Overview of the Research activities of the

GRC GRUPO DE REDES DE COMPUTADORES

https://grc.webs.upv.es/

April 2026

Research: Broad set of topics

Smart Urban and Environmental IoT

Low-power sensors, LPWAN (LoRa, NB-IoT), edge computing, AIoT platforms, energy-aware sensing, interoperable data systems.

Intelligent Mobility and Transportation Systems

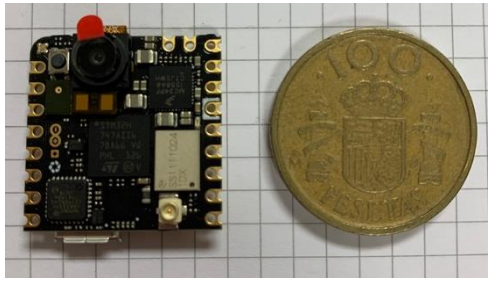
Vehicular networks (V2X), smart traffic infrastructure, cooperative driving, edge/cloud integration for real-time decision making.

AI-enhanced Applications and architectures

Embedded AI, neural network deployment on edge devices, federated learning, model compression, and pruning for IoT.

Drone and Swarm Communication

Aerial networks, coordination protocols, communication resilience in dynamic environments, surveillance and environmental sensing.



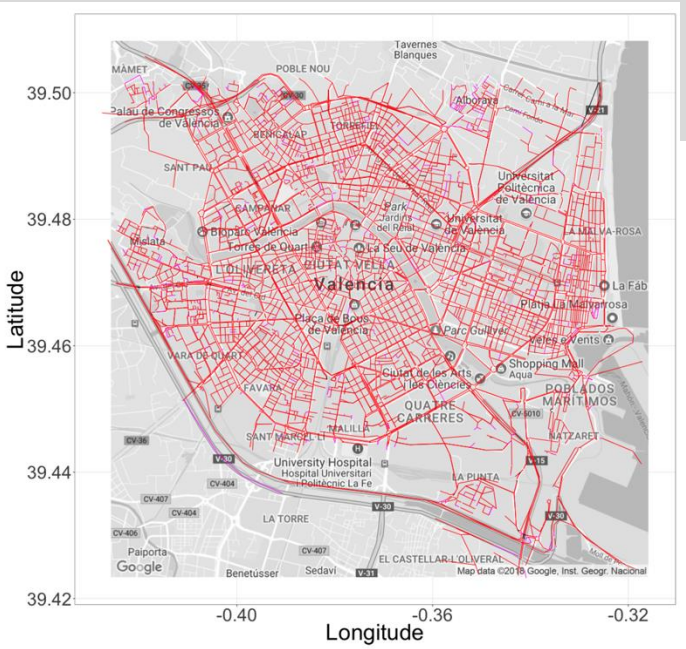
Social Sensing and Human-in-the-loop Systems

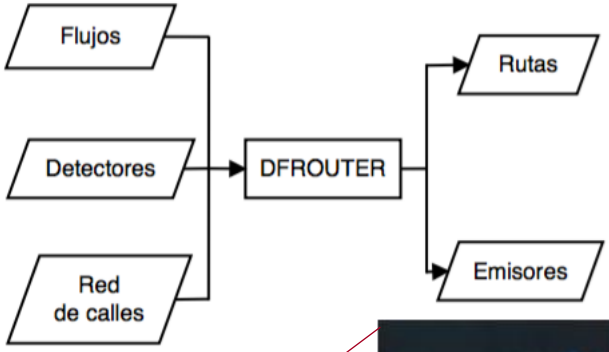
Crowdsourced sensing, social media mining, natural language processing for event detection, participatory platforms for public services.

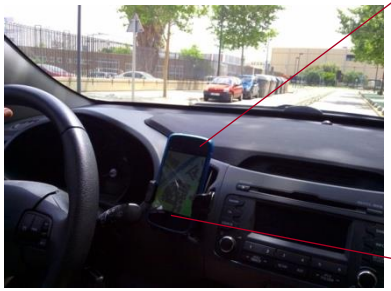
Intelligent Transport Systems (ITS)

ABATIS

- ABATIS Project: Centralized traffic monitoring and management
  - Based on:
    - Historic data
      - collaboration with Valencia City Council
    - Real time data
  - Adaptable towards achieving many different goals

