

Vasundhara Vishwanath Baligar

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EDUCATION

University of Massachusetts Amherst (UMass Amherst)

Master of Science in Computer Science

Courses: Advanced Machine Learning, Applied Statistics, Empirical Research

Amherst, MA, United States

Sep 2025 – May 2027

KLE Technological University

Bachelor of Engineering in Electronics and Communication; CGPA: 8.8

Courses: Machine Learning, 3D Computer Vision, Signal Processing

Hubli, Karnataka, India

Dec 2020 – June 2024

SKILLS

Technical Languages: Python, C/C++, R, MATLAB, Bash/Shell scripting

Frameworks and Tools: PyTorch/(3D), OpenCV, Hugging Face, TensorFlow, Keras, Docker, Apptainer

Data and Visualization: Open3D, MeshLab, Blender, Unity 3D, Matplotlib, NumPy, Pandas, SciPy

RESEARCH EXPERIENCE

Visiting Researcher | University of Wyoming | HPC Cluster, CUDA, Apptainer

Jan 2025 – June 2025

- Contributed to identifying the 4th type of Unsolvability Problem Detection task in Visual Question Answering (VQA) for 3D heritage sites to **evaluate large language model (LLM) responses**.
- Developed a VQA dataset with 1200+ 3D heritage model-question pairs using Generative AI and multi-view icosahedron captures (handling raw point clouds as **large as 23M points**), followed by human cross-validation. This filled a critical gap as there were no prior datasets for this task.
- Set up and optimized environments for large-scale 3D LLMs like **MiniGPT-3D**, **LSceneLLM**, **PointLLM**, **ShapeLLM** to run inference efficiently on high-resolution point clouds.

Research Intern | Indian Institute of Science (IISc) | Python, HTML, IoT

Feb 2024 – June 2024

- Built an experimental NILM hardware testbed using a TI MSP430 3-phase Energy Meter, RS232 serial communication, and relays for appliance-level control.
- Programmed TI CC3200 Wi-Fi MCU in **Embedded C (Energia)** to interface with relays and synchronize appliance operation via **NTP and Firebase cloud commands**.
- Integrated real-time 1.2s energy data logging and anomaly detection using **CUSUM (Statistical Modeling)**, enabling reliable system performance under dynamic load conditions.

PROJECTS

Mapping User Facial Emotions Onto an Avatar | Blender 3D, Real-time Facial Mapping

- Built a real-time facial motion capture system in Python using **OpenCV and Dlib**, tracking 68 facial landmarks from a camera and using head pose estimation (solvePnP) to follow face movements smoothly.
- Added smoothing and range normalization methods to clean up noisy landmark data, making the mouth, brow, and head movements look natural when mapped onto a Blender 3D rig (RIG-Vincent).
- Connected computer vision to 3D animation controls, turning **live camera input** into rigged avatar motion in Blender, showing a working perception-to-action loop for human-robot interaction (HRI), XR, and telepresence.

Surface Texture Mapping (IIT Delhi) | PyTorch, CUDA, Open3D

- Implemented a neural mesh transfer (Mesh Draping) pipeline to project textures across incomplete 3D surfaces, preserving **high-frequency geometric detail** with progressive positional encoding.
- Reconstructed partial/incomplete 3D meshes** by selecting and aligning keypoints between source and target surfaces, achieving realistic surface deformation and alignment.

Point Cloud Hole Filling Using Implicit Functions | PyTorch3D, Docker, NVIDIA DGX, Meshlab

- Applied an encoder-decoder Occupancy Network (**PointNet + ResNet**) to fill holes in sparse/occluded 3D point clouds while retaining its original geometry.
- Generated synthetic holes across 51,300+ 3D models from all 55 categories of the ShapeNetCore.v2 dataset using kNN for controlled training and evaluation.
- The model demonstrated strong performance, enabling it not only to fill holes, but also **reconstructed partial point clouds** with >90% shape accuracy and visibly smoother surfaces compared to baselines.

PUBLICATIONS

Demand Response Platform with IoT and NILM for Home Energy Management

ISGT Asia IEEE PES, Bangalore

[Link](#)

Demand Response Based on Anomaly Detection and Non-Intrusive Load Monitoring

IEEE PEDES, NITK Surathkal

[Link](#)

ACHIEVEMENTS

- Selected among national participants for the Graphics and Vision Summer School at IIT Delhi.
- Ranked within the top 4% of participants at a university-wide hackathon.
- Secured 1st place at University Chess Championship; competed at State-level tournaments.