

# Curriculum Vitae

## Personal information

First name / Surname **Aurel Zeqaj**  
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Nationality Italian  
Date of birth 02/08/1991  
Gender M

## Summary

M.Eng in Aerospace Engineering with more than two years of experience in data and signal processing, software programming, and RF TT&C space telecommunications. Coordinated, as technical lead, and successfully completed an ESA project, i.e. HELIOS (Highly rELiable Links during sOLar conjunctionS), that improved Deep Space links during solar conjunctions. Collaborated with ESOC in the BepiColombo - MORE mission. Currently a PhD candidate (3<sup>rd</sup> year) with a focus on the development of AI-based techniques to improve the autonomous navigation of CubeSats around small bodies.

## Work experience

Occupation or position held	<b>PhD Student @ University of Bologna</b>
Dates	10/2021 – Present
Main activities and skill acquired	<ul style="list-style-type: none"><li>• Working on the autonomous navigation of small satellites using AI-based techniques.</li><li>• Designed and manufactured a navigation computer board to estimate the trajectory of a spacecraft using optical observables.</li><li>• Developed a tool based on Blender (open source 3D computer graphics SW) for the procedural generation of synthetical images relative to small bodies;</li></ul>
Location	Forli (FC), Italy
Occupation or position held	<b>Visiting PhD Researcher @ NASA Jet Propulsion Laboratory</b>
Dates	09/2023 – 02/2024
Main activities and skill acquired	<ul style="list-style-type: none"><li>• Developed an AI-based pipeline for the detection (custom Convolutional Neural Network architecture) and tracking (custom Point Cloud Transformer architecture) of particles orbiting around small bodies.</li></ul>
Location	Pasadena (California), USA
Occupation or position held	<b>Risk Assessment Engineer @ Advolo S.r.l.</b>
Dates	01/2020 – 12/21

Main activities and skill acquired	<ul style="list-style-type: none"> <li>• Technical assistance for the design and certification of work equipment in accordance with EU (Machinery Directive, LVD, PED, EMC, RED, ATEX) and North America (UL and CSA) directives/standards;</li> <li>• Classification of Explosive Atmospheres following the ATEX 1999/92/EC directive;</li> <li>• Lecturer for TÜV Italia Akademie concerning ATEX directives;</li> <li>• AIAG+VDA Failure Mode and Effect Analysis (FMEA) for Lamborghini Automobili S.p.A.;</li> </ul>
Location	Forlimpopoli (FC), Italy
Occupation or position held	<b>Research Fellow @ University of Bologna.</b>
Dates	04/2017 – 06/2019
Main activities and skill acquired	<ul style="list-style-type: none"> <li>• Technical Lead of the HELIOS (Highly rEliable LInks during sOlar conjunctionS) project, commissioned by the European Space Agency, which had as aim the definition of a communication subsystem architecture that allows robust Radio Frequency TT&amp;C links during superior solar conjunction phases. The project was successfully concluded in May 2018 with a Final Presentation at ESOC-Darmstad.</li> <li>• Collaboration in the BepiColombo mission.</li> <li>• Development of different Python routines for the pre-processing of radiometric Open/Closed Loop and Calibration data, with a focus on Frequency extraction algorithms.</li> <li>• Participation to international Conferences and to internal meetings with ESA/ESOC Technical Officers.</li> <li>• Development of a Matlab code to test and develop Frequency estimation methods.</li> <li>• Drafting of scientific papers and technical documents.</li> </ul>
Location	Forli (FC), Italy
Occupation or position held	<b>Researcher @ Radio Science and Planetary Exploration Lab</b>
Dates	09/2016-06/2019 and 10/2021-Present
Main activities and skill acquired	<ul style="list-style-type: none"> <li>• Participating in radio science experiments (Cassini, Juno, BepiColombo).</li> <li>• Working on Radiometric tracking data.</li> </ul>
Location	Forli (FC), Italy
<b>Education and training</b>	
Dates	2014-2017
Title of qualification awarded	Master degree in Aerospace Engineering
Name and type of organisation providing education and training	Alma Mater Studiorum - Università di Bologna
Title of the thesis	<i>Study of Reliable Deep Space Communication Links during Solar Conjunctions</i>
Dates	2010-2014
Title of qualification awarded	Bachelor degree in Aerospace Engineering
Name and type of organisation providing education and training	Alma Mater Studiorum - Università di Bologna
Title of the thesis	<i>Studio e implementazione di un codice per l'impacchettamento di un propellente solido</i>
<b>Personal skills and competences</b>	
Mother tongue(s)	<b>Italian, Albanian</b>

Other language(s)

Self-assessment

European level (\*)

English

French

Spanish

German

## English, French, Spanish, German

Understanding				Speaking				Writing			
Listening		Reading		Spoken interaction		Spoken production					
	C1		C1		C1		C1				C1
	B1		B1		B1		B1				A1
	B2		B2		B2		B2				A1
	A1		A1		A1		A1				A1

(\*) Common European Framework of Reference for Languages

## Computer skills and competences

- Skilled in the use of Matlab, Python, Git, SVN, Bash, Blender, Pandas, Tensorflow and PyTorch.
- Good knowledge of Fortran, Monte, Simulink, HTML5, CSS3 and JavaScript.

## Certifications

- Jul. 2020, [IBM Data Science Specialization](#), (9 courses), IBM
- Sep. 2020, [Machine Learning](#), Stanford University
- Sep. 2020, [DeepLearning.AI TensorFlow Developer Specialization](#), (5 courses), Deeplearning.ai
- Nov. 2020, [Deep Learning Specialization](#), (4 Courses), Deeplearning.ai
- Jul. 2020, [Introduction to HTML5](#), University of Michigan
- Jul. 2020, [Introduction to CSS3](#), University of Michigan
- Jul. 2020, [Interactivity with JavaScript](#), University of Michigan
- Jan. 2021, [Fundamentals of Scalable Data Science](#), IBM

## Publications

A.J. Stocker et al., [An X Band Radio Channel Model for Propagation Through the Solar Corona](#), Radio Science, 2018

## Conferences

- A. J. Stocker et al, [Simulating the Reliability of Radio Links during Superior Solar Conjunctions](#), Eucap (London, UK), 2018
- A. J. Stocker et al, [The reliability of Phase Locked Loops during superior solar conjunctions](#), URSI (Gran Canaria, ES), 2018
- A. Zeqaj, [Design of an orbit determination computer for AI autonomous navigation](#), Aerospace Science and Engineering – III Aerospace PhD-Days (Bertinoro, IT), 2023
- Carmine Buonagura et al, [Deep Learning for Navigation of Small Satellites about Asteroids: an Introduction to the DeepNav Project](#), 2nd International Conference on Applied Intelligence and Informatics (Reggio Calabria, IT), 2023

## Driving licence

Class B