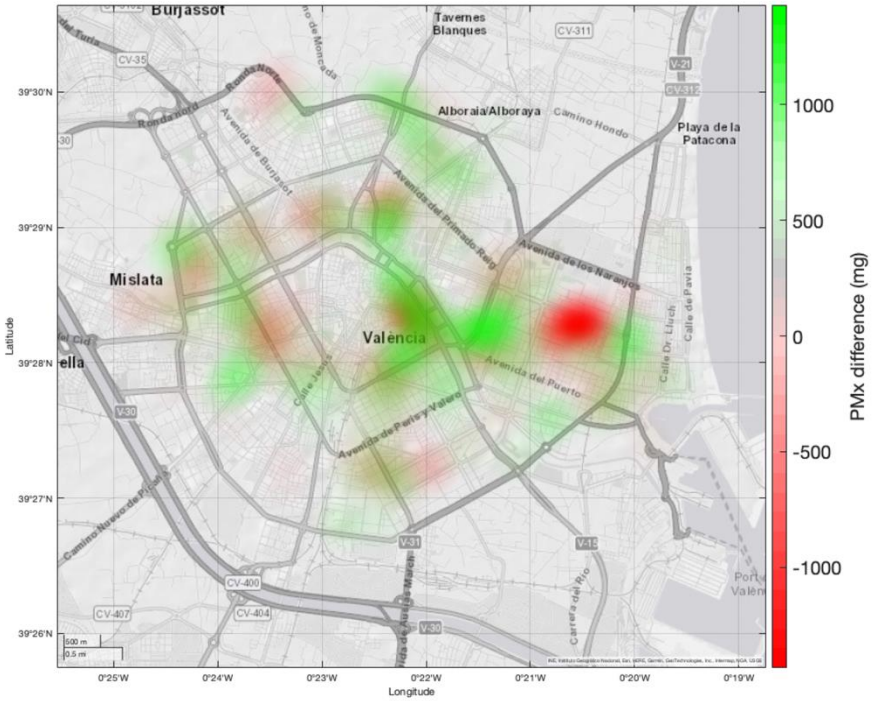




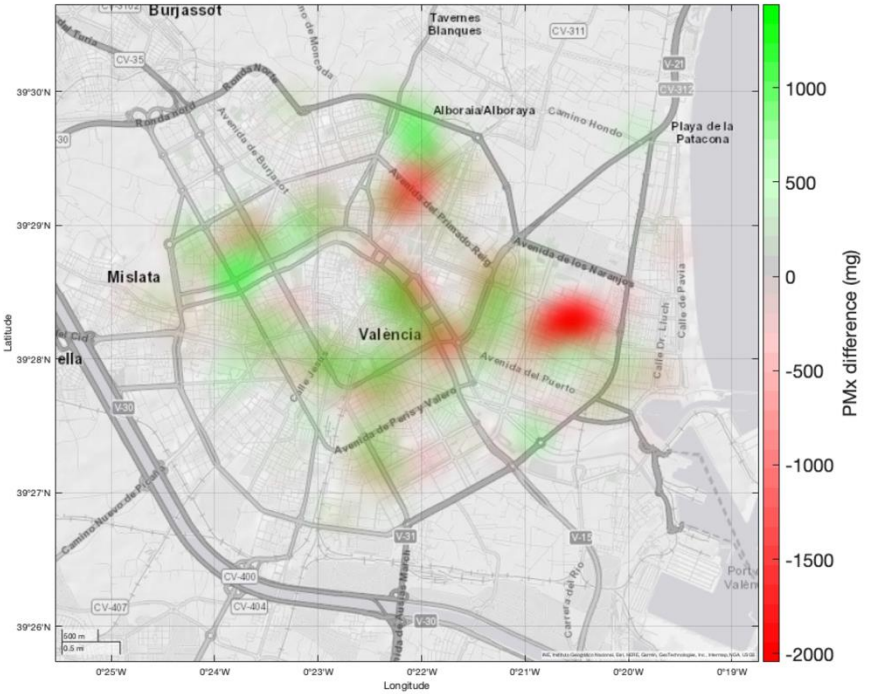


Differential heatmaps

- Full traffic isolation



- Partial traffic isolation



DrivingStyles

- Collection and analysis of the driving style patterns
  - Basic goal: providing energy-related behavior suggestions
- To be used by:
  - Fleet management
  - Insurance companies
  - City councils
  - …

Available at:

