Rishika Bera

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Portfolio: rishika2024.github.io | Citizenship: United States

EDUCATION

Northwestern University — Evanston, IL
MS in Robotics — Sept 2025 - Dec 2026

Indian Institute of Technology - Jodhpur — Rajasthan, India
B.Tech in Mechanical Engineering — Dec 2021 – May 2025

TECHNICAL SKILLS

Programming Languages: C, C++, Python, MATLAB, HTML, CNC G-Code

Robotics: ROS 2, UAV, SLAM, Robot Kinematics & Dynamics, Path Planning, Control Systems, Perception, Sensor Fusion, Motion Planning

Machine Learning & AI: Machine Learning, Deep Learning (MLPs, CNNs, Autoencoders, GANs, Transformers, Diffusion Models), Reinforcement Learning, LLMs

Software & Libraries PX4, MoveIt, OpenCV, Gazebo, RViz, CoppeliaSim, Unity3D, Simulink

Tools: Linux, Git

Hardware: Meca500 Arm, Pixhawk, Franka Arm, Interbotix Arm, RealSense Camera, Arduino, Raspberry Pi

Design & Manufacturing: SolidWorks, Onshape, Blender, 3D Printing, CNC Machine, Soldering

PROJECTS

3D Printing Robot Arm - Meca500 | (ROS 2, G-Code, Python, Robot Learning) — Apr 2026 - Present
- Building a ROS 2 wrapper over the Meca500 API to enable motion planning and system integration
- Developing a Python pipeline to parse G-Code files into end effector waypoints for the 6-axis arm
- Investigating robot learning approaches for adaptive control of tool orientation and extrusion across varying materials

Sketch to Photorealistic Image Generation | (Python, PyTorch, Diffusion Models, OpenCV) — Apr 2026 - Present
- Extracted colored edge maps from COCO images via OpenCV Canny detection to build paired training data
- Trained a conditional diffusion model with a UNet backbone to generate photorealistic images from sketches

Morphing Aerial–Ground Transformer Robot | (CAD, Raspberry Pi, PX4, Pixhawk, UAVs) — Jan 2026 - Apr 2026
- Designed a hybrid aerial-ground robot in CAD, featuring a hinge mechanism and planetary gear wheel system
- Assembled and flight-tested a quadrotor on an F450 frame, refining 3D-printed parts across multiple revisions
- Integrated PX4 with Raspberry Pi for teleoperated mode-switching between aerial and ground operation

EKF-SLAM from Scratch on TurtleBot | (C++, ROS 2, SLAM, Kalman Filter) — Jan 2026 - Mar 2026
- Implemented EKF SLAM from scratch in C++ with linearized prediction and Kalman gain correction
- Solved unknown data association via Mahalanobis distance thresholding on landmark estimates
- Detected cylindrical landmarks from 2D LaserScan using circle fitting on clustered point segments
- Simulated and validated the full pipeline on TurtleBot3 in Gazebo, fusing wheel odometry and LiDAR

Bug-Sorting - Franka Robot Arm | (Python, ROS 2, OpenCV) — Dec 2025
- Contributed to developing an autonomous system to catch and sort moving HexBugs with the Franka Arm
- Built a vision system using OpenCV and RealSense to detect, label, and track HexBugs in real-time
- Explored continuous tracking and pick-and-place motion planning using ROS 2 and MoveIt

WORK EXPERIENCE

Purdue University — May 2024 - Jul 2024
Summer Undergraduate Research (SURF) Intern
- Engineered PrimerCurator's multimodal backend pipeline integrating text, image, and video using ChatGPT API
- Reduced manual tutorial creation time by 78% with >90% accuracy in automated extraction