

PERSONAL INFORMATION

Gaias, Gabriella

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WORK EXPERIENCE

September 2022 – Present

Assistant Professor

Politecnico di Milano, Dipartimento di Scienze e Tecnologie Aerospaziali
Via La Masa 34, 20156 Milano - Italy

Teaching Aerospace mechanics

September 2019 – August 2022

Marie Skłodowska-Curie Research Fellow

Politecnico di Milano, Dipartimento di Scienze e Tecnologie Aerospaziali
Via La Masa 34, 20156 Milano - Italy

Project **EU H2020 ReMoVE (Rendezvous Modelling Visiting and Enhancing)**
Marie Skłodowska-Curie Individual Fellowship, Grant Agreement Nr. 793361.
Beneficiary: Politecnico di Milano (Italy), Secondment: D-Orbit S.p.A. (Italy).

Role Principal Investigator (Personal Grant)

Topic Design of a technological solution for the active removal of large faulty satellites polluting strategic terrestrial orbits. Guidance Navigation and Control (GNC) algorithms and preliminary system design of a small-size, agile, versatile, and modular satellite platform capable to rendezvous, join, and de-orbit a noncooperative Target.

Business or sector Aerospace research

April 2018 – August 2019

Senior Research Fellow

Politecnico di Milano, Dipartimento di Scienze e Tecnologie Aerospaziali
Via La Masa 34, 20156 Milano - Italy

Project **ERC COMPASS (Control for Orbit Manoeuvring through Perturbations for Application to Space Systems)**
European Research Council: ERC STARTING GRANT 2015, Grant Agreement Nr. 679086, lead by Prof. Camilla Colombo - Politecnico di Milano.

Role Researcher

Topic Autonomous trajectory control enhanced by orbit perturbations for nano and micro satellites missions.

Business or sector Aerospace research

July 2010 – September 2022*

Research Engineer

German Aerospace Center (DLR), German Space Operations Center (GSOC)
Münchener Straße 20, 82234 Weßling - Germany

Expertise Development of AOCS/GNC algorithms, simulation systems, and flight software for autonomous formation-flying and proximity operations applications. Provided key contributions to two formation-flying missions.

FireBird mission **AVANTI (Autonomous Vision Approach Navigation and Target Identification)**, flight demonstration of autonomous, vision-based, rendezvous in low-Earth orbit within the FireBird mission - flown Nov 2016.

- Activities and responsibilities **Principal Investigator**, responsible for: experiment scientific phase (from phase B to phase E), project management and coordination, experiment documentation (ICDs, technical notes, scientific dissemination);
Flight operations on the BIROS spacecraft: responsible for: experiment in-orbit commissioning, execution of operational procedures, on-board collision avoidance and guidance & control subsystems;
Flight SW design, development, and integration: responsible for: development of the guidance & control subsystem (algorithm design, flight SW implementation, test, and integration on BIROS), development of the on-board collision avoidance subsystem (algorithm design, flight SW implementation, test, and integration on BIROS), co-developer (with Dr. Jean-Sébastien Ardaens) of the C++ based high-fidelity simulation environment AvantiSimulator, co-developer of the experiment ground-segment (telemetry and telecommands definition, flight procedures, telemetry replay tools).
- PRISMA mission **ARGON (Advanced Rendezvous Demonstration using Global Positioning System and Optical Navigation)**, flight demonstration of ground-in-the-loop angles-only rendezvous on the PRISMA mission - flown Apr 2012.
- Activities and responsibilities **Angles-only relative navigation**: responsible for: development of the relative navigation filter, relative navigation from the telemetry during flight operations (ground-based system).
- Mission operations **PRISMA (Prototype Research Instruments and Space Mission Technology Advancement)**, formation-flying test-bed mission operations - flown 2010-2014.
- Activities and responsibilities **GNC engineer in control room**: responsible for: porting of the GNC workstation from the Solna (Sweden) operations center to the GSOC premises, flight procedures preparation and execution for the different experimental phases, GNC related telemetry analysis in real-time (during contacts) and post-facto.

*on leave from April 2018

July 2009 – June 2010 Postdoctoral Research Fellow

DLR/GSOC Space Flight Technology Department
Münchener Straße 20, 82234 Weßling - Germany

Project Topic **Hardware in-the-loop Multi-Satellite Simulator for Proximity Operations**. Development and implementation of a simulation test-bed for closed-loop, real-time, real-scale on-orbit-servicing scenarios interfaced to the European Proximity Operations Simulator (EPOS 2.0).

Disciplines Matlab/Simulink; C++; Spacecraft dynamics.

Business or sector Aerospace research

September 2005 – January 2006 Internship

DEIMOS SPACE S.L., Ronda de Poniente 19, Tres Cantos, 28760 Madrid (Spain)

Project Topic **AGORET Application of Genetic Algorithms to the Optimization of Atmospheric Re-Entry Trajectories**

Supervisor J.-C. Bastante

Preliminary optimization of re-entry trajectories in atmospheric environments. Genetic algorithms are used to achieve solutions optimal w.r.t. a set of design features and feasible w.r.t. path constraints set by the physical context.

Disciplines Atmospheric flight; Evolutionary techniques.

Business or sector Aerospace industry

TEACHING EXPERIENCE

Academic Year (AY) 2018/2019 2019/2020 Teaching Assistant

Course **Introduzione all'Analisi di Missioni Spaziali** (Introduction to space mission analysis). Fundamentals of celestial mechanics.