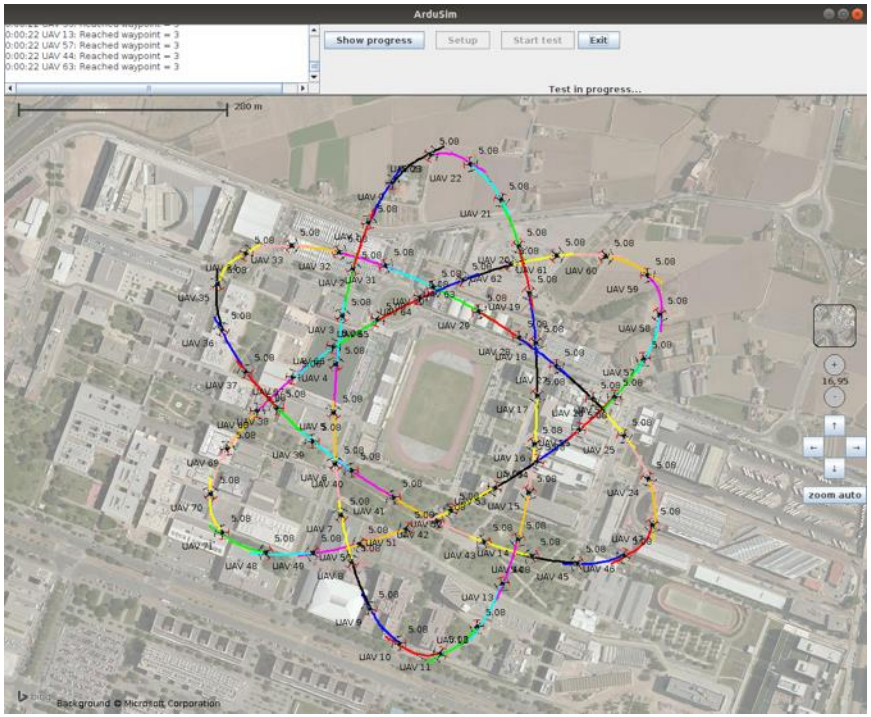
Google play

http://www.drivingstyles.info

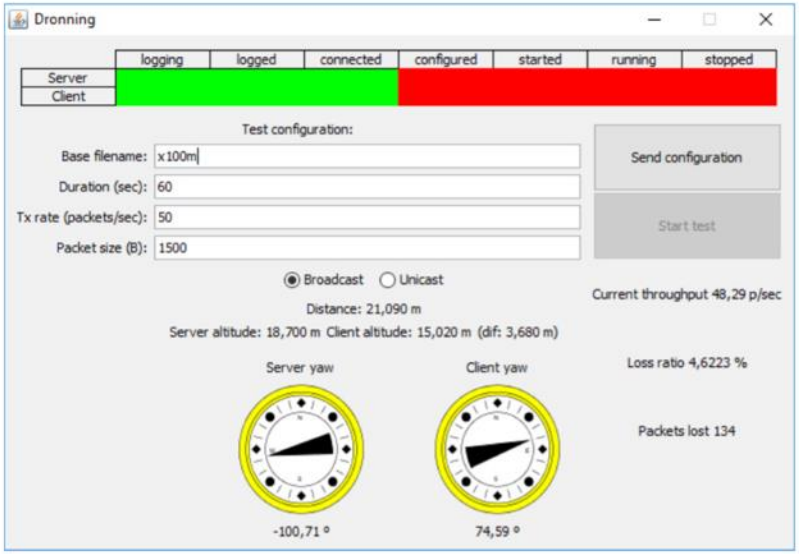
Drone and Swarm Communication

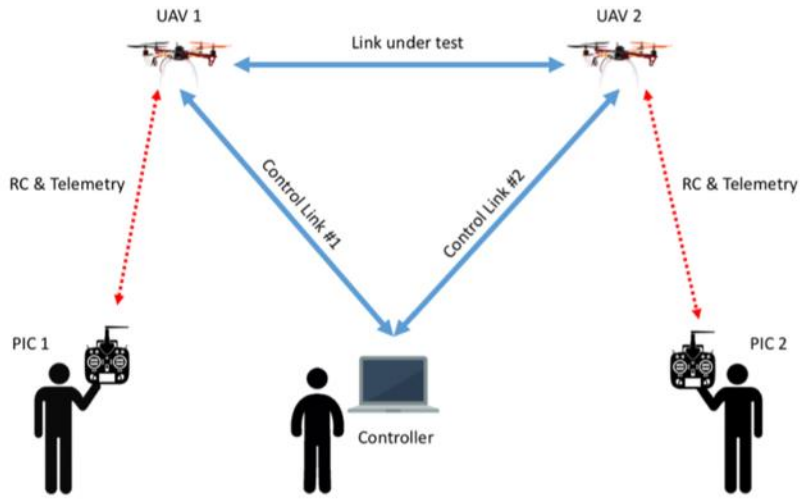
ArduSim simulator

- Available here: https://github.com/GRCDEV/ArduSim
  - based on **Ardupilot** (https://ardupilot.org/)
  - open-source autopilot software available
  - Communication based on **MAVLink** (https://mavlink.io/en/)
  - Allows direct portability of the code to real devices!!!

