

# Om Kumar

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## EDUCATION

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### Manipal Institute of Technology

*B.Tech in Mathematics and Computing*

Manipal, Karnataka

*July 2023 – Present*

- CGPA: 8.65 / 10.0
- Relevant Coursework: Statistics, Probability Theory, Real Analysis, Linear Algebra, Optimization, Machine Learning

## EXPERIENCE

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### Netweb Summer Research Intern

*NISER Bhubaneswar (Hybrid)*

May 2025 – Present

- Developed a post hoc floater removal pipeline for 3DGS that eliminates spurious Gaussian primitives without retraining; reduces model size to **20.4%** of the original Gaussian count while improving reconstruction quality by **+4.75 dB PSNR**
- Developed a multi-view diffusion framework for enhancing novel view synthesis in sparse, under-constrained regions, achieving up to **+10% PSNR**, **+15% SSIM**, and **–20% LPIPS** over baselines
- Research outcomes submitted to **ECCV 2026** (under review)
- Improved 3D reconstruction pipeline for heritage sites, processing **TB-scale** multi-view image datasets and accelerating rendering by almost **1000×** using optimized point clouds, Gaussian splats, and mesh representations

### Research Intern

*Kharagpur Learning, Imaging and Visualization Group, IIT Kharagpur (Remote)*

Nov 2024 – Present

- Co-developed an **arbitrary-scale super-resolution** model for ultrasonography, outperforming bicubic and baseline CNNs on PSNR/SSIM
- Built a fully reproducible, production-ready training pipeline with automated data versioning and experiment tracking, enabling large-scale experiments across **100K+** medical images
- Engineered automated dataset acquisition and preprocessing workflows on distributed GPU clusters, reducing manual setup time by **70%**
- Currently developing a multi-task, multi-modal foundation model for medical imaging with cross-dataset harmonization

### Research Assistant

*Manipal Institute of Technology*

Mar 2024 – Sept 2024

*Manipal, Karnataka*

- Applied Generative Flow Networks (Bengio et al.) to generate novel drug candidates for *S. Aureus*, expanding candidate space beyond rule-based baselines

### AI Subsystem Team Member

*Project MANAS*

Mar 2024 – Present

*Manipal, Karnataka*

- Achieved **3rd place globally** at IGVC 2025 (USA) in the **AutoNav Driverless Challenge**, competing as a fully autonomous ground vehicle
- Developed and deployed real-time **ODLC (Object Detection, Localization & Classification)** pipeline achieving **sub-30 ms** inference on embedded hardware using ONNX-optimized models
- Built **end-to-end autonomous navigation stack** including perception, path planning, and control for driverless operation

- Designed **efficient probabilistic occupancy grid mapping** framework, reducing memory overhead by **40%** for real-time decision-making
- Won **1st place** among autonomous drones and **3rd overall** (17 teams) at ISDC 2025; built monocular depth-based 3D terrain mapping

### Part-Time Teacher

2019 – Present

*Gurukul Classes (Remote)*

- Delivering 1-on-1 mathematics and computer science to international students with **100%** client retention

## LEADERSHIP AND ACTIVITIES

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### Team Manager

August 2025 – Present

*Project MANAS*

*Manipal, Karnataka*

- Heading Research, Marketing, Outreach, Budgeting, and General Operations for **Project MANAS** – The official AI and Robotics Research team of MIT Manipal

### Organizing Committee

October 2024

*TechTatva – MIT Manipal's Annual Technical Fest*

*Manipal, Karnataka*

- Helped organize a paper presentation event on behalf of Research Society Manipal.

### Associate

Oct. 2023 – Sept. 2024

*Entrepreneurship Cell, MIT Manipal*

*Manipal, Karnataka*

- Organized Manipal Entrepreneurship Summit 2024; designed reports and newsletters.

### Local Committee Member

Oct. 2023 – Sept. 2024

*IAESTE (International Association for Exchange of Students for Technical Experience)*

*Manipal, Karnataka*

- Hosted international interns and produced content for conferences.

## PROJECTS

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### Open Source Contributor - Project Tirtha | Python, PyTorch, Nerfstudio

*Github*

Integrated VGGT-based reconstruction, achieving  $\sim 1000\times$  faster inference compared to baseline pipelines; served as the deployment backbone for the NISER heritage-site research project

### Gurukul | Node.js, Next.js, React, Supabase, Vercel

*Github*

Built a full-stack tutoring platform, enabling online onboarding and increasing service reach beyond local geography

### Monocular Depth Estimation for Terrain Mapping | PyTorch, OpenCV

*Github*

Generated depth from UAV RGB imagery and integrated it with path planning for autonomous exploration (ISDC 2025)

### Object Detection and Localization | PyTorch, ROS2

*Github*

Trained and deployed ODLC models on an autonomous ground robot, enabling real-time perception during IGVC 2025

### Automated Tender Acquisition (GeM) | Python, Selenium

*Github*

Automated government tender submissions, reducing manual effort from hours to minutes per tender

### Ultrasound Image Super-Resolution | PyTorch

*Github*

Developed a lightweight attention-based U-Net improving diagnostic clarity over standard interpolation methods

## SKILLS

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**Technical:** Python, C++, Java, PyTorch, ROS/ROS2, Docker, Git, Gazebo, MuJoCo

**Languages:** English (B2), Spanish (A1)

**Interests:** Basketball, Writing, Swimming