

# Vishnuvardhan Shakthibala

Trento, Italy

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## Education

### Politecnico Di Milano

Milano, Italy

MSc in Space engineering

Sept 2018 - Jul 2021

- Average grade : 99/110 | Thesis grade: 6/7
- **Thesis title:** Autonomous motion planning spacecraft guidance for inspection mission
- Adopted the FMT\* motion planning algorithm to find guidance law.
- Modeled the Spacecraft Inspection problem to be able to apply FMT\* algorithm.
- **Main courses:** Orbital mechanics, Space mission design and analysis, Attitude dynamics and control, System Identification and Estimation, and Modeling and simulation of Aerospace systems

### Alliance University, India

Bengaluru, India

Bachelor of Technology in Aerospace engineering

Aug, 2013 - Aug, 2017

- Cumulative GPA: 3.7/4.0
- Bachelor's thesis: Spacecraft trajectory optimization using Evolutionary Algorithm

## CONFERENCES AND CONTRIBUTIONS

### IAC 2024

Milan

Guidance and Control of CubeSat using Aerodynamic Forces for Space Debris Characterization

- Currently working independently towards manuscript submission.

### IAC 2021 (Contributed)

Dubai

PHASE-A DESIGN OF ICE CREAM: A COST-EFFECTIVE MARS SAMPLE RETURN MISSION

- Team Advisor for the team that presented the project as a conference paper at IAC 2021, Dubai.

### IAC 2021 (Contributed)

Dubai

ARGO: a planetary defense mission to test gravity traction techniques

- Part of the project that produced this paper. My role was to provide auxiliary support to all the subsystem, derive requirements from payloads, and develop a preliminary design of the On-board data handling architecture.

## Work Experience

### Simulation and Virtual Reality lab at University of Trento

Trento, Italy

Post graduate research assistant under [Prof. Mauro Da Lio](#)

Mar, 2023 - Present

- Supporting the development of the Green Co-Driver by integrating green driving functionality developed by University of Padova into an self-driving agent developed by University of Trento.
- Contributing to the integration of the Green Co-Driver agent into both static and dynamic driving simulators at UniTN and POLIMI.
- Utilized Carmaker software for rapid prototyping within the static driving simulator environment.
- Lead the transition of the project from Carmaker to Carla, ensuring broader applicability and independence with Open source platform.
- Engaged in dissemination and communication activities to promote the project's findings.
- **Skills:** Carmaker, C++/C, Python, Matlab, Carla, Rapid prototyping, ZMQ protocol.

### Spacecraft dynamics control and system engineering group

Italy

Group leader (Volunteer Part-time)

Dec, 2023 - Present

- Co-Founder and group leader of an independent research group focused on Space systems.
- Driving and guiding the development of AOCS open-source simulator.
- Involved in research problems related to Cubesat formation flying, with a goal to develop robust GNC by leverage natural dynamics while respecting the constraints.

### Brain technologies

Pordenone, Italy

System Validation Engineer at **Electrolux**

Jun, 2023 - Feb, 2024

- Functional validation (UI Firmware, CCF, Mainboard) of complete integrated prototypes
- Create a test plan which defines the kind of validation and verification that needs to be carried out
- Managing and solving issues with other departments.

## Brain technologies

Trento, Italy

Software Developer for ADAS systems at **Stellantis - CRF**

Sep, 2022 - May, 2023

- Developing software in C++ on RTMaps for Software in loop testing aimed at Rapid prototyping.
- Successfully implemented the interfaces, enabling seamless integration of third-party devices – Radar, Camera from tier 2 providers into prototyping process.
- Automating and analyzing strategies to accelerate the migration of models from Simulink to RTMaps.
- Conducted bench tests to validate algorithms for real-time data processing using CAN data.
- Collaborated with the development team to fine-tune components/interfaces to reduce processing overload and increase the usability.
- Building interactive HMI using python to visualize ADAS/ADX features.
- Interacted with Dspace products – AUTERA AutoBox, Microautobox. CAN Message data logging and reading.
- **Skills:** RTMAPS, C++/C, Python, Matlab, Simulink, CAN protocol.