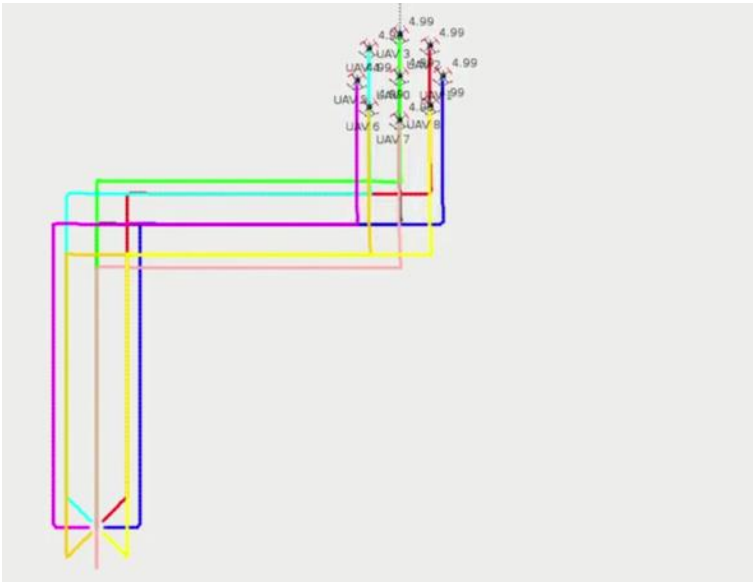


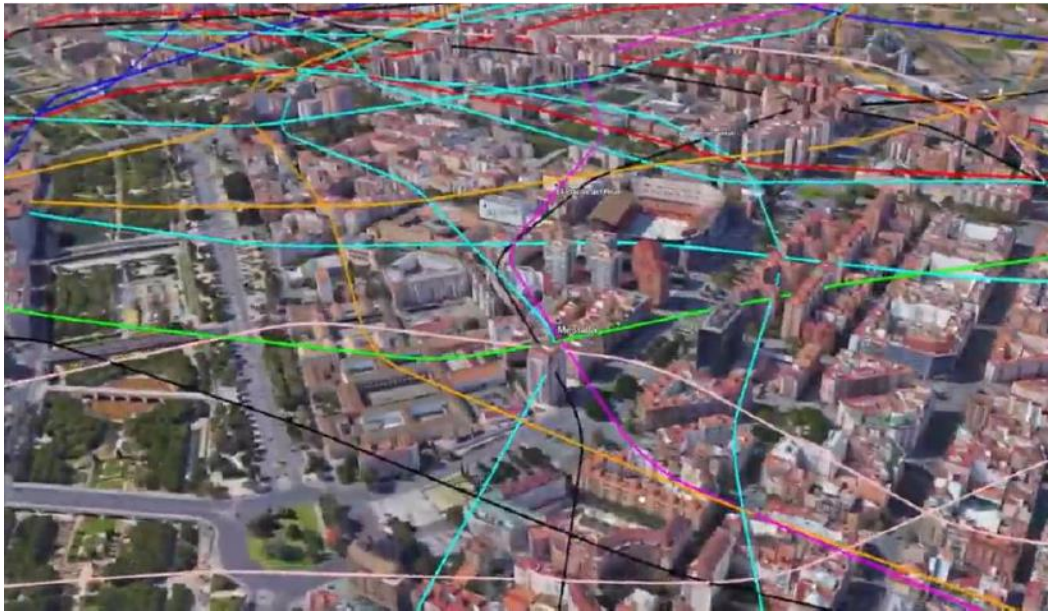
UAV-to-UAV communications





Swarm Management





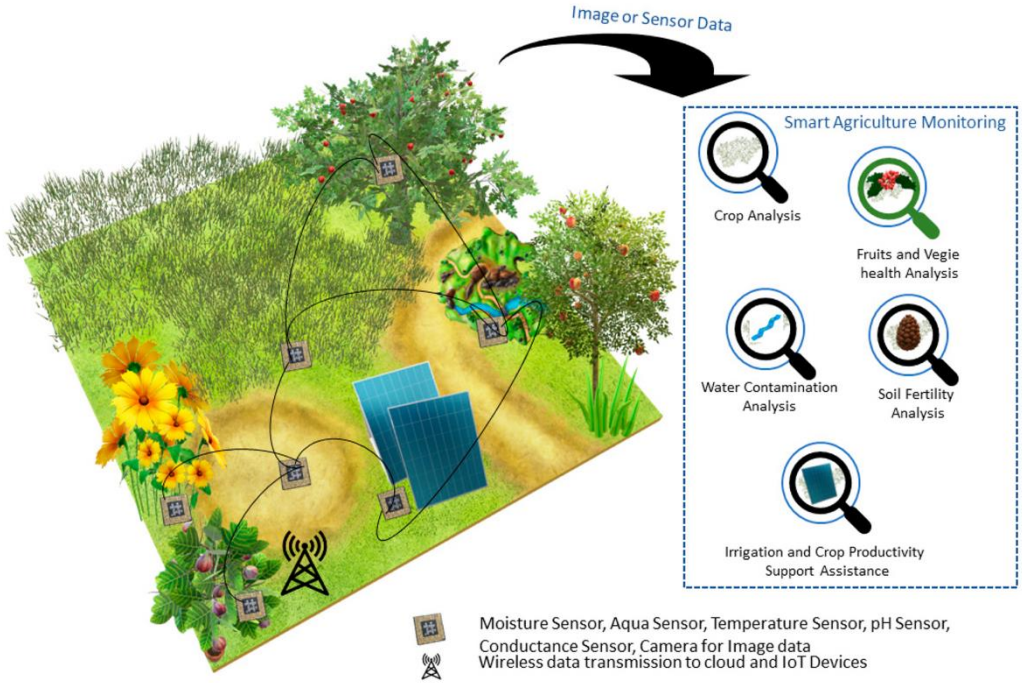
Drone photogrammetry

Context and Motivation :

- Drone photogrammetry is increasingly used in surveying, agriculture, and 3D modeling.
- However, planning complex flight paths manually is tedious and error-prone.
- DJI Fly has limitations in mission planning (like waypoint limits).

Birds counting and detection

Smart Urban and Environmental IoT