Role Exercises at the board, preparation and correction of the exams.

Name and address of employer Politecnico di Milano, DAER Dipartimento di Scienze e Tecnologie Aerospaziali
via La Masa 34, 20156 Milano - Italy.

AY 2006/2007 Teaching Assistant

Course **Satellites' Attitude Determination and Control.**

Fundamentals of spacecraft attitude dynamics and control and an overview of attitude sensors and actuators.

Role Project tutor, to support students in setting up a simplified project of an ADCS system realized in the Matlab/Simulink environment.

Name and address of employer Politecnico di Milano, DIA Dipartimento di Ingegneria Aerospaziale
via La Masa 34, 20156 Milano - Italy.

EDUCATION AND TRAINING

Jan 2006– Apr 2009 PhD in Aerospace Engineering

Organisation IV Facoltà di Ingegneria, Politecnico di Milano, Milan - Italy

Thesis Topic **Microsatellites' Formation Flying: Brand New Architectures and Strategies for the Control System**

Supervisor Dr. M. Lavagna

Microsatellites formation flying in the proximity of the Earth, with focus on relative dynamics (accounting for Earth gravity potential perturbation up to the 4th order zonal contribution), control (formation keeping and coordination), and applications (interferometry study-case).

Disciplines Relative dynamics; Control systems theory.

Final grades Merito

Mar 2008– Jul 2008 Visiting Research Student

Organisation Keldysh Institute of Applied Mathematics (KIAM) of the Russian Academy of Sciences (RAS), Moscow - Russia

Project Topic **Highly accurate mathematical models of the motion of a spacecraft under a non-central field of forces**

Supervisor Prof. M. Yu. Ovchinnikov

Analytical satellite theory within the generalized problem of two fixed centers.

Disciplines Celestial mechanics; Applied mathematics.

Sep 1998 – Apr 2005 MEng in Aerospace Engineering

Organisation IV Facoltà di Ingegneria, Politecnico di Milano, Milan - Italy

Thesis Topic **Planning and Preliminary Space Systems' Design for Long Term Space Programs**

Supervisor Dr. M. Lavagna, Dr. A. Da Costa (co-developer Simone Centuori)

Evolutionary algorithm-based tool dedicated to solve the long-term space missions planning problem by working on the single mission preliminary sizing, while taking into account the complex net of constraints, both in the design and temporal domains.

Disciplines Space Systems Design; Space Mechanics; Satellites' Attitude Determination and Control; Advanced Space Rocket Propulsion.

Final grades 100/100 magna cum laude

1993–1998 Scientific Diploma

Organisation Liceo Scientifico A. Einstein, Milan - Italy

Final grades 50/60

PERSONAL SKILLS

Mother tongue Italian

| Other languages | UNDERSTANDING | | SPEAKING | | WRITING |
|-----------------|---------------|---------|--------------------|-------------------|---------|
| | Listening | Reading | Spoken interaction | Spoken production | |
| English | C1 | C2 | C1 | C1 | C1 |
| German | C1 | C1 | C1 | B2 | B2 |
| Russian | A2 | A2 | A2 | A2 | A2 |

Levels: A1 and A2: Basic user – B1 and B2: Independent user – C1 and C2: Proficient user
[Common European Framework of Reference for Languages](#)

| Digital competences | SELF-ASSESSMENT | | | | |
|---------------------|------------------------|------------------|------------------|------------------|-----------------|
| | Information Processing | Communication | Content creation | Safety | Problem solving |
| | Independent user | Independent user | Independent user | Independent user | Basic user |

[Digital competences - Self-assessment grid](#)

Computer skills

- Windows, Linux (basic)
- C/C++, Matlab/Simulink, xml/xslt
- LaTeX/Beamer, MS Word, MS Power Point, Excel, Project.

ADDITIONAL INFORMATION

2003 - Present Fellowships and Awards

H2020-MSCA-IF-2017; **Marie Skłodowska-Curie Individual Fellowship**
 From European Commission - Research Executive Agency (REA), Bruxelles - Belgium
 Institution Politecnico di Milano, Milan – Italy

Jun 2009 – Jun 2010; **Postdoctoral Fellowship**
 From German Academic Exchange Service (DAAD), Bonn - Germany
 Institution German Space Operations Center (GSOC), Oberpfaffenhofen - Germany

Jan 2006 – Dec 2008; **PhD course in Aerospace Engineering**
 From Italian Space Agency (ASI)
 Institution Politecnico di Milano, Milan – Italy

Oct 2008; **Amelia Earhart Fellowship Award**
 From Zonta International, Chicago, Illinois – USA
 Institution Politecnico di Milano, Milan – Italy

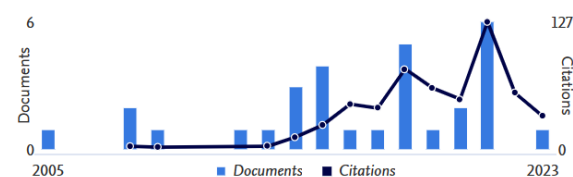
Sep 2003; 1st **Aurora Student Design Contest, Flagship class missions**
 From European Space Agency (ESA)
 Project Topic Prometeo - Mars Sample Return Mission

SCIENTIFIC PRODUCTION

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