Daksh Adhar

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Education

Carnegie Mellon University - School of Computer Science Aug. 2024 – May 2026
Master of Science in Robotic Systems Development | GPA: 4.15/4 Pittsburgh, PA
Coursework: Optimal Control and RL, Robot Autonomy, Robot Mobility, Computer Vision
Teaching Experience: TA for 16642-Manipulation Estimation and Control

Indian Institute of Technology, Guwahati July 2020 – May 2024
Bachelor of Technology in Engineering Physics | GPA: 8.27 / 10.00 Guwahati, India
Coursework: Quantum Mechanics, Statistical Mechanics, Nuclear Science, Computational Physics, Simulation Techniques

Experience

1X Technologies | Website May 2025 – August 2025
AI Resident, Reinforcement Learning Team Palo Alto, California
- Trained RL policies for dexterous manipulation on NEO hand, and added randomization for sim-to-real transfer
- Designed metrics to benchmark RL policies in both Isaac Gym and MuJoCo, evaluating sim-to-sim robustness
- Developed a ROS 2 Humble C++ controller to deploy evaluated policies in real-time simulation and teleoperation
- Built Tkinter-based local and Streamlit-based browser app for object segmentation mask data collection using SAM2
- Integrated Cloudflare R2 and DBeaver SQL backend to load frames and store operator clicks on 1M+ frames

Biomimetic Robotics & Artificial Intelligence Laboratory, IIT Guwahati | Website Jan. 2023 – May 2024
Research Internship, Prof. Shyamanta M. Hazarika Guwahati, India
- Developed a testing framework on PyBullet and OpenAI Gym environment for training bionic hand grasp RL policies
- Formulated reward functions and used Soft Actor-Critic algorithm to enable grasp-and-lift of deformable objects
- Applied domain randomization for sim-to-sim transfer, achieving 38% slip reduction and 14% decrease in deformation
- Increased stability with adaptive sliding mode control, improving slippage by 103.35% and deformation by 197%

Projects

AR assisted Robotic Total Knee Arthroplasty | Website Jan. 2025 – Ongoing
- Developed a manipulator system for total knee arthroplasty, achieving 2 mm and 2° accuracy in drilling surgical pins
- Utilized a RealSense camera for real-time bone segmentation, registration and tracking, replacing invasive IR trackers
- Designed a dynamic planning subsystem that updates as surgical pins are drilled in the bone, using MoveIt and ROS
- Integrating a custom 3D-printed drill end effector, enabling drill activation based on trajectory position

Unitree G1 Soccer Ball Kicking | Code | Report Jan. 2025 – April 2025
- Simulated penalty-style ball kicking on the Unitree G1 humanoid with whole-body motion and balance control
- Computed strike impulse using quadratic programming and joint trajectories through direct collocation optimization
- Stabilized the robot using IHLQR and tracked kicking motion with TVLQR, achieving <0.5 m error from targets

Pixel art using Franka Emika Panda Arm | Code | Report Jan. 2025 – April. 2025
- Developed a pixel-art stamping system using Franka Emika Panda with custom end-effector for ink-pad stamping
- Optimized stamping order with Christofides' algorithm, reducing travel distance by 30% compared to naive ordering
- Implemented force control for stamping for consistent stamping pressure, and adaptive re-stamping based on vision feedback

Publications

Robustifying a RL agent-based bionic reflex controller through an adaptive sliding mode control Nov. 2024
Journal Paper at Cambridge University Press, Robotica Cambridge/Robotica
Grasp force optimization as a Bilinear Matrix inequality problem: A Deep-learning approach Dec. 2023
6th National Conference on Multidisciplinary Design, Analysis and Optimization arXiv/2312.05034
Reinforcement Learning-Based Bionic Reflex Control for Anthropomorphic Robotic Grasping Sept. 2023
Arxiv Paper arXiv/2312.05023

Skills

Programming Languages: Python, C++, Matlab, Julia, SQL
Tools/Frameworks: PyTorch, Tensorflow, Mujoco, Isaac Gym, OpenAI Gym, ROS2, MoveIt2, Gazebo, PyBullet
Miscellaneous: SolidWorks, Fusion 360, Arduino, Raspberry Pi, PCB designing, Kinect, RealSense

Honors

Narotam Sekhsaria Foundation Scholar, 2024 - $25,000 merit-based scholarship awarded to 15 out of 5500 applicants
JN Tata Endowment, 2024 - $12,000 merit-based scholarship awarded to 50 out of 10,000 applicants
International Rover Challenge, 2023 - Finalists with 9 others for YUVAAN mars rover, Mars Society South Asia