SIDDHARTH SAHA

Phone: (412) 214-2516 | *E-mail*: sidsaha@cmu.edu | *Blog*: http://cs.cmu.edu/~ssaha3 | *GitHub*: trunc8 | *LinkedIn*: sahasiddharth611

EDUCATION

Carnegie Mellon University, School of Computer Science — Pittsburgh, PA
Master of Science, Robotic Systems Development — *May 2024*
Ongoing Coursework: Systems Engineering, Robot Mobility on Air, Land, and Sea, Computer Vision, Manipulation
Capstone Project: Heterogeneous Multi-robot Search and Rescue (Prof. Sebastian Scherer and AirLab)
Achievement: J.N. Tata Scholarship, 97 scholars out of 1700+ applicants

Indian Institute of Technology Bombay — Mumbai, India
Bachelor of Technology (Honors), Mechanical (Minor: Computer Science) | *GPA: 9.43 / 10.00* — *Aug 2021*
Selected Coursework: Planning and Control of Legged Robots, Reinforcement Learning, Design of Algorithms
Bachelor Thesis: Mapping Regions of Dynamic Activity and Building Dynamic-free 3D OctoMaps
Achievements: Technical Citation; ROS Conference 2021: Two lightning talks on Thesis and GSoC project

EXPERIENCE

Goldman Sachs, *Analyst* | Bengaluru, India — *Jul 2021 – Jul 2022*
• Ideated and executed payment structuring ideas for mortgage-backed securities in multi-national team of 15 members

Google Summer of Code – JdeRobot, *Student Developer* | Remote — *Jun 2021 – Aug 2021*
• Migrated Docker image to ROS2 and implemented behavior tree navigator in *SLAM Toolbox* for pick-&-delivery exercise
• Built VNC-based RViz2 web template, pushed contributions to production environment and released ROS2 Foxy image

PROJECTS

Equilibrium states of Rotary Inverted Pendulum | *SMAμL Lab, IIT Bombay* — *Jul 2021 – Feb 2022*
• Modelled ultra-flexible inverted pendulum using assumed modes method and validated shape predictions experimentally
• Proposed and proved dependence of number of equilibrium configurations on initial state for compliant systems

Hilti SLAM Challenge | *IROS 2021, Prague* — *Sep 2021*
• Estimated robot position in ROS bag files with sensor calibration and Visual-Inertial Odometry technique *VINS-Fusion*

Quadruped Robot | *RoboCup Rescue League Challenge* — *Dec 2019 – May 2021*
• Founded and led a two-tiered team of 15 members, overseeing a technical budget of ~14K USD granted by IIT Bombay
• Modelled virtual leg compliance with impedance control and simulated gaits with 11-order Bézier curve foot trajectories
• Implemented real-time SLAM via sensor fusion of cost-effective IMU sensor and Intel RealSense PointCloud data

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

Multi-robot Path Planning for Capture of Non-adversarial Moving Target — *Mar 2021 – Apr 2021*
• Modelled motion primitives and capture probability as Mixed Integer Linear Programming (MILP) problem
• Optimized in joint path space with *Gurobipy*, and simulated motion model and graph-represented world with *Networkx*

F1/10th – Autonomous Grand Prix | *IROS 2020, Las Vegas* — *Oct 2020*
• Leveraged Bernstein polynomial based local trajectory planner and MPC for Ackermann steering in 4-membered team
• Acquired global optimal path via Operator Splitting Quadratic Program (OSQP) solver & implemented obstacle detection

LEADERSHIP

Mentor, Summer of Science: Guided 4 mentees with Data Structures and Algorithms — *Apr 2020 – Jun 2020*
Teaching Assistant, IIT Bombay: Tutored 70+ students across two freshmen courses — *Jan 2019 – Apr 2019*
Convener, Electronics & Robotics Club: Guided 600+ freshmen with their first wheeled robot — *Apr 2018 – Mar 2019*

SKILLS

Robotics: ROS1, ROS2, Gazebo, Webots, MATLAB Simscape Multibody
Programming: C++, Python, C, Java, R, x10, Bash, Sed, Awk, Perl, RegEx, CMake, SQLite
Software: Git, Docker, OpenCV, PyTorch, TensorFlow, LaTeX, Vim, Jekyll, Django, Fusion360
Optimization: GNU MathProg, GLPK, Gurobi, PuLP, IPOPT, OSQP

COMMUNITY AND VOLUNTEER WORK

JdeRobot: Heading JdeRobot's ROS2 Working Group as an open-source contributor — *Mar 2021 – Present*
Indian Women in Engineering: Mentored 4 sophomores under initiative by Goldman Sachs — *Sep 2021 – Nov 2021*
Abhyasika, IIT Bombay: Tutored high-school junior from low-income background — *Nov 2018 – May 2019*