

SIDDHARTH SAHA

📝 Blog ♦ 🏠 Homepage ♦ in LinkedIn ♦ ✉ Mail ♦ 🔄 trunc8 ♦ Mumbai, India

EDUCATION

| Examination | University | Institute | Year | CPI/% |
|-----------------|------------|-------------------------------|------|------------|
| Graduation | IIT Bombay | IIT Bombay | 2021 | 9.43/10.00 |
| Intermediate/+2 | HSC | Pace Junior Science College | 2017 | 89.54 % |
| Matriculation | ICSE | Lilavatibai Podar High School | 2015 | 97.40 % |

Undergraduate Degrees: B.Tech. with Honors in Mechanical Engineering, IIT Bombay
Minor in Computer Science and Engineering, IIT Bombay

BACHELOR'S THESIS

Mapping Regions of Dynamic Activity & Building Dynamic-free 3D Occupancy Maps | [Demo](#)

Guides: Prof. Leena Vacchani, Prof. Abhishek Gupta

Jun 2020 - Jul 2021

- Proved that the occupancy & dynamic activity probabilities in an octree map **formed a field** in the range (0,1)
- Designed & implemented novel clustering algorithm in *ROS OctoMap* to reject nodes with high dynamic activity

SCHOLASTIC ACHIEVEMENTS

- Bagged **Technical Citation** — 2nd highest department award for excellence in technical activities at IIT-B [’21]
- Awarded **SSP scholarship** (among 15 students across India) by **Japan Science & Technology Agency** [’19]
- Conferred **AP grade** (3/188 students) in *Statistical Machine Learning* course for exceptional performance [’20]
- Endowed with the **Economic Times Campus Star Award** from over 49,000 candidates across India [’20]
- Achieved **national top 1%** of 41K+ students to qualify for **InChO** (Indian National Chemistry Olympiad) [’17]

PROFESSIONAL EXPERIENCE & INTERNATIONAL EXCHANGE

Google Summer of Code Developer | RoboticsAcademy – JdeRobot

Jun 2021 - Aug 2021

- Constructed **RADI-4.0** (Robotics Academy Docker Image) for **ROS2 Foxy**, and VNC-based RViz2 web template
- Implemented **BT(Behavior Tree)** Navigator & extended warehouse delivery exercise to ROS2 web-based template

Quantitative Summer Analyst | Goldman Sachs, Bengaluru

May 2020 - Jun 2020

Mortgage Structuring Strategies, Global Markets Division

- Innovated and implemented **payment structuring** ideas for mortgage-backed securities to **maximize arbitrage**
- Achieved **sharp improvement** of █████% profits by optimizing cash-flows through different derivative instruments

Special Auditing Student | Hiroshima University, Japan

Jun 2019

- Assimilated ongoing research in the **Cybernetics Laboratory** under the *Sakura Research Exchange Programme*

COMPETITIONS

Winner | **International Micromouse Challenge** | [Source](#) & [Demo](#)

Dec 2020

Team Leader in Maze-solving challenge to program an autonomous bot simulated in ROS/Gazebo

- Implemented *online breadth-first planner* for optimal path & **omni-wheel** based drive to reduce steering latency

Winner | **Off-Track Bot** | Innervive '20, Delhi

Nov 2020

Autonomous bot simulated in Webots to trace given pattern minimizing number of blocks kept as cues

- Innovated vision-based **object detection in C** to sharply prune required number of blocks

Vision Based Obstacle Avoidance Drone | 9th Inter IIT Tech Meet, [Source](#)

Mar 2021

Team Leader of IIT Bombay in Autonomous navigation challenge in complex static environments inside ROS/Gazebo

- Ranked **6th** across India | Designed & implemented navigation pipeline with three-layered intelligence algorithms

RoboCon, Team IIT Bombay | ABU RoboCon '19 Ulaanbaatar, Mongolia

Jan 2019 - Apr 2019

Competition to construct a manual bot with throwing capability & an autonomous walking bot

- Bagged **9th position** among 50+ national teams in stage-1 | Designed Solidworks model of **robotic gripper arm**

KEY PROJECTS

Quadruped Robot | RoboCupRescue League Challenge

Dec 2019 - Present

Team Leader of two-tiered team with 15 members, overseeing a technical budget of over 10 lakhs INR

- Explored **impedance control** to create virtual leg compliance & tested *gait trajectories* in Gazebo environment
- Implemented fusion of *MPU6050* sensor data with *Intel RealSense D435* **PointCloud2** data to achieve SLAM

International autonomous racing contest with standardized hardware simulated in ROS/Gazebo

