

# Adam Imdieke

Robotics PhD student working on perception and manipulation

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## RESEARCH FOCUS

- Developing multisensory robot manipulation systems through novel tactile hardware and perception-driven control.
- Designing Contact-Aware Inverse Kinematics (ContactIK) for high-DoF robots to improve whole-body environmental interaction.
- Learning robust manipulation policies via generative models and multi-sensory inputs (vision, force/torque, proprioception).

## PUBLICATIONS

### SPARK-REMOTE | Lead Author

ICRA Workshop: Human-Centric Multilateral Teleoperation | Apr 2025

- A Cost-Effective System for Remote Bimanual Robot Teleoperation.
- Proposes haptic feedback and torque limiting controllers for our dual-arm UR5e robot arm to improve depth perception and bimanual manipulation loop closure.

### AUGINSERT | Co-Author

IROS 2025 | Aug 2025

- Learning Robust Visual-Force Policies via Data Augmentation for Object Assembly Tasks. Leverages Force / Torque data, proprioception, and vision to learn robust insertion policies.

### TALK THROUGH IT | Co-Author

RAS 2024 | Jul 2024

- End User Directed Manipulation Learning using feedback to Guide Robot Skill Acquisition.

## PROJECTS

### TACTILE SKIN FOR SPOT | Research Project

Project Page | May 2025–Present

- A Novel, Low-cost 3D printed tactile skin for robotic arms to enhance whole-body environmental contact sensing.
- Leverages high Degree of Freedom robots to condition Inverse Kinematics null spaces to satisfy contact constraints.
- Hardware development for real-time Contact aware Inverse Kinematics (ContactIK) enables both contact-avoidance and contact-embracing behaviors in manipulation.

### GENERATIVE MODELS | Research Project

Project Page | Sep 2025–Present

- Investigating video diffusion models for zero-shot robotic manipulation, focusing on data efficiency and policy generalization.

### SPOT NATURAL LANGUAGE INTERFACE | Class Project

Project Page | Nov 2023–Present

- Integrating LLM control of Boston Dynamics Spot, enabling natural language commands for long-horizon tasks.
- Developed robust human-following capabilities for Spot, resilient to dynamic environments and occlusion.

## EDUCATION

### UNIVERSITY OF MINNESOTA

Ph.D. in Computer Science

Sep 2024–Present | Minneapolis, MN

### UNIVERSITY OF MINNESOTA

M.S. in Robotics

Sep 2023–Present | Minneapolis, MN

### UNIVERSITY OF MINNESOTA

B.S. in Computer Engineering

Sep 2019–May 2023 | Minneapolis, MN

## SKILLS

### POLICY LEARNING

NN based manipulation policies • Diffusion learning • Reinforcement learning • Multisensory perception

### TECHNICAL SKILLS

Python • C++ • PyTorch • Jax • ROS/ROS2 • Git • Linux ( 10 years) • Network programming

### ROBOT CONTROL

Inverse Kinematics • Motion planning • Force/Torque response • Impedance control

### HARDWARE DEVELOPMENT

CAD modeling • 3D printing (SLA, FDM) • PCB design • SMD soldering • Embedded systems

### SIMULATION

Mujoco • PyBullet • ROS • Isaac Lab

## INTERESTS

### MACHINE LEARNING

Generative models • Perception Models • Manipulation Policy Learning • Transformers • Neural Architectures • Imitation Learning (IL) • Reinforcement Learning (RL)

### CONTROL

Optimization-based control (IK, MPC) • Modern Control • System ID • Filtering

### TELEOPERATION

Human-Robot Interaction • Haptic Feedback • VR Interfaces • Low-latency Systems