Environmental sensing typically deals with rural and extreme environments such as remote areas, forests, sea, or mountains.

Parques Naturales: La Mata – Torrevieja; Albufera

LPWAN networkss

ELSEVIER

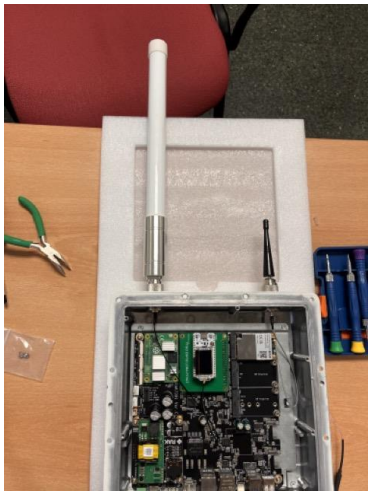
Computer Communications

Volume 218, 15 March 2024, Pages 44-58

AlLoRa: Empowering environmental intelligence through an advanced LoRa-based IoT solution

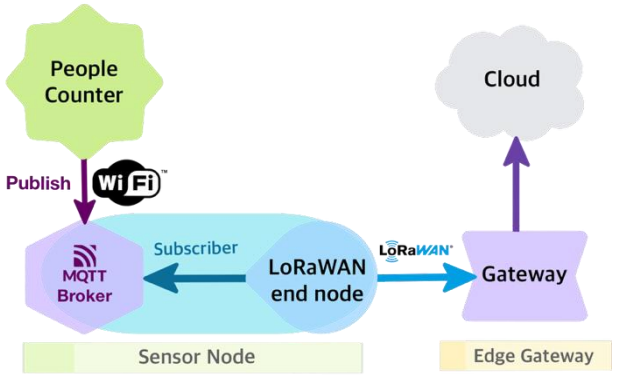
Benjamín Arratia, Erika Rosas, Carlos T. Calafate, Juan-Carlos Cano, José M. Cecilia, Pietro Manzoni

