

# Yash Kumar Sahu

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## Education

- 2023 – 2024 **Masters Thesis**, Indian Institute of Science (IISc)  
**Advisor:** Prof. Pradipta Biswas and Prof. Sadagopan Narasimhan  
**Title:** Comparative Study on Image Translation GANs for Object Detection in Low-Resource Domains (presented at ICVTTs 2024, see Publications)
- 2019 – 2024 **Bachelors & Masters in Computer Science**,  
Indian Institute of Information Technology, Design and Manufacturing (IIITDM), Kancheepuram  
**Advisor:** Prof. Sadagopan Narasimhan; **GPA:** 8.44/10.0 (3.65/4.0) (**Top 5%** in class)

## Selected Honors and Awards

- ICRA 2024 **RoboMaster University Sim2Real Challenge** (by Tsinghua University) | Yokohama, Japan | [ More Info. ↗ ]  
○ Awarded 3<sup>rd</sup> prize globally, competing among 30+ teams (1<sup>st</sup> ever Indian team to reach finals).
- RoboCup 2023 **Autonomous Robot Manipulation Challenge** (by MathWorks) | Bordeaux, France | [ More Info. ↗ ]  
○ Ranked 4<sup>th</sup> globally and 3<sup>rd</sup> in classification accuracy among 10+ countries in the finals.
- RoboWars 2023 **IIITDM Technical Festival** (sponsored by IEEE) | Chennai, India | [ More Info. ↗ ]  
○ Awarded 2<sup>nd</sup> prize inter-university in the finals competing in a physical battle against 12 robots.
- ERC 2022 **European Rover Challenge** (by European Space Agency (ESA)) | Krakow, Poland | [ More Info. ↗ ]  
○ Ranked 6<sup>th</sup> globally at the 2022 remote edition world finals featuring 50+ teams from 10+ countries.

## Publications

- Under Review **Improving MR Interaction through GenAI**  
Yashaswi Sinha, Atharva Rege, Yash Kumar Sahu, Rubini M, Himanshu Vishwakarma, Pradipta Biswas
- Hugging Face **Synthetic Tools Dataset via Diffusion Models** [ Dataset ↗ ]  
Yash Kumar Sahu\*, Yashaswi Sinha\*, Himanshu Vishwakarma, Arushi Khokhar, Pradipta Biswas  
Open-source dataset: 37,000 images spanning 16 hand tool classes (Under Review)
- ICRA 2025 **Blind Tactile Exploration for Surface Reconstruction**  
Yashaswi Sinha\*, Soumojit Bhattacharya\*, Yash Kumar Sahu, Pradipta Biswas  
*IEEE International Conference on Robotics and Automation*
- ACM IUI 2025 **Diffuse Your Data Blues: Augmenting Low-Resource Datasets via User-Assisted Diffusion**  
Yashaswi Sinha, Yash Kumar Sahu\*, Shravan Shanmugam\*, Abhishek Mukhopadhyay, Pradipta Biswas  
*Proceedings of the 30th International Conference on Intelligent User Interfaces* (Accept. Rate 25%)
- ICVTTs 2024 **Comparative Study on Image Translation GANs for Object Detection in Low-Resource Domains**  
Yash Kumar Sahu, Abhishek Mukhopadhyay, Gyanig Kumar, Pradipta Biswas  
*IEEE International Conference on Vehicular Technology and Transportation Systems* (Accept. Rate 30%)
- CICT 2023 **Vision-Based Object Sorting in Dynamic Environments using YOLO for RoboCup ARM Challenge**  
Yash Kumar Sahu, Radhika Mittal, Deep Patel, Chayan Maiti, M Sreekumar  
*IEEE International Conference on Information Communication Technology* (h5-index: 27)

\* Denotes equal contribution

## Research Experiences

- 2023 – Present **Intelligent Inclusive Interaction Design (I3D) Lab** [ More Info. ↗ ], Indian Institute of Science  
Research Assistant | Advisor: Prof. Pradipta Biswas
- Image Editing via Diffusion* ○ Compositing object images onto diverse backgrounds along with surface material transfer.  
○ Mask-guided latent and activation alignment for regional and feature-level identity-preservation.  
○ Improved classification by 11% with 67% less data compared to traditional augmentations.
- Scene Understanding* ○ Learning scene-conditioned object placement with a Conditional VAE.  
○ Encoded latent vectors fused with scene context to generate placement heatmaps.

