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# Siddharth Rama Sushil

Robotics | ComputerVision | DeepLearning

siddharth-rs
Dehradun, India

## Education

**B.Tech, Mechanical Engineering,** Indian Institute of Information Technology, Jabalpur **2019 — 2023**
GPA: 8.6/10 (**Top 5%** in my batch of 101 students)
**Relevant Courses Undertaken:** Data Structure and Algorithms, Fundamentals of Computing, Design Thinking, Human-centric Robotics, Smart Manufacturing, Industrial Internet of Things, , Smart Sensors, Solidworks and Adams, CATIA, Computer Aided Design, Fundamentals of Electrical and Electronic engineering

## Achievements and Awards

**Utility Patent Published (Indian patent office),** 3D Spatial Monitoring Device **2023**
- Successfully designed, developed and patented a working prototype of the "IoT-Enabled 3D Spatial Monitoring Device".
- The device adds real-time monitoring and analysis to legacy construction system, it **reduces safety incidents by 25%**

**International Project Grant Awardee,** TIGC, La Trobe University, Australia **2023**
- Awarded grant for our project POC about mapping urban drainage layouts and performing predictive maintenance.
- Selected as **Top 10 finalists** from **200+ teams** across Asia to receive the prestigious grant from **La Trobe University, Australia**.

**Gold Medalist,** Design and Manufacturing Proficiency Medal, IIIT Jabalpur **2023**
- Awarded **1st Prize** for the **best cross-disciplinary project** in our batch of **400+ students**.
- Recognized for exceptional design and engineering capabilities, demonstrating innovation and interdisciplinary collaboration.

**All India Rank 1** , L&T National Tech Innovation Challenge, TECHgium 5th Edition **2022**
- Won **1st prize** of **$12,000** for delivering the top innovative solution to modernize legacy construction systems.
- Outperformed over **30,000 students** from **450 leading colleges and universities** across India to secure top honors.

**International Conference iNaCoMM 2021,** Student Mechanism Design Competition **2021**
- Achieved **2nd rank** at the Design Competition held under the umbrella of International Conference on Machines and Mechanisms.
- Defended our model against **50+ teams** from top institutions across the nation.

**Excelled in National Competitive Exam** , Joint Entrance Exam India (Mains) **2019**
- **Secured 97 & 99.6 percentile** in paper 1 and 2 respectively among more than a **million applicants**.
- The examination evaluates analytical skills in science and math, along with spatial awareness and design aptitude.

## Work Experience and Internships

**Addverb Robotics** **July 2023 — Present**
Robotics Engineer
- Part of mobile robotics team at **India's largest robotics company**, backed by **Reliance**, driving advanced industrial automation.
- Collaborated with a cross-functional team of **15+ engineers, designers & analysts** to bring **India's 1st ASRS mobile robot** to life.
- Spearheaded the the **perception unit** of ASRS, enabling precise robotic operations and **reducing manual intervention costs by 20%**.
- Engineered real-time pipeline for filtering and classifying 3D point-cloud data to achieve **spatial accuracy of 99.6%**
- Leveraged methods like **RANSAC**, **voxel downsampling**, and **outlier removers** to decrease detection errors.
- Automated system updates through Bash scripts, improving operational efficiency and **reducing downtime** by **30%**.
- Led the **onsite deployment** for Robotic Delivery Systems for international clients such as **Siemens, ISITEC** and **Adidas**.
- Conducted workshops for **50+ client employees**, ensuring a deeper understanding and seamless adoption of the deployed systems.
- Tech Stack: Python, C++, Bash, OpenCV, TensorFlow, Pytorch, ROS, Git, Jupyter Notebook, Docker

**Defence Research and Development Organisation (DRDO)-> IRDE lab** **Jan 2023 — July 2023**
Research Intern
- Worked alongside senior scientists and researchers to identify key challenges in **early warning missile detection systems**.
- Conducted in-depth research on implementing CNNs for **infrared small target detection (IRSTD)**.
- Gained expertise in low **signal-to-noise ratio (SNR) image processing**, shape detection, and DL-based feature aggregation.
- Compared classical techniques, including **morphological transformations**, with cutting-edge deep learning approaches.
- Benchmarked performance on diverse datasets, including a custom-curated database of **10,000+ datapoints**.
- Built and preprocessed IR image datasets, incorporating **pixel-level annotations** and **multi-directional noise analysis**.

**Oil and Natural Gas Corporation, India** **June 2021 — Aug 2021**
Summer trainee
- Gained a thorough understanding of workover rigs in the oil and natural gas industry.
- Explored **predictive maintenance** by leveraging models like **ResNet** and **YOLO** to process live images and video feeds from rigs.
- Worked closely with field technicians to gather practical feedback, ensuring the solution met real-world usability standards.
- Evaluated model performance using metrics such as **mean average precision (mAP)** and **F1 score**.

