Raman Research Award –* ***3× recipient.***
- ***Thesis:*** *Making NeRF See Structure, Not Just Light.*

Publications

Multimodal & Representation Learning

** indicates equal contribution, † denotes my role as mentor*

- Thawakar, O., **Venkatraman, S.**, Thawkar, R., Shaker, A., Cholakkal, H., Anwer, R. M., Khan, S., & Khan, F. (2025). *"EvoLMM: Self-Evolving Large Multimodal Models with Continuous Rewards."* **arXiv**. Paper Code
- **Venkatraman, S.**, Walia, J. S., & Dhanith, J. P. R. (2025). *"SAG-ViT: A Scale-Aware, High-Fidelity Patching Approach With Graph Attention for Vision Transformers."* **Complex and Intelligent Systems**. Paper Code
- **Venkatraman, S.**, Kavitha, M. S., Dhanith, J. P. R. (2025). *"Can We Go Beyond Visual Features? Neural Tissue Relation Modeling for Relational Graph Analysis in Non-Melanoma Skin Histology."* **arXiv**. Paper Code
- Dhanith, J. P. R.*, **Venkatraman, S.***, Sharma, V.*, Malarvannan, S., & Narendra, M. (2024). *"Multimodal Emotion Recognition Using Audio-Video Transformer Fusion With Cross Attention."* **Complex & Intelligent Systems**. (Under review). Paper Code
- **Venkatraman, S.**, Dhanith, J. P. R., & Kavitha, M. S. (2025). *"Hierarchical Graph-Guided Contextual Representation Learning for Neurodegenerative Pattern Recognition in MRI."* **Computers in Biology and Medicine**. Paper
- **Venkatraman, S.**, Pandiyaraju, V., Abeshek, A., Aravintakshan, S. A., Kumar, P. S., & Madhan, S. (2024). *"Targeted Neural Architectures in Multi-Objective Frameworks for Complete Glioma Characterization From Multimodal MRI."* **Applied Soft Computing**. (Under review). Paper

Generative Modeling & Neural Rendering

- **Venkatraman, S.**, & Pandiyaraju, V. (2025). *"Making NeRF See Structure, Not Just Light: Enforcing PDE-Based Surface Constraints for 3D Consistency."* **Pattern Recognition**. (Under review). Code
- **Venkatraman, S.***, Raj, R.*, Kumar, P. S.* (2025). *"TIDE: Two-Stage Inverse Degradation Estimation with Guided Prior Disentanglement for Underwater Image Restoration."* **arXiv**. Paper Code
- Jaskaran Singh Walia*, **Venkatraman, S.***, & Pavithra, L. K. (2025). *"Fusion: Frequency-Guided Underwater Spatial Image RecOnstructioN."* **CVPR'25 Workshops**. Paper Code

- Dhanith, J. P. R.*, **Venkatraman, S.***, Raj, R. S. P.*, Abeshek, A.*, Malarvannan, S., Ramkumar, J., & Anumalasetty, S. (2024). *"Enhancing Traffic Sign Classification in Autonomous Vehicular Technology Using Weather-Conditioned Synthetic Data and Xception-Enhanced Vision Transformers."* **IEEE Transactions on Intelligent Vehicles** (Under review). Code

