Adam Imdieke

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RESEARCH FOCUS

- Multisensory robot manipulation learning, focusing on novel hardware for robot perception and neural network architectures for manipulation policies.
- Current work includes developing a tactile skin for arms on high DoF robots (Boston Dynamics Spot arm) and Contact aware Inverse Kinematics to enhance whole-body environmental interaction.

PUBLICATIONS

SPARK-REMOTE | Lead Author
ArXiv | 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 satisy contact constraints.
- Hardware development for real-time Contact aware Inverse Kinematics (ContactIK) enabling contact avoidance contact embracing behaviors.

GENERATIVE MODELS | Research Project
Project Page | Sep 2025–Present

- Investigating Video Diffusion Models for Zero-Shot Robotic Manipulation Policy Learning

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.
- Novel human following capabilities, robust to dynamic environments and crowds.

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