Sarthak Dayal

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EDUCATION

University of Texas at Austin Aug 2023 - May 2026
B.S. Computer Science, Minor: Robotics (GPA: 4.0)
Coursework: Honors Operating Systems, Computer Architecture, Data Structures, Discrete Math, Gateway to Robotics, Differential Equations and Linear Algebra, Probability.

WORK EXPERIENCE

MIDI Lab (Dr. Amy Zhang), Research Assistant - Austin, TX May 2024 - Present
- Built simulated environments, a physical computer vision system, and an easy-to-use YAML configuration pipeline that enabled faster and more robust training of Reinforcement Learning policies for dynamic manipulation tasks in air hockey.
- Developed PPO and SAC benchmarks for use by other researchers in the RL community, which achieved tasks 99% of the time with a high sample efficiency, validating our setup and paving way for future researchers to evaluate their results.
- Formulated a novel representation learning approach to leverage repeated structure in state spaces for reduced training time and samples in the hierarchical setting, currently being used to learn tasks in simulation from raw visual inputs.
- **Technologies:** PyTorch, Numpy, Matplotlib, OpenCV, Tianshou, Box2D, Mujoco, Gymnasium, Weights & Biases, Slurm.

Paradigm Robotics, Product Lead, Radar/Acoustics, Part time - Austin, TX Nov 2023 - Aug 2024
- Researched over 15 types of radar technologies and many sensor-fusion solutions, culminating in the development of a localization and mapping system that worked in smoke-filled rooms, where traditional LiDAR-based methods fail.
- Conducted product interviews with radar vendors, informing a cost-benefit analysis that guided purchasing decisions.
- Developed a sound detection platform that accurately classified more than 10 distinct sound types, enabling proactive firefighter alerts to potential hazards and identifying nearby individuals.
- **Technologies:** C++, C, Python, ROS, Gazebo, MoveIt, Cochl AI, TI radar toolbox.

PROJECTS

E1000 Network Driver (Honors Operating Systems) | C, x86-32 Assembly, QEMU Dec 2024
- Built an emulated E1000 network card driver and integrated into a custom UNIX-based operating system that allowed us to send packets between computers over wifi, culminating in the creation of a networked Doom game.

Text to Object Mapping for Library Bookshelves | Python, SAM, CLIP, Google Cloud Vision Apr 2024 - May 2024
- Developed a novel technique that segmented a bookshelf image from text descriptions of books given an image of a bookshelf, improving ease of access for camera-assisted robotics tasks in libraries.

Counter A&M Turret (Won HackTX among 747 teams from 52 universities) | Python, C++, OpenCV Oct 2023
- Engineered a vision and controls pipeline, and built the physical body for a C-RAM-like Texas A&M logo-targeting water bead turret in a 4-person team during a 24-hour hackathon.

Reflexion Buddy (Winner, IBM Watson AI challenge, HackMIT) | Python, Streamlit, Watson, GPT-3 Sep 2023
- Designed and engineered a product to enable mental health professionals track patient health and improve patient outcomes by providing an interactive multimodal (audio, text, image) journaling interface with sentiment analysis and mood tracking.

ACTIVITIES

CS 309: Essentials of AI for Life and Society with Dr. Peter Stone | Teaching Assistant Aug 2024 - Present
- Supported curriculum development and improved student learning outcomes by writing new course material, providing verbal feedback to students, and supporting course logistics, guiding course design for a class offered for the first time ever.

Directed Reading Program (DiRP) | Reinforcement Learning Mentor and Admin Mar 2024 – Present
- Organized a new reading group with 5 students interested in Reinforcement Learning, leading group discussions to teach fundamental concepts and guiding the development of projects including Q networks and PPO for toy environments.

Technical Skills: Python (PyTorch, ROS, Streamlit, OpenCV), C, C++ (ROS, OpenCV), ARM/x86 Assembly, Gymnasium, Tianshou, Mujoco, Gazebo, Arduino, Weights & Biases, Git, Cochl AI, SAM, CLIP, QEMU, Slurm.

Publications: Co-authored with a focus on task creation and benchmarking, "Robot Air Hockey: A Manipulation Testbed for Robot Learning with Reinforcement Learning," accepted at ICRA 2024 Manipulation Skills Workshop.