## Projects

**Urban Drainage Inspection and Maintenance System :** **Dec 2022 — Oct 2023**

Top-10 project in pan-asia hackathon

- Ideated and developed UDIMS for mapping urban drainage layouts, integrating predictive and preventive maintenance capabilities.
- Applied **Orb SLAM** with depth cameras and LIDAR for 2D and 3D mapping.
- Employed **extended Kalman filter** for accurately predicting the state of robot from IMU and GPS sensor.
- Utilized transfer learning on neural networks to perform **semantic segmentation** and **anomaly detection**
- Integrated sensors for measuring water quality indicators like pH, ORP, temperature, ammonia levels, and BOD in sewage.

**Autonomous Disinfection Robot with Real Time Mapping :** **Jan 2022 — Nov 2022**

Awarded Best Interdisciplinary Project

- Engineered an AMR that creates real-time maps of its environment and sanitizes rooms with controlled UV bursts.
- Utilized the **ROS Navigation Stack** and **gmapping** to perform real-time **2D SLAM** for generating occupancy grids.
- Utilized **euclidean clustering** to segment point clouds for effective navigation.
- Implemented **proportional-integral-derivative (PID) control loops** for precise actuation of robot wheels
- Made **custom ROS nodes** for controlling UV disinfection mechanisms, ensuring targeted and efficient sanitization.

**IoT-Enabled 3D Spatial Monitoring Device :** **Dec 2021 — May 2022**

Utility Patent published

- Engineered a **multi-sensor fusion algorithm** to track 3D position, velocity, and orientation of crane payloads with high accuracy
- Integrated **Extended Kalman filter** for noise reduction and prediction to achieve precise **real-time tracking** of crane hooks.
- Utilized ROS for device communication, ensuring smooth integration with existing systems.
- Designed custom nodes for processing **sensor data streams** and **synchronizing multi-sensor inputs**.
- Contributed to extending the lifespan and functionality of existing crane systems without full replacements.

**IRON LUNGS 2.0 (Low cost modified mechanical respirator):** **June 2021 — Dec 2021**

Runner up at iNaCoMM 2021

- Reimagined the traditional negative pressure ventilator, integrating modern mechanism for improved respiratory support.
- Proposed a smarter mechanism for an artificially assisted respiration machine for severe COVID patients.
- Simulated the motion of the **Scotch-Yoke mechanism** using **CAD** to optimize performance under varying load conditions.
- Developed **control algorithms** to modulate ventilation rates based on real-time feedback, adapting the respirator for patient needs.
- Conducted **dynamic simulations** using ANSYS, evaluating stress distribution and motion profiles under varying load conditions

## Technical Skills

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|---|---|
| **Software** | Gazebo, Rviz, MATLAB, Solidworks, Tinkercad, Prusa Slicer, Simulink, Webots, Pybullet |
| **Programming** | ROS, C++, Python, Bash, Arduino IDE, Embedded C, Java, JavaScript |
| **Frameworks** | Point Cloud Library (PCL), OpenCV, Tensorflow, Keras, Docker, Git, PyTorch, TensorRT, scikit-learn |
| **Hardware** | RaspPi, Nvidia boards, Arduinos, Micro controllers, Stereo camera, TOF Sensors, PLCs, 3D/2D Lidar. |

## Positions Of Responsibility

**Senator, Student Senate IIIT Jabalpur** **April 2021 — May 2022**

- Planned and managed the orientation program for the 2021 IIIT-J batch of **620 students**, executing a seamless program flow.
- Successfully hosted official campus cultural events engaging and captivating live audiences of **over 500 participants**.
- Actively participated in student senate meetings, contributing to and debating institutional decisions impacting **2,000+ students**.

**President, The Music Club of IIIT Jabalpur** **Feb 2021 — May 2022**

- Headed a **12-member committee**, responsible for arranging **35** offline and online music events for over **1000 college students**.
- Coordinating collaborative sessions and competitions with music clubs for inter IIIT cultural events.
- Organized and conducted Music Theory workshops for **over 100 campus students**.

## Extracurricular Activities

- Won the **1st Prize** for **Model United Nations** at official fest, Techkriti of IIT Kanpur. 2022
- Secured **3rd position** at the Instrumental Competition of annual Cultural Fest, IIIT Jabalpur. 2019
- Editor of the aftermovie for **Inter-IIIT Sports Fest** with participation from **25 IIITs** across India. 2020
- Completed the **GERMAN-1 course NPTEL, IIT-M**, gaining foundational skill for cross-cultural communication. 2022
- Co-founder of a cinematography page dedicated to document snippets of life in the Himalayan valley. 2021