



**Dear colleagues, partners, and satellite innovation enthusiasts,**  
Welcome to the fourth edition of our HARMONY project newsletter. The Harmony PhD candidates are now entering their second year of research activities! Earlier this month, the second HARMONY Network-Wide Event took place. This newsletter will extensively cover this week of intense work and discussions between all actors involved in HARMONY. Meanwhile, Harmonists have started to publish their first results and disseminate their experience and knowledge.

[Visit our website to know more about the HARMONY PhDs!](#)

## Retrospective



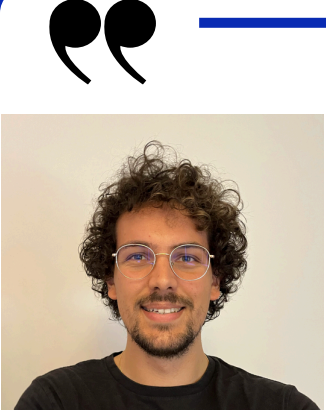
Organised by the IETR Lab in the facilities of the University of Rennes 1 from the 3rd to the 7th of June 2024, the second HARMONY Network-Wide Event gathered all actors of the HARMONY project. Most of the HARMONY PhD candidates, the "Harmonists", are now entering their second year of research. During the event, they have had the occasion to present the first results of their research activities and discuss future directions. A training session on the important topic of carbon footprint assessment for satellite systems was also given by a Thales expert.

After the training session on eco-design, the Harmonists started working on a hands-on activity to apply the carbon footprint assessment tools on use cases relevant for the HARMONY project and find solutions to reduce the ecological impact. This activity will be pursued during several months and will be documented in a deliverable submitted to the European Commission. Another group activity around space mission design and model-based system engineering was kicked-off during the HARMONY event. The Harmonists brought together their multi-disciplinary expertise to design a satellite mission/constellation. The satellite mission identified for this activity involves a telecommunication constellation based on fractionated antenna arrays, inter-satellite links and regenerative payloads to provide 5G connectivity to ground users.

- During the last months, the Harmonists have been very proactive in disseminating their knowledge:
- Alessandro Mastopietro working on MBSE (Model-based system engineering) gave multiple presentations describing his PhD work at the Da Vinci Institute in Reggio Emilia in front of schoolers.
  - Alessandro also participated to a Hackathon on MBSE Application for Lunar Green House Module Development, organized by ESA, DLR, OHB and TAS. His team won the first place, congratulations to them!
  - Aymeric Cailleux participated in the Thales UK PhD Event and presented his PhD work.

- The Harmonists have also continued to publish on their research:
- Three different abstracts from Alessandro Mastopietro, Giulio Orlando and Oscar Martinez for the International Astronautical Congress (IAC2024) have been accepted.
  - Alex Evrard submitted his system analysis on inter-satellite links to the 42nd ESA Antenna Workshop in the Netherlands and is currently waiting for a notice of acceptance. Giulio and Aymeric will also attend the workshop.
  - Finally, in collaboration with Thales Alenia Space España and IETR, Dorian Chenet will publish his first academic paper on "Space Edge Computing key enabling technologies" in the PhD Symposium of EuroPar2024. He will attend the conference at the end of August.

## Voices of HARMONY



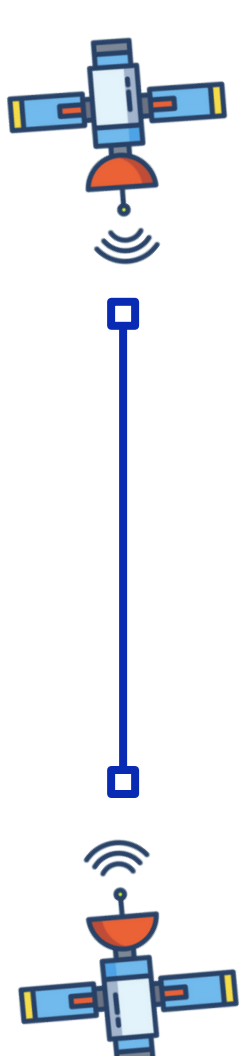
As a doctoral student in the Harmony project, I'm thrilled by the supportive environment it fosters. Not only does Harmony provide invaluable resources for my own research, but it also opens doors for exciting collaboration. The chance to connect with fellow PhD students from diverse disciplines is a game-changer. We can bounce ideas off each other, gain fresh perspectives, and discover potential areas for interdisciplinary research.

Harmony's commitment to expanding our horizons extends beyond the academic sphere. The project facilitates participation in conferences and hackathons. These events are not just opportunities to showcase our work, but also to network with leading researchers and industry professionals. The chance to learn from experts and collaborate on innovative projects is truly inspiring. Being part of Harmony feels like having a supportive chorus behind you, helping you reach your full potential as a researcher.

**Alessandro Mastopietro - PhD Candidate**

## Commitment

Reports on the status of gender equality indicate that there is much work to be done. Gender inequalities is one of the greatest challenges in today's society but unfortunately, science is not exempt of inequalities. In a lot of European countries, women only represent a minority among science and engineering workers. According to Eurostat, in Europe in 2022, on average, women only account for 41% of all employees in science and engineering. However, to face global challenges like economic prosperity, social justice, and environmental integrity, everyone's contribution is needed. The HARMONY Project will get involved in dissemination activities to inspire women and girls to pursue Science, Technology, Engineering, and Mathematics (STEM) education and



raise awareness about career opportunities and the importance of gender equality and empowerment in the space sector. The refreshing breeze of the new space industry not only brings cutting-edge technological developments but also ambitions to bring a durable change in mentalities and make the space industry up to today's challenges. In an era where mankind is looking towards the Moon, Mars and beyond, it is unthinkable that progress can be achieved without a full contribution of women. As a European project, it is HARMONY's duty to embody Europe's values in terms of tolerance, respect and progress. Diversity in research expands the pool of talented researchers, bringing in fresh perspectives, talent and creativity.

**We firmly believe that diversity and open-mindedness are essential to our collective success.**

## Looking Ahead

We trust that our fourth newsletter has provided you with valuable insights and an overview of our ongoing initiatives. More publications and dissemination activities will be communicated in our next newsletter in September.

We wish you a pleasant summer!

Kind regards,

The HARMONY Team

# Thank you!

