

# Miguel Callejón Cantero

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MSc Aerospace Engineering

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MSc Aerospace Engineering student at Delft University of Technology (TUDelft), after graduating at Technical University of Madrid (UPM). Very interested in space from both a scientific and technologic point of view, currently studying the Space Exploration profile. Robust mathematical abstraction capabilities and deep understanding of metaheuristic algorithms proven by previous experience in optimisation projects. Strong team-working, assertivity, communication, and drive skills as my commit to students' associations can prove. Looking for upcoming challenges which can broaden my knowledge and working experience.

## SKILLS

<b>Programming</b>	Python (Conda, Numpy, FEnics, Pyke, Pygmo, Pytorch...), Matlab & Simulink, Fortran 90, C, C++
<b>Presentation tools</b>	Office, $\LaTeX$ , Markdown, GIMP
<b>Other technical tools</b>	Jupyter, Visual Studio Code, Git, Linux, Paraview, CATIA v5
<b>Communication</b>	Spanish (mother tongue), English (C1, 101/120 TOEFL 23/02/2019), French (A2, basic level)

## TECHNICAL EXPERIENCE

### INTERN ADVANCED CONCEPTS TEAM (ACT)

07 2020 — 10 2020

European Space Agency (ESA)

Noordwijk, Zuid Holland, The Netherlands

- Main task: create and develop optimisation challenges in the web platform [optimize](#).
- Three challenges created: Jupiter Icy Moons Explorer (JUICE), Traveling Salesman Problem (TSP), and interferometry:
  - JUICE: trajectory optimisation problem of a spacecraft that orbits through the Jovian system, based on the homonym mission.
  - TSP: classical optimisation problem applied to a hypothetical mission that shall remove space debris with the least possible fuel consumption. The debris pieces were those recovered from the collision of satellites Iridium-33 and Cosmos-2251, and Fengyun-1C destruction.
  - Interferometry: Using an array of telescopes, it is required to find the position that would maximize image reconstruction of the sky, varying the initial position of the array. It resembles similarity to a two-dimensional Golomb ruler, as only the difference in position between the telescopes influences the final similarity.

## EDUCATION

### Master of Science in Aerospace Engineering

09 2019 —

Technical University of Delft (TUDelft)

Delft, Zuid Holland, The Netherlands

- Specialization: Space Flight, Space Exploration
- Key courses: Multi-Disciplinary optimisation; Astrodynamics, optimisation in Astrodynamics, Numerical Astrodynamics, Mission Geometry and Orbit Design, Planetary Sciences, Space Systems Engineering.
- Key projects:
  - Preliminary design of a *scientific mission to explore the centaur Chariklo*.
  - Systems requirements analysis of an *asteroid mining mission*: mission and need statement, stakeholders analysis, acceptance criteria, concept design, and risk analysis.
  - Design of an *Earth Observation mission* required to analyse sea-level variance for a span of 10 years. Ground-repeating-tracks were used, as well as a literature research to find similar missions, and design trades.
  - *Shape Design optimisation of an Earth re-entry system*: propagating the equations of motion, finding the most suitable numerical integrator and propagator, to find the shape with the best compromise between three objectives: minimize the heat load on the vehicle, maximize its payload volume, and maximize the ground track of the system during re-entry.
- Literature study: Application of Taylor Series Integration to an astrodynamics trajectory to a binary asteroid system such as HERA.

### Grado en Ingeniería Aeroespacial

09 2015 — 07 2019

School of Aeronautical and Space Engineering (ETSIAE), Technical University of Madrid (UPM)

Madrid, Madrid, Spain

- Specialization: Aerospace Science and Technology (7.14)
- Key courses: optimisation Theory (9.4), Complex Analysis (9.5), Orbital Mechanics, Lagrangian Mechanics, Flight Mechanics, Rocket Propulsion, Space Flight, Vibrations.
- Internship in the Department of Applied Mathematics working with open source platforms FEnics, Python, and Paraview. Dissertation (Trabajo Fin de Grado, TFG): Implementation of a compressible Navier-Stokes solver using FEnics.

## ACTIVITIES

Student Representative in ETSIAE' Department of Applied Mathematics	09 2018 - 07 2019
Academic Student Association: Yuri Gagarin, Secretary	09 2017 - 07 2019
Academic Student Association: Yuri Gagarin	09 2016 - 07 2017
Academic Student Association: ETSIAE Music Club (CLUBMA)	09 2016 - 07 2019
Formal Education in Music (Piano) at Valladolid Music Conservatory	09 2004 - 07 2014