SIDDHARTH SAHA

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EDUCATION

Carnegie Mellon University, School of Computer Science | GPA: 3.97 / 4.00 — Pittsburgh, PA
Master of Science in Robotic Systems Development (MRSD) — *May 2024*
Courses: Deep Learning, Optimal Control & Reinforcement Learning, SLAM, Planning & Decision-making
Achievements: J.N. Tata Scholar; ICRA 2023 Quadruped Robot Challenge: Travel grant to London and 3rd Prize

Indian Institute of Technology Bombay | GPA: 9.43 / 10.00 — Mumbai, India
Bachelor of Technology in Mechanical (with Honors), Minor in Computer Science — *Aug 2021*
Courses: Foundations of Learning Agents, Design & Analysis of Algorithms, Design of Mechatronic Systems
Achievements: Technical Citation; ROS Conference 2021: Delivered two lightning talks
1st Prize: Micromouse Challenge (International), Off-track Bot (National), Operations Challenge (IIT Bombay)

EXPERIENCE

Amazon Robotics, *SDE Intern (C++ Specialist)* | Westborough, MA — *May 2023 – Aug 2023*
- Implemented RRT-based motion planning for suction-based manipulator arms operating on unpackaged items
- Identified critical issue that the arm continued full pick-and-place motion even if the package was dropped
- Pinpointed the issue to a mutex that blocked the suction state from updating in the behavior tree's blackboard
- Confined the scope of this mutex resulting in a remarkable 50% speedup in these failure cases

Goldman Sachs, *Analyst* | Bengaluru, India — *Jul 2021 – Jul 2022*
- Ideated and executed payment structures for mortgage-backed securities in multi-national desk of 15 members
- Achieved steep improvement of 1.62% profits by optimizing cash-flows through derivative instruments

Google Summer of Code – JdeRobot, *Student Developer* | Remote — *Jun 2021 – Aug 2021*
- Migrated Docker Image from ROS 1 to ROS 2 Foxy, constructed RViz 2 web interface, and deployed to production
- Post-GSoC, headed JdeRobot's ROS 2 Working Group for a year as an open-source contributor

Stride – Quadruped Team, *Co-founder and Team Lead* | Mumbai, India — *Dec 2019 – May 2021*
- Led a two-tiered team of 15 members, overseeing a budget of 14,000 USD granted by IIT Bombay
- Modelled virtual leg compliance with impedance control and implemented gaits using Bézier curve trajectories

PROJECTS

Demos and More Projects

Long-horizon Task Planning for Quadrupeds | *Research Project, CMU* — *Sep 2023 – Present*
- Learned locomotion skills like climbing, jumping, and walking using PPO and curriculum-learning in Isaac Gym
- Constructed an A* planner, guided by a learned cost predictor, to generate time and energy-efficient paths
- Implemented a novel anytime dataset generation method in Isaac Gym with diversity guarantees for training data
- Achieved a significant 13% reduction in energy and 29% reduction in time compared to a walking-only planner

Autonomous Search Quadruped in Unknown Terrains | *MRSD Capstone, CMU* — *Sep 2022 – Dec 2023*
- Devised NMPC tracked using reactive WBC and integrated it with exploration and LiDAR-based localization stacks
- Implemented safety features for disaster sites & demonstrated on-demand temporary takeover by safety operator
- Led to exploration rate of 16 m^2/min and impressive 95% repeatability rate in debris-filled terrain with narrow doors
- Demonstrated my robot at Quadruped Robot Challenge (ICRA 2023-London), securing 3rd prize for Carnegie Mellon against top institutions like MIT and KAIST

Robot Vision Scene Understanding Challenge | *CVPR 2021 Competition, Remote* — *Mar 2021 – Apr 2021*
- Built object-based 3D semantic map utilizing RGBD & odometry measurements from robot traversing environment
- Devised consensus between YOLOv4 & 3D detection techniques (VoteNet, Group-Free 3D) to improve confidence
- Applied 3D NMS algorithm to obtain semantic map of environment with bounding boxes around detected objects

F1/10th – Autonomous Grand Prix | *IROS 2020 Competition, Remote* — *Oct 2020*
- Leveraged Bernstein-polynomial based local trajectory planner & model predictive control for Ackermann steering
- Acquired global optimal path via Operator Splitting quadratic program solver and implemented obstacle detection

SKILLS

Programming: C++, CMake, CUDA, Julia, MATLAB, Python, Scripting (Bash, Sed, Awk)
Robotics: Drake, Gazebo, Isaac Gym, MoveIt, MuJoCo, OpenCV, PyTorch, ROS 1/2
Software: Docker, Git, Jira, LaTeX, Linux, Protobuf, Vim
Optimization: CppAD, Eigen, GLPK, GNU MathProg, Gurobi, IPOPT, OSQP, PuLP