Robust Learning & Miscellaneous

- **Venkatraman, S.***, Kumar, P. S.*, Raj, R.*, Chandrakala S (2025). *"UGPL: Uncertainty-Guided Progressive Learning for Evidence-Based Classification in Computed Tomography."* **ICCV'25 Workshops**. Paper Code
- **Venkatraman, S.**, Kumar, P. S., Pandiyaraju, V., Abeshek, A., Aravintakshan, S. A., Kannan, A. (2025). *"SPROUT: Symptom-centric Prototypical Representation Optimization and Uncertainty-aware Training for Few-Shot Precision Agriculture."* **Neurocomputing**. Paper Code
- **Venkatraman, S.**, Pandiyaraju, V., Abeshek, A., Kumar, P. S., Aravintakshan, S. A., Kannan, A (2025). *"Bayesian Uncertainty Propagation for Bone Fracture Diagnosis via Region-Aware Adaptive Label Refinement."* **Computers in Biology and Medicine**. (Under review).
- **Venkatraman, S.***, Kumar, P. S.*, Jayasankar, K. S.*, Sunil, M.*, Ajith, G.*, Malarvannan, S.*, Dhanith, J. P. R. (2025). *"A Lightweight Continual Learning Approach via Retrieval-Augmented Generation for Personalized AI Assistants."* ***In progress***.
- Sunil, M.*, Shravya, V.*, **Venkatraman, S.**†, Dhanith, J. P. R. (2025). *"Rethinking Knowledge Retrieval for Generation: A Survey on RAG Architectures and Applications."* **Proceedings of the IEEE**. (Under review).

Research & Work Experience

Nagasaki University – Pattern Recognition and Machine Learning Lab **Mar 2025 – Jul 2025**
Computer Vision Intern | *Advisor: Dr. Muthu Subash Kavitha* *Nagasaki, Japan · Remote*

- Engineered a Neural Tissue Relation Modeling (NTRM) framework for non-melanoma histopathology segmentation, integrating tissue-level spatial context beyond pixel features and achieving a **Dice similarity improvement of 4.9–31.25%** over prior SOTA methods.
- Implemented graph-based relational encodings to model inter-tissue dependencies, **reducing segmentation errors by 18%** in boundary-dense and morphologically ambiguous regions.
- Designed a latent transformer architecture for CT-to-PET translation, leveraging deep–shallow variational autoencoder pairs to learn modality-specific representations, improving **pixel-consistency** by **12%** and producing **anatomically coherent** PET outputs with **15%** fewer artifacts compared to baseline models.

MedxAI Innovations **May 2024 – Mar 2025**
Machine Learning Scientist Intern | Showcase *Chennai, India*

- Deployed an **AI-powered solution** assisting **200+ Upper GI Endoscopy procedures**, delivering **real-time visual guidance** that improved procedural accuracy and quality by **50%**.
- Automated **clinical documentation workflows**, reducing manual data entry by **70%** and improving reporting efficiency for hospital staff.
- Streamlined report delivery for **5+ gastroenterologists** at *MGM Hospitals*, cutting documentation delays by over **80%** and boosting overall workflow efficiency by **60%**.

Sponsored Research and Industrial Consultancy (SpoRIC), VIT **Oct 2023 – Jul 2024**
Industry-Sponsored R&D *Chennai, India*

Computer Vision Engineer | *Client: Apollo Hospitals & Apollo Sindoori Hotels Ltd.* | Showcase

- Prototyped an **AI-powered cross-platform app** for *Apollo Hospitals (Chennai)* to monitor calorie intake, enabling nutritionists to deliver **timely diet updates** and projecting a potential **30% boost** in patient recovery rates.
- Validated the POC in collaboration with medical staff across select Apollo branches, demonstrating feasibility to **reduce clinician workload by over 50%** through automated nutrition tracking.

Machine Learning Engineer | *Client: Innovative Implements Pvt. Ltd.* | Showcase

- Delivered a high-speed IoT framework using **Raspberry Pi** and **TensorFlow** for **gesture-based AI automation**, enhancing **teaching assistance in 10+ rural schools** across Tamil Nadu.
- Optimized system efficiency to achieve a **minimal response time of less than 33 ms per frame**, ensuring robust performance under **limited memory constraints** and preventing overheating without a heat sink.

