Nageswar Sai Gangadhar | **190100080**
Mechanical Engineering | **B.Tech.**
Indian Institute of Technology Bombay | **Gender: Male**
DOB: 24-05-2002

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2023	
Intermediate	BIEAP	Sri Chaitanya Junior College	2019	97.30%
Matriculation	CBSE	Dr.KKR's Gowtham International School	2017	10

Pursuing **Dual Minors** in **Data Science** and **Systems & Control Engineering**, **IITB** *('21)*

Achievements

- **World Champions** of the **International Aerial Robotics Competition 2020** Mission-9 *('21)*
- Secured **All India Rank 811** in **JEE Advanced** examination among 0.2 million candidates *('19)*
- Secured **All India Rank 569** in **JEE Mains** examination among 1.1 million candidates *('19)*
- Awarded with **KVPY Scholarship** by Department of Science and Technology, Govt. of India *('19)*
- One among the **400 students** nationwide selected for 2nd round of **INCho**/Chemistry Olympiad *('19)*

Research Projects

Multi-robot Patrolling | IIT Bombay *(Nov '21 - present)*
Guide - Prof. Arpita Sinha and Prof. Leena Vachhani | Systems and Control Engineering, IITB

- **Introduction:** *Given a graph representation G (V,E) of the environment and a set of agents A, we wish to find a patrolling strategy with minimal observation which minimizes worst graph idleness*
- Implemented a partition-based **Evolutionary Heuristic** algorithm for min-max cost closed walk
- Working on algorithms for online strategy optimisation in the face of an agent failures or downtime
- Developed algorithms are analyzed using **ROS** framework and the **TraCI** library on **(SUMO)** simulator

Key Projects

International Aerial Robotics Competition | AeRoVe UMIC, IITB *(Sep '20 - Mar'21)*
World Champions *of the most premier and longest running aerial robotics competition*

- **Controls engineer** in an interdisciplinary team of 23; developed **software** for controlling **robotic arm** on a fully autonomous drone capable of executing a set of complex operations within a time-frame
- Designed controller utilising **ROS Control** & **tf** packages for a **custom-built robotic arm**, comprising of an alignment mechanism and an end-effector to track and manipulate large dynamic objects
- Implemented **PID controller** and fine tuned all the gains to make the end-effector precisely follow a **target object** in 3-D space, undergoing a **sea states** motion upto level-3 using its **stereo** data
- Developed **algorithms** for the **sequencing** of end-effector maneuvers to execute object replacement
- Simulated the entire mission and tested controller performance in **Gazebo** simulator

Self Driving Car Project | SeDriCa UMIC, IITB *(May '21 - Oct '21)*
A Student technical team, aiming to develop India's first level-5 autonomy self-driving car

- **Sr. Controls engineer** in a team of 22; developing software to provide optimal control of the vehicle
- Implementing **non-linear MPC** and improving its performance by using complex dynamic models
- Ideated on the ego vehicle **decisions & actions** when encountered with different **traffic signs**
- Built a data structure for storing details of institute map and **encoded** all the information regarding **traffic signs**, **road intersections** and **Geo-locations,** for accurate testing within the institute
- Implemented **A* path planning** algorithm for global planning on our custom built map

Neural Super Sampling | Machine Learning for Remote Sensing - II *(Nov '21 - Dec '21)*
Course Project | Guide - Prof. Biplab Banerjee | Centre for Machine Intelligence and Data Science

- Implemented and trained a Super Resolution GAN for upscaling the resolution of an image four times
- Enhanced performance using ESRGAN, obtained by replacing original block with proposed Dense Block

Autonomous Navigation and Control | Autumn of Automation, UMIC *(July '20 - Aug '20)*

- Worked in a team of five to deploy a **Fully Autonomous Bot** capable of **navigating** and **capturing** balls of different colours in its path, and tested the software architecture in **Gazebo** simulator
- Modified vision-based line following to plan path according to ball color ahead and direction markers
- Devised a mechanism to capture/discard the ball based on its color, **LiDAR** and **camera** sensor data

Driver Drowsiness Detection | Introduction to Machine Learning *(Apr '21 - May'21)*

Course Project | Guide - Prof. Biplab Banerjee | Centre for Machine Intelligence and Data Science

- Extracted **face** and **eyes** region of interest using the **Haar Cascade** files for input to ML model
- Built a **CNN classifier** model using **Keras** library for predicting state of individual eyes
- Formulated a strategy to determine drowsiness **confidence** based on the output and its duration

Text Detection for Visually Impaired | ITSP, IITB *(May'20 - June '20)*

- Worked in a team of four to develop a **text-recognition and speech generation** software for blind
- Adapted **MSER** method to extract text from images captured from **unstructured environment**
- Improved accuracy by **pre-processing** to eliminate glare & noise, and fix low contrast in the images
- Implemented **Tesseract** and **CNN** based Optical Character Recognition **(OCR)** for text recognition

Parallelized A* | High performance Scientific Computing *(Apr '21 - May'21)*

Course Project | Guide - Prof. Shivasubramanian Gopalkrishnan | Dept. of Mechanical Engineering

- **Parallelized** serial **A*** path planning algorithm using **OpenMP**, **MPI** and **CUDA** framework
- Performed a **time analysis** by varying the number of **threads** for each parallelized versions

Technical Proficiencies

Software	AutoCAD, SolidWorks, ROS, Docker, Git, Gazebo
Programming Languages	C/C++, Python, LaTeX, MATLAB/OCTAVE, Bash
Programming Libraries	OpenCV, Tensorflow, PyTorch Numpy, Pandas, OpenMP, MPI, CUDA

Positions Of Responsibilities

Coordinator | Innovation Cell, IIT Bombay *(Jun '20 - Oct '21)*

Innovation Cell aims to facilitate technical start-ups and foster an atmosphere of technopreneurship

- Member of the team involved in recruitment, organizing and publicizing events under Innovation Cell
- Designed problem statements to test both technical and analytical aptitude of 300+ applicants

EVENTS Coordinator | Techfest, IIT Bombay *(May '20 - Dec'20)*

Asia's largest Sci-Tech festival with footfall of over **175,000** *people with* **2500+** *national colleges*

- Managed **50+** College Ambassadors across India to conduct competitions, workshops & events
- Lead a team of **50+** CAs to coordinate with **4K+** Schools to bring in participation in Techfest

Key Courses Undertaken

Mechanical Engineering	Microprocessors and Automatic Controls, Heat Transfer, Manufacturing Processes, Thermodynamics, Solid Mechanics, Fluid Mechanics, Kinematics and Dynamics of Machines*, Industrial Engineering and Operations Research*
AI & Robotics	Machine Learning, Deep Learning, Reinforcement Learning, Linear and Non-linear Systems, Image Processing*, High Performance Scientific Computing

** to be completed by Nov '21*

Extra Curricular Activities

- Completed an year-long training in **NCC** and participated in **Annual Training Camp** [2020]
- Attained two-year professional training in **Karate**; achieved orange belt [2014]
- Designed and developed a **Bluetooth controlled car** with a team of 4 for RC car competition [2020]