- Used *Bernstein polynomial* based local trajectory planner and MPC for Ackermann steering in 4-membered team
- Derived global optimal path using **OSQP solver** | Implemented obstacle detection | Compiled **Docker** submission

Two-wheeled Self-Balancing Bot | [Documentation](#) & [Demo](#)

Aug 2020 - Nov 2020

- Stabilized Arduino bot using PD control and applied **complementary filter** on gyroscope & accelerometer input

Automated Graph Reader | [Source](#) & [Demo](#)

Aug 2020 - Nov 2020

Deployed live on Heroku server, the web-app accepts queries for y-values in simple input graphs

- Implemented image processing & OCR using **Tesseract** to automatically extract values & line plot in input graph

Ricart-Agrawala Algorithm | [Source](#)

Aug 2019 - Nov 2019

- Built Java implementation of **mutual exclusion** among nodes in distributed environment with no shared memory

Wifi De-auth Attacker

Mar 2019

- Programmed *ESP8266* (Wi-Fi chip) to send de-authentication frames, **exploiting vulnerability** in IEEE 802.11

Sudoku Solver Using Block Printing | [Source](#)

Apr 2018 - May 2018

- Implemented a **Raspbian** based machine to **physically imprint digits** into any given unsolved sudoku grid
- Leveraged **scikit-learn** & invoked **support vector machines** for recognition of handwritten digits in the sudoku

Gyro Brick Breaker

Jul 2018

- **Led 5-membered** team to develop a **hand-gesture controlled** brick-breaking game coded in Processing IDE

POSITIONS OF RESPONSIBILITY

Teaching Assistant | Student Mentorship Program, IIT Bombay

Apr-May 2018 / Jan-Apr 2019

- *Physical Chemistry*: **Only student from freshmen year** appointed to guide class of **15 students** in tutorials
- *Electricity & Magnetism*: Conducted tutorial sessions for **52 students** focusing on the academically weak students

Summer of Science Mentor | Maths and Physics Club, IIT Bombay

Apr 2020 - Jun 2020

- Guided **4 mentees** to proficiency in *Data Structures & Algorithms* with **conceptual aid** and meticulous roadmap

Convener | Electronics and Robotics Club, IIT Bombay

Apr 2018 - Mar 2019

Part of a two-tiered team of 70 members constituting the Institute Technical Council of IIT Bombay

- Organized bootcamps and **delivered talks** on Arduino and Image Processing, attended by **200+ enthusiasts**

TECHNICAL SKILLS

| | |
|------------------------------------|--|
| Programming & Scripting | Python, C, C++, Java, R, Javascript, x10, Bash, Sed, Awk, Perl |
| Frameworks | RegEx, Git, Vim, Docker, OpenCV, PyTorch, TensorFlow, Tesseract-OCR, L ^A T _E X |
| Optimization | GNU MathProg, Gurobi, PuLP, Ipopt, OSQP |
| Robotics tools | ROS1, ROS2, Gazebo, Webots, MRPT, Pinochio, TSID, Crocodyl |
| Controllers & Modules | Arduino, Raspberry Pi, Tiva C, NodeMCU, MPU6050, Intel RealSense D435 |
| Software | Matlab, Fusion360, AutoCAD, Solidworks, Octave |

KEY COURSES

| | |
|-------------------------|---|
| Computer Science | Computer Vision, Reinforcement Learning, Data Structures and Algorithms, Design and Analysis of Algorithms, Digital Image Processing |
| Robotics | Advanced Topics in Mobile Robotics, Design of Mechatronic Systems, Microprocessors & Automatic Control, Kinematics & Dynamics of Machines, Machine Design, Robotics |
| Optimization | Optimization from Fundamentals, Optimization for Engineering Design, Industrial Engineering & Operations Research |
| Certifications | ROS for Beginners II: Localization, Navigation & SLAM, Using GPUs to Scale & Speed-up Deep Learning, Advanced Methods for Planning & Control of Legged Robots |

EXTRA CURRICULAR ACTIVITIES

| | |
|------------------------|---|
| Competitions | • 1st in Operations General Championship(GC) 2nd in Aerial Path-planning GC [’21] |
| Public Speaking | • Participated in Model United Nations by WeSpeak, IIT Bombay [’17] • Received Special Mention among 35 participants in English Debate, Freshiezza [’17] |
| Journalism | • Curated article in Mechanical Media Newsletter with a reach of 700+ students [’17] |
| Social Service | • Volunteered at Abhyasika to tutor school children from underprivileged background [’18] |
| Sports | • Completed inter-hostel Crossy General Championship & the Cyclothon by TechFest [’17] |
| Leadership | • Headed 150+ students as House Captain in 10 th & Vice-Captain in 9 th grade [’14, ’15] |