Adam Imdieke

Computer Science PhD student working on robotic 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 multisensory 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 **Contact-Rich** Object Assembly Tasks. Leverages **Force/Torque** data, proprioception, and vision to learn robust insertion policies.

TALK THROUGH IT | Co-Author

RA-L 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

Diffusion Policies • **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 • **Sim-to-Real**

INTERESTS

MACHINE LEARNING

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

CONTROL

Optimization-based control (IK, MPC) • **Modern Control** theory • **Impedance Control**

TELEOPERATION

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