Software Development Engineer | *Client: Prim Buds Garden Cambridge School* | Showcase

- Developed a fully **responsive and scalable school website** using **React.js**, **Tailwind CSS**, and **Supabase**, delivering a modern platform aligned with stakeholder requirements.
- Collaborated in a cross-functional team to deploy the live site within **6 weeks**, achieving **100% functional compliance** with client specifications.
- Optimized UI components and implemented accessibility features, increasing **user engagement by 15%** within the first month post-launch.

Virtusa **Aug 2023 – Nov 2023**

Computer Vision Intern | Showcase *Chennai, India*

- Devised **FaceLog**, a **Django**-based web application integrating **PyTorch**-powered **facial recognition AI**, automating **attendance management for 5,000+ hostel residents** at VIT University.
- Demonstrated a **Proof of Concept (POC)** to VITC management, validating support for **10,000+ users**, handling **1,000+ requests/second**, and achieving **99.9% uptime**.

Key Projects

Zero-Shot Instance-Aware Colorization via Controllable Semantic Grounding **Oct 2025 – Nov 2025**

AI7102 Course Research Project | Code *MBZUAI, Abu Dhabi*

- Proposed a **fully zero-shot, training-free framework** for instance-aware, text-driven image colorization, enabling fine-grained control without masks or supervision.
- Designed a **language-grounded semantic localization + diffusion-based colorization pipeline** that preserves luminance, geometry, and texture while supporting precise multi-object recolorization.

Continually Improving Personalized Itinerary Recommendation System **Aug 2024 - Sep 2024**

Smart India Hackathon 2024 (SIH '24) | Code Contest *VIT Chennai, India*

- Devised and deployed a **continually learning AI itinerary planner** using Django and vanilla JavaScript, delivering **90% recommendation accuracy** and boosting user satisfaction by **35%**.
- Augmented personalization through **Retrieval-Augmented Generation (RAG)**, improving repeat-user itinerary relevance by **25%** and enabling dynamic adaptation to user preferences.

Robust Generative Domain Adaptation for Autonomous Vision **Mar 2024 – Jun 2024**

AMD Pervasive AI Developer Contest | Code Contest *VIT Chennai, India*

- Devised a **CycleGAN-based domain adaptation system** for realistic day-to-night scene translation, reducing domain shift by **28% (FID score)** and improving **object detection accuracy by 15%** in low-light conditions for autonomous driving datasets.
- Secured **Finalist position** among international teams; awarded **exclusive access to AMD Radeon Instinct GPUs (ROCm 6.1.2) worth $24,000** and fully sponsored to attend the **AMD Advancing AI Conference, San Francisco**.

Technical Skills

Programming	Python, C++, C, Java, MATLAB, R, Bash scripting, SQL, LaTeX
Frameworks	PyTorch, TensorFlow, Keras, Scikit-Learn, OpenCV, HuggingFace
Developer Tools	Git, HTML, CSS, JavaScript, React.js, Django, Blender, AWS, GCP, VS Code

Achievements and Honors

Awards, Honors, and Accomplishments

- **Sir C.V. Raman Research Award** – 3× recipient, VIT (Oct 2024, Feb 2025).
- **Finalist**: *AMD Pervasive AI Developer Contest*; received *full sponsorship* to attend the *AMD Advancing AI Conference* in SFO; awarded high-performance AMD hardware to facilitate research.
- **Scholarships:** *Category-1* Scholarship granted at VIT for *academic merit* (Top 2,100 of 200,000 in VITEEE); *fully-funded* scholarship conferred by the UAE Government.
- **Team Lead**: State-funded R&D (VIT), Kauvery Hospitals R&D, Apollo Hospitals R&D, Smart India Hackathon 2024 (internal qualifier).

Teaching, Mentoring, and Academic Services

- **Teaching Assistant**: BCSE332P - Deep Learning Lab (Fall 2024), VIT University, Chennai.
- **Conference Reviewing**: WACV'26, BMVC'25; ICCVW'25.
- **Author**: *Python in Plain English* on Medium, a publication with 3.5M+ monthly readers.

**References available upon request.*