- 3D Surface Reconstruction**
- Performed surface reconstruction using actor-critic reinforcement learning for tactile exploration.
  - Enhanced reconstruction by registering tactile & photogrammetry point clouds using RANSAC.
  - Achieved 91% IoU with 1mm precision for surface coverage of convex objects with sharp edges.
- Image Translation**
- Compared GANs and Diffusion models in translating synthetic & simulated to realistic images.
  - Utilized these translated images for data augmentation to increase dataset diversity.
  - Achieved FID 50.0, with 14% F1 and 56% mAP@50 boost on datasets limited under 1000 images.
- 2023 - 2024** **Centre for AI, IoT and Robotics (CAIRO), IIITDM** | Research Intern | Advisor: **Prof. Sreekumar M**
- Implemented path planning, depth estimation for efficient searching and pick-place by a robotic arm.
  - Developed software for autonomous pick and place of a 7-DoF Franka Emika Panda using MATLAB.
  - Performed object detection and classification using custom trained YOLO on RGB and depth images.
- 2023** **Mobile Robotics Lab, Indian Institute of Science** | Research Intern | Advisor: **Prof. Debasish Ghose**
- Implemented 3D path planning for drones using Corridor-based planning (Corridrones).
  - Designed layered architecture for navigation, incorporating A\*, Dijkstra's, & RRT algorithms.
  - Developed cloud server architecture that reduced memory usage by 37% and enabled scalability.
- 2022** **Smart Manufacturing Lab, IIITDM** | Research Intern | Advisor: **Prof. Senthilkumaran K**
- Developed a full-stack PyQt GUI for collaborative 3D printing using two 4-DoF robotic arms.
  - Supported synchronized multi-arm motion with real-time pose and print progress display.
  - Mapped G-code coordinates to robot extruder poses for alternate layer printing by each arm.
- 2021** **Department of Computer Science, IIITDM** | Research Intern | Advisor: Prof. Ram Prasad Padhy
- Simulated traffic scenarios for autonomous navigation of self-driving cars using Autoware.AI.
  - Developed a ROS-Gazebo bridge for physics simulation integration with Autoware.AI.

## Talks

- 2024 **Hands on Object Detection and CNNs**, Talent Sprint, Indian Institute of Science, Bengaluru
- 2024 **Paper Presentation**, *IEEE ICVTT 2024*, Amrita Vishwa Vidyapeetam, Bengaluru
- 2023 **Paper Presentation**, *IEEE CICT 2023*, IIITDM Jabalpur
- 2022 **Practical Robotics with ROS**, *4 Lecture Series*, IIITDM Kancheepuram

## Corporate Experiences

- 2022 – 2023 **Hyper Horizon** [ [More Info. ↗](#) ] | Robotics Software Intern (Autonomous Undersea Systems Division)
- Crafted navigation software in C++ and Python for an Autonomous Underwater Vehicle (AUV).
  - Deployed the ROS integrated robot in Indian water bodies for stealth monitoring operations.
  - Built a full-stack PyQt mission planner for sensor telemetry monitoring and mission deployment.
  - Configured 3D localization with sensor fusion of IMU, underwater depth SONAR, and GPS.

## Leadership

- 2020 – 2022 **Mars Research Station (MaRS), IIITDM** | Software Development Team Lead
- Co-founded the college's first rover club, winning the college's **Pioneering Spirit Award**.
  - Club recognised by the **Director of Indian Space Research Organization (ISRO) Satellite Centre**.
  - Spearheaded the software team to achieve top rankings in international rover competitions.

## Skills

- **Languages & Libraries:** Python, Pytorch, OpenGL, OpenMP, PyBullet, PyQt, Bash, C/C++
- **Tools & Platforms:** Docker, Git, Linux, MATLAB, Nvidia Isaac Sim, ROS, ROS2

## Volunteering

- 2021 – 2023 **National Cadet Corps (NCC)** | Senior Under Officer
- Led university NCC wing among 400+ students in training for the nation's second line of defense.
  - Achieved best grades (**top 2%**) in the battalion for the second-highest level (B) training certification.
- 2022 – 2024 **Student Mentor** | Mars Research Station (MaRS), IIITDM
- Guided 100+ students over two years in robotics, bridging simulation and real-world implementation.
  - Served as the official team mentor for ISRO's Rover Challenge, leading the team to secure 5<sup>th</sup> place nationally, competing against industry professionals and postgraduate experts.
  - Mentored team for a national competition, leading to team felicitation by the **Indian President**.