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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, Robot Localization and Mapping, Planning and 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 collision modelling and motion planning for 6-DOF manipulator arm operating on unpackaged items
- Achieved 50% speedup in failure handling of dropped packages via suction feedback and low-level interrupts
- Developed sensor driver for Intel Realsense D455 and pushed to Amazon's internal version control system

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 their Docker Image from ROS 1 to ROS 2 Foxy, built RViz 2 web interface, and deployed to production
- 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, Eigen, GLPK, GNU MathProg, Gurobi, IPOPT, OSQP, PuLP

PROJECTS

Demos and More Projects

Long Horizon Task Planning for Quadruped Robot | *Research Project, CMU* — *Sep 2023 – Present*
- Obtained controller using curriculum-based learning in Isaac Gym; distilling vision-based policy to real Go1 robot
- Generated local motion time & energy costs dataset and trained cost predictor as a multi-head convolutional NN
- Demonstrated long horizon task planning with user-defined objective using A* search guided by the cost predictor

Autonomous Quadruped in Unknown Cluttered Terrains | *MRSD Capstone, CMU* — *Sep 2022 – Dec 2023*
- Devised non-linear model predictive control tracked using reactive whole-body control and deployed to quadruped
- Implemented safety features for disaster sites & demonstrated on-demand temporary takeover by safety operator
- Integrated localization (Superodometry), controller (custom), and exploration (TARE Planner) sub-systems
- Demonstrated robust exploration at 16.5 m^2/min coverage rate of unknown, cluttered room with trapped humans

Quadruped Robot Challenge | *ICRA 2023 Competition, London* — *May 2023 – Jun 2023*
- Deployed controller to Unitree Go1 & navigated challenge course using Beyond Visual Line-of-Sight teleoperation
- Recovered from falls using pre-defined maneuvers and achieved the third position representing Carnegie Mellon

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 across YOLOv4, VoteNet, & Group-Free 3D and implemented 3D NMS for perception pipeline

F1/10th – Autonomous Grand Prix | *IROS 2020 Competition, Remote* — *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