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SIDDHARTH SAHA

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EDUCATION

Carnegie Mellon University, School of Computer Science | GPA: 3.96 / 4.00 — Pittsburgh, PA
Master of Science in Robotic Systems Development (MRSD) — *May 2024*
Courses: Computer Vision, Optimal Control and RL, Planning and Decision-making, Robot Learning
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: International Micromouse Challenge, Off-track Bot (National), Operations Competition (IIT Bombay)

EXPERIENCE

CMU Robotic Exploration Lab, *Graduate Research Assistant* | Pittsburgh, PA — *Nov 2022 – Present*
- Performing task planning using search-based planning methods over locomotion skills for the Unitree Go1 robot
- Devised mixed-integer quadratic program for footstep planning on biped robot to traverse discontinuous terrains

Amazon Robotics, *SDE Intern (C++ Specialist)* | Westborough, MA — *May 2023 – Aug 2023*
- Implemented collision modelling and motion planning for 6-DOF manipulator arm operating on unpackaged items
- Developed sensor driver for Intel Realsense D455 and pushed to Amazon's internal version control system
- Achieved 50% speedup in failure handling of dropped packages via suction feedback and low-level interrupts

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 Robotics Academy Docker Image from ROS 1 to ROS 2 and built VNC-based RViz 2 web interface
- Deployed project to the production environment as the new Robotics Academy ROS 2 Foxy image
- Post-GSoC, headed JdeRobot's ROS 2 Working Group as an open-source contributor till Aug 2022

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
- Demonstrated real-time SLAM via sensor fusion of cost-effective IMU sensor and RealSense PointCloud data
- Modelled virtual leg compliance with impedance control and simulated gaits using Bézier curve foot trajectories

SKILLS

Programming: C++, CMake, CUDA, Java, Julia, MATLAB, Python, Scripting (Bash, Sed, Awk, Perl, RegEx)
Robotics: Drake, Fusion360, Gazebo, Isaac Gym, MoveIt, MuJoCo, OpenCV, PyTorch, ROS 1/2
Software: Docker, Git, Jira, LaTeX, Linux, Protobuf, Vim
Optimization: CppAD, GLPK, GNU MathProg, Gurobi, IPOPT, OSQP, PuLP

PROJECTS

Task Planning for Quadruped Robot | *Research Project, CMU* — *Sep 2023 – Present*
- Trained skills in Isaac Gym using curriculum-based learning and distilling vision-based policy to real Go1 robot
- Conceived novel skill-RRT planning framework over learned skills to allow custom user objectives over the motion

Autonomous Search Quadruped in Narrow & Cluttered Terrains | *MRSD Capstone, CMU* — *Sep 2022 – Present*
- Implementing exploration of unknown room with trapped humans using TARE Planner and Superodometry
- Devised non-linear model predictive control and performed model reference tracking using whole body control
- Deployed custom controller on Unitree Go1 that exceeded stretch requirements for robust locomotion over clutter

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

F1/10th – Autonomous Grand Prix | *IROS 2020 Competition* — *Oct 2020*
- Leveraged Bernstein polynomial based local trajectory planner & MPC for Ackermann steering in 4-member team
- Acquired global optimal path via Operator Splitting quadratic program solver and implemented obstacle detection