## Polispace, Politecnico di Milano.

Milan, Italy

Junior Project Manager (Volunteer)

Nov, 2020 - May, 2021

- Supervised a team of 10 undergrads to work on end-to-end spacecraft subsystem design from high-level requirements.
- Conducted regular teaching activities to equip the team with necessary knowledge and skills in Mission design
- **Skills:** System engineering, Project management.

## Society for Space education research and education

Bengaluru, India

Teaching Mentor (Volunteer)

Aug, 2020 - Mar, 2021

- Motivated and mentored interns to work on interesting space technology-related problems.
- Assessed and evaluated the quality of the internship projects.
- **Skills:** Teaching, Performance evaluation.

## Skills

**Programming** Matlab, Python, C++, C, Shell scripting

**Software** Simulink, Real-time multisensor application (RTMAPS), IPG Carmaker, Carla Simulator

**Miscellaneous** Linux-Ubuntu,  $\text{\LaTeX}$ (Overleaf), Microsoft Office, Git, GNU build tools.

**Soft Skills** Team work, Time management, problem-solving, leadership, adaptability, communication.

## University Projects

### Drag Free trajectory control (DFTC)

Milan, Italy

Politecnico Di Milan

Nov 2020 - Dec 2020

- Modelled the multi-disciplinary domain of the Uni-directional DFTC system.
- Numerically analyzing the system dynamics and selecting suitable integrator.
- Simulated and analyzed the model for nominal and off-nominal conditions in MATLAB.
- Parametric study is carried out to study the sensitivity of the system performance with variations in parameters.
- Simulated and analyzed the model for nominal and off-nominal conditions in MATLAB.
- **Skills:** Modeling and Simulation of dynamic systems, Classical control theory.

### ARGO - Phase A space mission design and analysis

Milan, Italy

Politecnico Di Milan

Feb, 2020 - Jun, 2020

- Designed the complex space mission using concurrent system engineering principles.
- Handled collection and dispersion of state-of-the-art data to multi-domain subsystems.
- Responsible for the preliminary design of the OBDH subsystem.
- **Skills:** Skills acquired: System Identification, State estimation, Monte Carlo Simulation, Control theory.

### Preliminary orbital trajectory design and perturbation analysis

Milan, Italy

Politecnico Di Milan

Nov 2018 - Jan 2019

- **Preliminary Trajectory Design:** Mission was to find the optimal trajectory between Mars and Mercury by leveraging the fly-by maneuver around the earth. Various trajectories are evaluated by pruning the solutions from feasible porkchop plots (built using Ephemeris) combined with the optimal fly-by maneuver.
- **Perturbation Analysis:** Analyzed the evolution of the prescribed orbit with effects of perturbations such as 3-body and J2 perturbation.
- Obtained perturbed orbit was then compared with the real data from the existing orbit of comparable characteristics.
- **Skills:** Orbital/Space mechanics, Evolutionary algorithms (Genetic algorithm).

## UAV system Identification and State estimation

Milan, Italy

Politecnico Di Milan

Jun 2020 - Aug 2020

- Frequency domain Grey box model identification of Linear lateral dynamics of UAV by using Experimental Data (with the aid of the Greyest function of Matlab).
- Data filtering was carried out by eliminating the noises and identifying the major frequency content of the dynamics.
- Prior to parameter estimation, the initial condition required for the Output error method was obtained by using both the Genetic Algorithm and Monte - Carlo Analysis.
- Designed Kalman filter (as a sensor fusion technique) to estimate the lateral velocity (one of the state variable) using inertial measurements.
- **Skills:** Orbital/Space mechanics, Evolutionary algorithms (Genetic algorithm).

## Achievements & Scholarship

**Handled the team as a project manager for AIAA UG Space mission design competition, AIAA**

2021, US

**University Financial Aid - DIRITTO ALLO STUDIO UNIVERSITARIO scholarship recipient, POLIMI**

2018-2021, Italy

**Top three finalists out of 76** , Design for additive Challenge (Competition by Additive Industries)

2017, Netherlands

**Best New Entry team award** , 33rd American Helicopter Society undergraduate student design competition

2016, US

## Interests

Documentary, Films, Cricket, Snow-Boarding

## Languages

**English - IELTS - C1, 2017** Professional proficiency

**Kannada** Native proficiency

**Tamil** Bilingual proficiency

**Italian** Beginner