

# Optimization of Machine Learning Algorithm Execution in IoT Infrastructures

## Objective

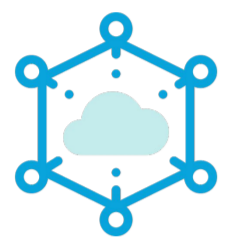
Optimize IoT & ML for Environmental Intelligence



Analyze IoT configurations



Accelerate ML algorithms



Boost edge computing power

## Expected Results and Potential Applications



Efficient IoT infrastructure



Advanced AI on low-power devices



Eco-friendly monitoring

## Research Stages

Deployment and evaluation of an **IoT infrastructure** with edge computing devices

Analysis, design, implementation, and acceleration of **machine learning** methods in IoT environments

Development of **virtualization** strategies to increase the computational capacity of **low-power nodes**

Over **1,500 tons** of fish and shellfish perished

between 2016 and 2021 during hypoxic events in Mar Menor due to eutrophication and human activities

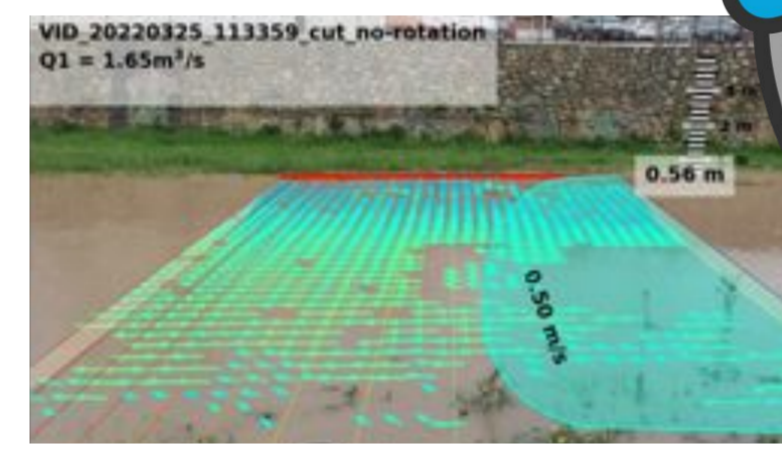


Modular, low-power, Long-Range communication protocol



Bimodal Observational Device for Optimizing Quantification of Ephemeral Streams

Energy-saving approach for monitoring ephemeral streams based on **Tiny ML** and **Edge Computing**



# Boosting Mar Menor's Recovery: Harnessing IoT & Machine Learning for Sustainable Environmental Intelligence

**Benjamín Arratia**



PhD in Computer Science Program, supervised by:

**Pietro Manzoni & Jose M. Cecilia**

### Bibliography:

- Jimeno-Sáez, P., Senent-Aparicio, J., Cecilia, J. M., & Pérez-Sánchez, J. (2020). Using Machine-Learning Algorithms for Eutrophication Modeling: Case Study of Mar Menor Lagoon (Spain). *International Journal of Environmental Research and Public Health*, 17(4), 1189.
- Gubbi, J., Buyya, R., Marusic, S., & Palaniswami, M. (2013). Internet of Things (IoT): A vision, architectural elements, and future directions. *Future generation computer systems*, 29(7), 1645-1660.
- Cecilia, J. M., Timón, I., Soto, J., Santa, J., Pereñíguez, F., & Muñoz, A. (2018). High-Throughput Infrastructure for Advanced ITS Services: A Case Study on Air Pollution Monitoring. *IEEE Transactions on Intelligent Transportation Systems*, 19(7), 2246-2257.
- Satyanarayanan, M. (2017). The emergence of edge computing. *Computer*, 50(1), pp 30-39.
- Guillén-Navarro, M. A., Martínez-España, R., López, B., & Cecilia, J. M. (2019). A high-performance IoT solution to reduce frost damages in stone fruits. *Concurrency and Computation: Practice and Experience*, e5299.

