

SIDDHARTH SAHA

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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, Crocoddyl
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	Advanced Methods for Planning & Control of Legged Robots, ROS for Beginners II: Localization, Navigation & SLAM, Using GPUs to Scale & Speed-up Deep Learning

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]