

PRANJAL MISHRA

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PROFILE

I'm a Robotics software engineer specializing in 3D perception and real-time autonomy for physical vehicles and robots. I build and deploy multi-sensor pipelines (stereo, RGB-D, LiDAR) for pose estimation, 3D geometry, and sensor fusion under real-time constraints on embedded Linux (NVIDIA Jetson), using C++ and Python with ROS 2. My work covers camera/sensor calibration, real-time perception-to-control integration, and taking systems from prototype to reliable operation on real hardware. Available to start immediately.

EDUCATION

Master of Science | ETH Zürich Sep 2023 - Aug 2026 | GPA: 5.4 / 6.0
Computational Science & Engineering (Specialization: Robotics & Computer Vision)

Bachelor of Technology | Indian Institute of Technology Roorkee, India July 2017 - June 2021 | GPA: 8.8/10
Major: Metallurgical & Materials Engineering Rank 3
Minor: Computer Science & Engineering

TECHNICAL SKILLS

Programming: C/C++, Python, Bash, MATLAB
Robotics & Real-Time Systems: ROS 1/2, Jetson embedded deployment, Docker, Gazebo, Isaac Sim, Unity
Perception & 3D Geometry: RGB-D sensing, multi-view stereo, camera/sensor calibration, ICP, OpenCV, Open3D, PCL
Sensor Fusion & State Estimation: Multi-LiDAR fusion, IMU-based state estimation, multi-sensor pipelines
ML Frameworks & Deployment: PyTorch, TensorFlow, model quantization
Testing & Debugging: Git, CI-style workflows, logging, profiling, system debugging
Web/API: React, Dash, FastAPI, REST API integration

PROFESSIONAL EXPERIENCE

Research Assistant (Robotic Systems) | D-HEST, ETH Zürich Aug 2024 – Aug 2026
SCAI Lab – Dr. Diego Paez-Granados Zurich, CH

- Built and deployed real-time perception-to-control pipelines in ROS 2 (C++/Python) on NVIDIA Jetson edge hardware, including sensor calibration, multi-sensor fusion, and reproducible Docker-based deployment across robotic platforms
- Contributed to **ROS4HC (ROS for Healthcare)**, an open-source framework standardizing physiological/biological sensor integration into ROS 2 systems, combining multimodal sensor drivers, signal processing, and real-time visualization on assistive robotic platforms [\[GitHub\]](#)
- Led markerless motion capture and data processing for pediatric gait disorder research with ETH AIT Lab, owning the multi-view 3D reconstruction pipeline and its clinical-scale data workflows

Simulation Engineer | Research & Development July 2021 – Aug 2023
Sterlite Technologies Limited Aurangabad, India

- Built finite-element multiphase flow and FSI models (COMSOL) to analyse failure modes in an industrial process
- Validated models against production data and ran sensitivity studies to identify key process variables
- Turned results into process changes with operations teams; work contributed to two patents

PROJECTS

Multi-Camera 3D Human Pose & Body Model Reconstruction Pipeline Jan 2026 - Aug 2026
(SCAI Lab × AIT Lab), ETH Zürich

- Built a multi-view perception pipeline reconstructing 3D body pose and shape from synchronized RGB/IR stereo point clouds: camera calibration, 2D keypoint detection, multi-view triangulation, and SMPL-X mesh fitting with ICP-based scan-to-mesh validation

- Developed a segmentation-driven subject isolation stage (instance segmentation → cross-view mask matching → SAM2-guided refinement) to fit body models robustly in cluttered clinical scenes with multiple people
- Engineered scalable batch workflows to run the pipeline reproducibly over large-scale clinical recordings spanning many subjects and sessions, plus a real-time visualizer with a FastAPI backend serving fitted gait body model and ground-reaction-force (GRF) data in temporal sync to a web-based frontend for biomechanical review

ArtiTwinSplat | Interactable Digital Twin Reconstruction from RGB-D Videos (Master's Thesis) June 2025 - Jan 2026
CVG Lab, ETH Zürich

- Designed a photorealistic, interactable 3D scene reconstruction pipeline based on 3D Gaussian Splatting (3DGS), extended to dynamic articulated scenes via disentangled background/object Gaussians
- Applied 4D RANSAC-based mobility fitting and an unsupervised RGB-D reconstruction framework to extract joint articulation priors for object motion estimation
- Extended Nerfstudio's WebRTC-based viewer to support live rendering of dynamic, articulated Gaussian Splat scenes, enabling real-time remote viewing of the reconstructed digital twin

ROS 2 Real-Time Perception-to-Control for Non-Holonomic Wheelchairs Feb 2025 - Nov 2025
SCAI Lab, ETH Zürich

- Built a real-time perception-to-control pipeline (C++/ROS 2) on NVIDIA Jetson, integrating dual Livox LiDARs, IMU-based state estimation (FAST-LIO), and multi-LiDAR point-cloud fusion/preprocessing
- Developed reactive crowd-navigation and collision-avoidance stack (convex bounding-shape constraints) for powered wheelchairs, including ROS 2 teleoperation interfaces for manual control and on-vehicle testing [\[GitHub\]](#)
- Integrated pedestrian detection (M-detector) with RVO2-based reactive collision avoidance for safe navigation in dynamic multi-agent environments

PokeSDF | A Unified Multi-Modal Representation for Deformable Objects (Semester Project) Nov 2024 - Feb 2025
SRL Lab, ETH Zürich

- Built an SDF-based 3D reconstruction pipeline fusing vision, force, and end-effector pose to infer object deformation from poking interactions, using a template-free approach [\[Project\]](#)
- Performed hand-eye calibration to register the camera frame to the robot's end-effector for accurate multi-modal fusion

AR Room Layout Estimation (Mixed Reality Course Project) Sept 2024 - Dec 2024
CVG Lab, ETH Zürich

- Built a real-time AR room-layout estimation application on Magic Leap using spatial mapping for boundary and object placement

Grasp Motion Diffusion Model (GMDM) (Digital Humans Course Project) Feb 2024 - May 2024
VLG Lab, ETH Zürich

- Developed a conditional latent diffusion model for single-stage human grasping motion generation, demonstrated on motion infilling and object trajectory prediction [\[Project\]](#)

PUBLICATIONS & PATENTS

2026. **P. Mishra**, R. Zurbrügg, M. Wilder-Smith, M. Hutter, M. Pollefeys, Z. Bauer.
ArtiTwinSplat: Interactable Digital Twin Reconstruction via Gaussian Splatting from RGB-D Videos.
ICRA 2026 Workshop on Advances and Challenges in AI-Driven Automation and Robotic System Integration with Digital Twins, Vienna, 2026. Lightning Talk & Poster. [arXiv](#)
2026. R. J. Manríquez-Cisterna[†], **P. Mishra**[†], J. Pena-Queralta, M. Perez-Serrano, S. Garyfallidis, L. Kupper, M. Ejtehadi, A. Breuss, A. A. Ravankar, J. V. Salazar Lucas, R. Riener, Y. Hirata, D. Paez-Granados.
ROS 4 Healthcare: Physiological Human Sensing for Social, Assistive, Rehabilitation, and Medical Robotics.
Frontiers in Robotics and AI, 2026. DOI: [10.3389/frobt.2026.1745197](#)
- Two prior patents (2022–2023) and one materials-science publication (2021) from earlier engineering work – available on request.