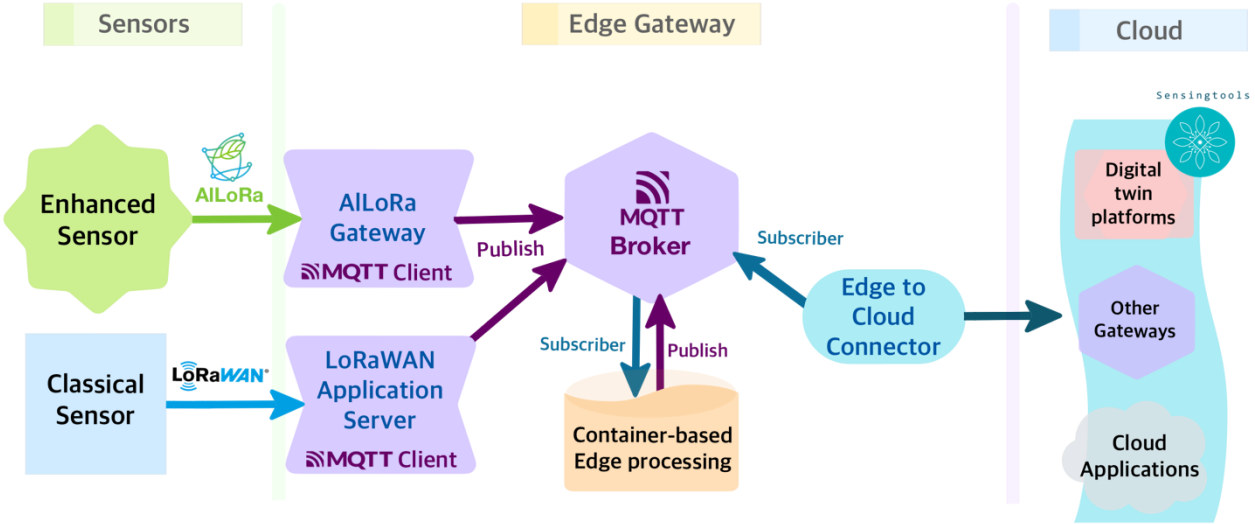
https://github.com/SMARTLAGOON/AlLoRa



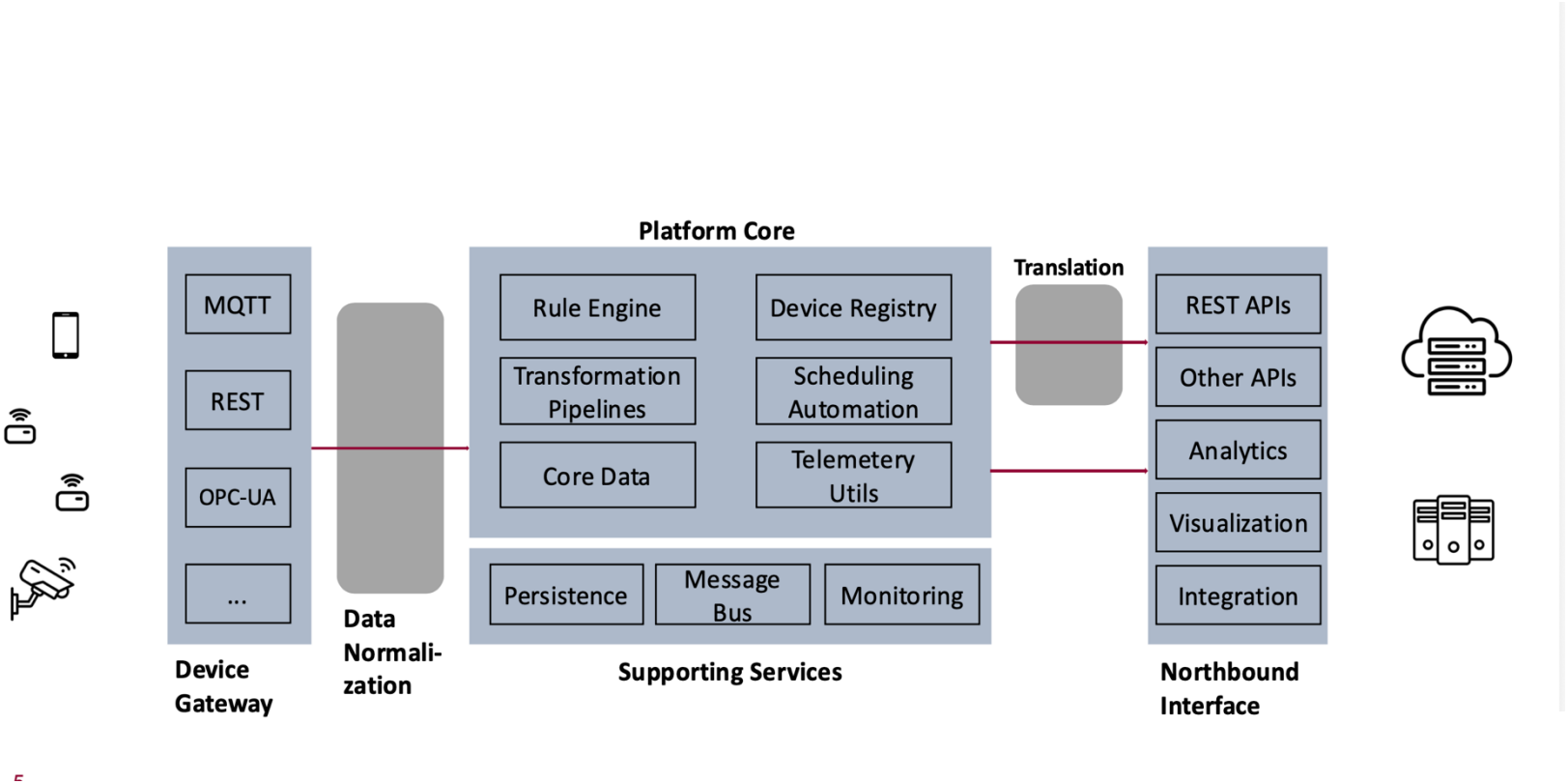
