

Vishwesh Vhavle

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I work at the intersection of 3D Computer Vision, Robotics, and Computer Graphics. I am interested in leveraging their interplay, along with representation learning, to advance methodologies across these domains.

EDUCATION

Indraprastha Institute of Information Technology, Delhi

2020 – 2024

Bachelor of Technology, Computer Science Engineering

GPA: 8.0/10.0

Coursework: Computer Vision, Computer Graphics, Reinforcement Learning, Machine Learning, Distributed Systems

Indian School Muscat, Oman

2008 – 2020

Science Stream, CBSE Board, Senior Secondary School

Grade: 94.4%

PUBLICATIONS

- **Vishwesh Vhavle**, Hiteshi Jain, and Avinash Sharma. Camera3DMM: Leveraging Perspective Camera for Estimating Parametric 3D Head Models. *SIGGRAPH Asia Technical Communications*, 2025.
- **Vishwesh Vhavle**. PinTags: A Visual Fiducial Marker System for Logistics. *NCVPRIPG*, 2025.
- **Vishwesh Vhavle*** and Jatin Sharma*. Alfred: Open-Source Autonomous Mobile Robot Platform with Augmented Physical Testbed. *I-SMAC*, 2024.

EXPERIENCE

Research Fellow – 3DVisLab, Indian Institute of Technology, Jodhpur

Jul 2025 – Current

- Developing learning frameworks for arbitrary mesh triangulations for local-global geometric processing.
- Working on improving human head mesh registration, detail-preserving deformations, and local template-based editing through surface geometry learning.
- Applying discretization-agnostic frameworks to FMCW LiDAR data with doppler velocity information.

3D Computer Vision Research Intern – Mercedes-Benz Research & Development, India

Sep 2024 – Jul 2025

- Developed a synthetic data generation pipeline to generate photorealistic images using morphable face avatars textured with 3D Gaussian Splatting for pre-training foundation models for driver monitoring systems.
- Worked on Parametric Human Head Reconstruction from commodity monocular images with extreme camera distortions. (**Patent Filed** and **Technical Communications Paper Accepted at SIGGRAPH Asia 2025**)

Robotics Research Assistant – Infosys Centre for Artificial Intelligence, IIIT Delhi

May 2022 – Jun 2024

- Developed an Open-Source Autonomous Mobile Robot (AMR) platform including the firmware, control system, perception, SLAM, navigation, and path-planner.
- Designed a motion-capture facility for comprehensive AMR testing and Sim-to-Real transfer of Deep-RL policies trained using ROS and Gazebo framework.
- Developed a framework for data-driven Trajectory Prediction of traffic agents using PyTorch, and deployed it on the autonomous vehicle project at IIIT Delhi.

PROJECTS

Camera3DMM: Perspective-Aware 3D Head Reconstruction 🌐⁸

May 2025 – Aug 2025

- Developed perspective-aware 3D human head reconstruction framework jointly estimating FLAME parameters and camera intrinsics from single RGB images.
- Achieved 22% improvement in mesh reconstruction quality over state-of-the-art baselines
- This work was published at **SIGGRAPH Asia Technical Communications 2025**.

PinTags: Visual Fiducial Marker System for Logistics 🌐¹

June 2024 – Aug 2024

- Designed high-capacity visual fiducial marker system supporting 32,768 unique tags using color-coded circular sectors in LAB color space for robust detection across lighting conditions.
- Implemented detection pipeline with 2x faster detection than AprilTags while maintaining competitive accuracy.
- This work was published at **NCVPRIPG 2025**.

Alfred: Autonomous Mobile Robot Platform 🤖²

Feb 2023 – May 2024

- Designed and manufactured an open-source UGV platform equipped with Velodyne VLP-16 LiDAR, NVIDIA AGX Orin, Intel NUC, and RealSense camera.
- Developed comprehensive robotics stack including UGV firmware, control system, perception, SLAM, navigation, and path-planning.
- This work was published at **I-SMAC 2025**.

Motion Capture Testbed for Simulated Robotics 🤖³

Mar 2023 – May 2024

- Developed a 200 m² UGV test facility with 6 ceiling-mounted cameras and NVIDIA Jetsons for real-time tracking.
- Implemented novel camera-LiDAR cross-calibration technique and optimized image processing pipeline for 22 FPS trajectory detection.
- Achieved average tracking error of less than 2 cm, enabling effective Sim-to-Real transfer of Deep-RL policies.

Solid Texture Synthesis 🤖⁴

Oct 2023 – Dec 2023

- Implemented non-parametric texture optimization approach for synthesizing solid textures from 2D exemplars.
- Developed end-to-end rendering pipeline using OpenGL and C++ with integrated histogram matching.

Navigation and Exploration through Deep RL 🤖⁵

Nov 2023 – Dec 2023

- Implemented TD3 policy gradient algorithm for model-free, off-policy online reinforcement learning.
- Deployed on Turtlebot 3 with ROS2 and Gazebo, achieving autonomous navigation using VLP-16 LiDAR point-clouds.

