

Edge AI on a satellite for near real-time marine plastic detection and monitoring

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The Partners



Project Coordinator, French SME based in Toulouse. Created in 2018 part of the **Agenium Group**. Expertise: AI solutions for space

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Remote Sensing Lab of NTU Athens

Expertise: ML techniques associated in remote sensing. EU-funded project, Marine Debris Archive (MARIDA). Benchmark dataset for developing & evaluating ML algorithms for Marine Debris.



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Department of Topography

Scope

Academic objectives of the Remote Sensing Laboratory of the NTUA

The Laboratory of Remote Sensing of the National Technical University of Athens was established in November 1987, having as its main task to serve research and educational needs in the fields of Photo-Interpretation and Remote Sensing and their applications: in Observing and Monitoring our planet, in Integrated Surveys of the Natural and Socioeconomic Environment and in the Development of Integrated Cadastral Land Information Systems. The specific aims of the Laboratory of Remote Sensing are:

1. To meet the educational and research needs (both at the undergraduate and graduate levels) of the School of Rural and Surveying

Data Processing, Annotation & Statistics

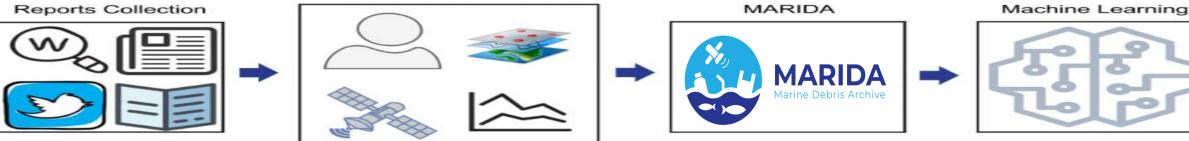
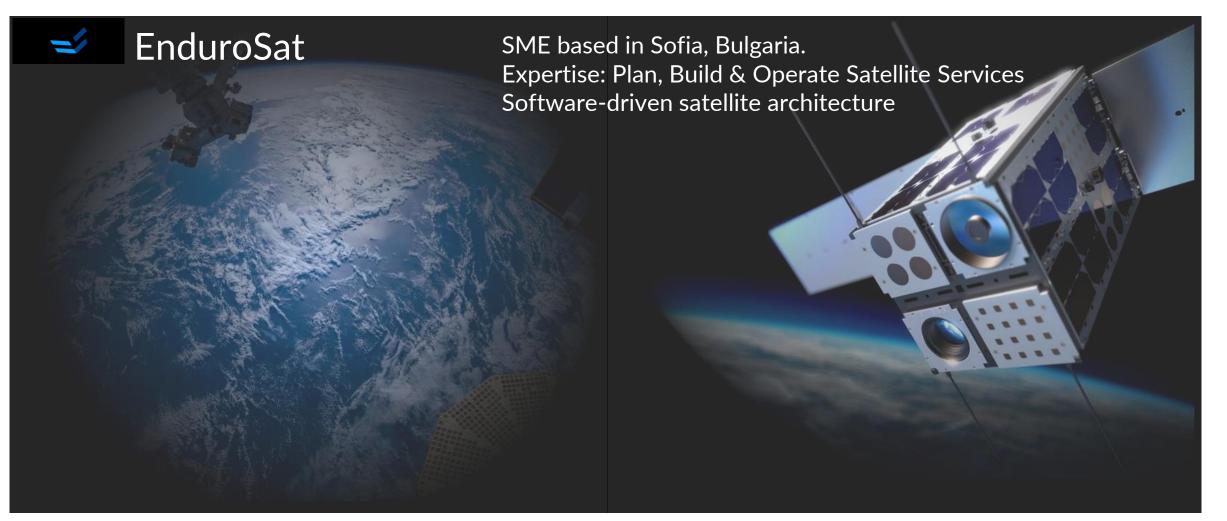


Fig 1. Schematic diagram representing the different steps for the construction of Marine Debris Archive-MARIDA.



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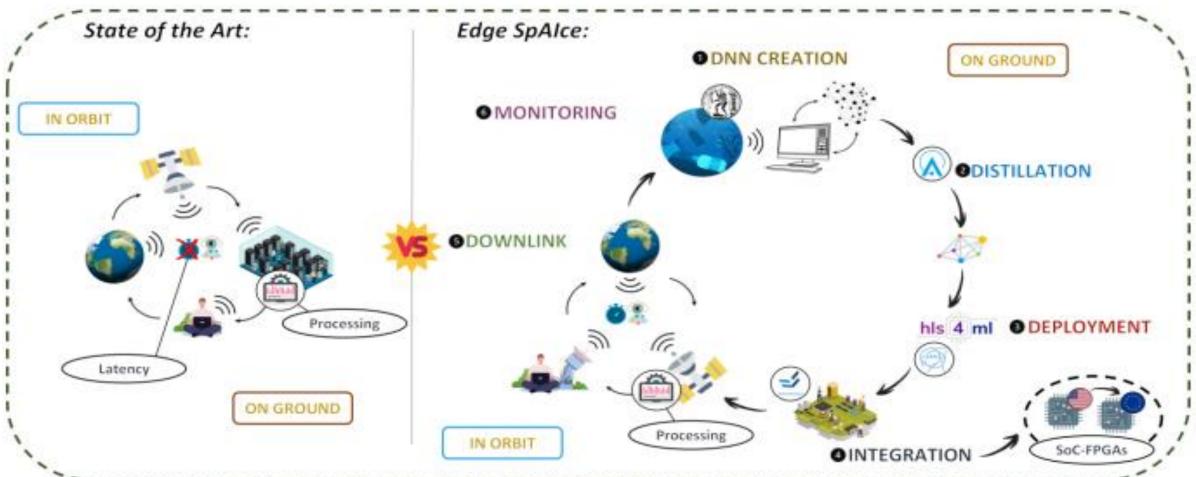
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The Project

A novel Edge-AI system for accurate and near real-time plastic detection and monitoring in marine environment



- Latency due to downlink data volumes
- Bottlenecks at the data center





- Massive reduction of downlink data volumes. Bandwidth allows for (almost) RT monitoring

- Reduced cost & environmental impact - no heavy earth-based processing needed.

The Project

- EU HORIZON-CL4-2023-SPACE-01 EU Call RIA, lump sum grant.
- Fully funded, 2.5m €, 3 yr project, started in January 2024.
- TRL sought 6. Allow for commercial development of services.
- CERN Tech & expertise: hls4ml OS sw & DNN optimization. From CMS trigger to EO services.
- Why FPGAs ? Latency and power consumption (~ 10W available on board)
- Development of backend implementation to target NanoXPlore European Space Grade FPGA



The Project

The wider picture: Novel Earth Observation (EO) services

- Application areas: Government, public and emergency services, Agriculture, Electricity & utilities, Supply chain monitoring, insurance & sustainable finance etc
- Our approach: Autonomous, re-configurable on demand (in-orbit updates) service, depending on application.
- 400% increase in # of EO satellites 2014 2021. Number expected to almost triple in the coming decade.
- WEF Study: the potential value-added from Earth data is estimated to reach \$700 billion in 2030. Cumulative \$3.8 trillion contribution to global GDP between 2023-2030.



Thank you