Cylindrical Manipulator with Linear Gripper 🤖⁶

Aug 2023 – Oct 2023

- Developed a 3-DOF cylindrical manipulator with position control for package manipulation sorting.
- Implemented the perception stack with object pose estimation using data from Intel Realsense RGBD camera.

Autonomous Central Navigation for Multi-Agent Robotics 🤖⁷

Sep 2021 – Feb 2022

- Built four ATmega-based robots with package drop manipulators and ARuCo marker-based tracking system.
- Developed central visual navigation system with multi-agent path planning using A* algorithm.

Birds-Eye View Registration from Dash-Cam Footage

Apr 2021 – May 2023

- Implemented an image processing pipeline for Argoverse 2's stereo camera dataset with camera extrinsics calibration.
- Developed vanishing-point detector for Direct-Linear Transform and integrated fine-tuned Mask R-CNN for road segmentation.

Content-Based Image Retrieval for Indian Foods

Apr 2023 – May 2023

- Fine-tuned ResNet-50 model on custom Indian Foods dataset created through web-scraping for feature encoding.
- Implemented efficient similarity search using cosine similarity across cached image encodings.

AWARDS & ACHIEVEMENTS

- **2025: First Runners-Up** of the 3D Gaussian Splatting Challenge at **3DGS Workshop, SIGGRAPH Asia 2025**
- **2024:** Bachelor Thesis Project selected as **Best BTP in the Engineering Track** for the Class of 2024 at **IIIT Delhi**
- **2023: Top-Up Fellowship** by **ARTPARK IISc Bangalore**
- **2023: Summer Undergraduate Research Fellowship** by **IIIT Delhi**
- **2022:** Seed Funded **₹7,00,000** from **the Government of India** under the Nidhi-Prayas Scheme
- **2021: Finalist** at **Flipkart's GRiD 3.0 Robotics Competition**
- **2021:** Granted **50% Merit Scholarship** by **IIIT Delhi**

SKILLS

- **Languages:** C++, Python, Java, Bash (Shell), MATLAB, PHP, Elixir
- **Tools:** OpenCV, NerfStudio, 3DGS, ROS1, ROS2, PyTorch, PCL, Docker, OpenGL, Open3D, Git, Linux, Windows
- **Hardware:** Arduino, ATmega, ATtiny, Raspberry Pi, ESP8266
- **Software:** Autodesk Fusion 360 (CAD, PCB), Blender, Unity, Adobe Creative Suite, Figma, Tinkercad

TEACHING EXPERIENCE

Teaching Assistant – 3D Vision Summer School, IIIT Hyderabad

Summer 2023

- Taught parametric models including FLAME and SMPL for 3D human and facial modeling applications.
- Instructed novel view synthesis algorithms including Neural Radiance Fields (NeRFs) and related 3D reconstruction techniques.

Teaching Assistant, Computer Vision – IIT Delhi**Jan 2024 – May 2024**

- Helped design course assignments, mentored course projects, and graded quizzes and assignments for 200 students (Undergraduate, Masters, and PhD).

Head Teaching Assistant, Computer Graphics – IIT Delhi**Sep 2023 – Jan 2024**

- Conducted weekly labs for 90 students (Undergraduate, Masters, and PhD) using OpenGL in C++, helped design course assignments, mentored course projects, and graded quizzes, assignments, and course projects.

Teaching Assistant, Human Computer Interaction – IIT Delhi**Sep 2022 – Jan 2023**

- Conducted weekly tutorials for 40 students to strengthen the concepts taught in class and graded assignments and course projects.

VOLUNTEER EXPERIENCE

Student Volunteer – SIGGRAPH Asia 2025**December 2025**

- Contributed 18 hours supporting technical programs including Computer Animation Festival, Technical Papers presentations, and Emerging Technologies exhibits.



Volunteer Teacher – IIT Delhi**Summer 2023**

- Taught middle school students from underprivileged backgrounds, providing mentorship and personalized learning materials.

Founding Coordinator – International Relations Council, IIT Delhi**Jun 2022 – May 2024**

- Created and led initiatives to foster an inclusive campus environment for international students.
- Organized cross-cultural events and programs to promote understanding and equal participation opportunities.

LINKS

 <https://vishweshvhavle.github.io/> <https://scholar.google.com/citations?user=kgTeR74AAAAJ&hl> <https://github.com/vishweshvhavle> <https://linkedin.com/in/vishweshvhavle>

1.  <https://pintag-review.github.io/PinTag/>
2.  <https://github.com/vishweshvhavle/alfred/>
3.  https://drive.google.com/file/d/1VTPbL9K_OmTGgPaHCfmb2N_AGlndtN9/view
4.  <https://github.com/vishweshvhavle/solid-texture-synthesis>
5.  <https://github.com/vishweshvhavle/deep-rl-navigation>
6.  <https://youtu.be/to7IvqKXnhQ>
7.  <https://drive.google.com/drive/folders/10-bGFo7b6reio7eZTLztf6eE0pG8L1za>
8.  <https://doi.org/10.1145/3757376.3771420>