Multiple sources data collection

RAK7391 WisGate

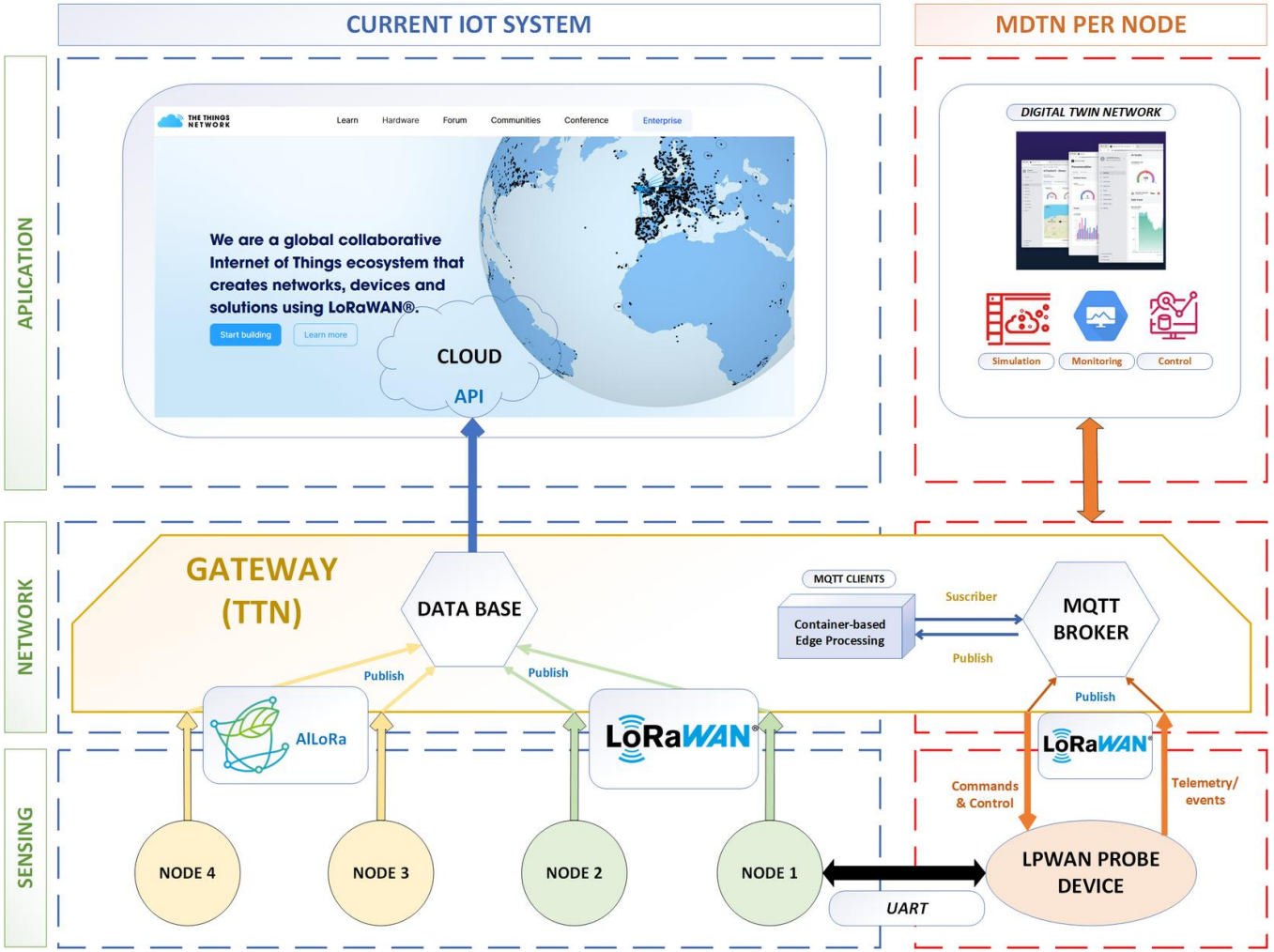




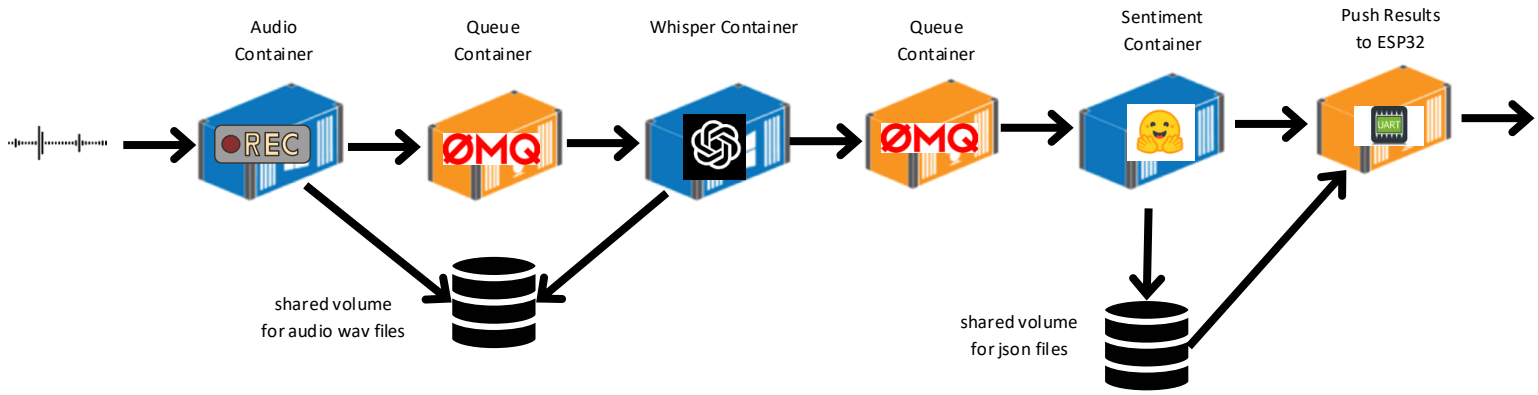
Multiple sources data collection



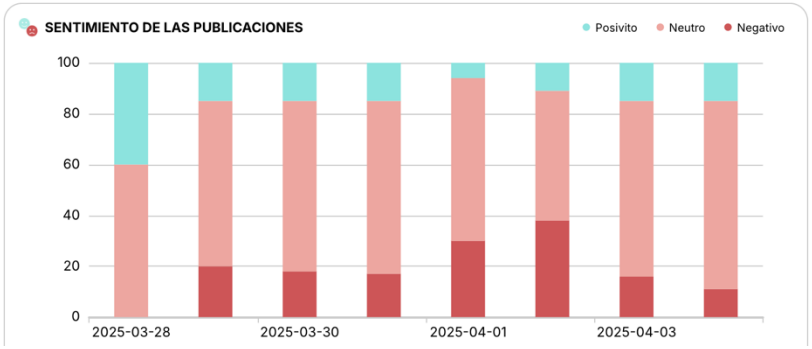
IoT deployments monitoring

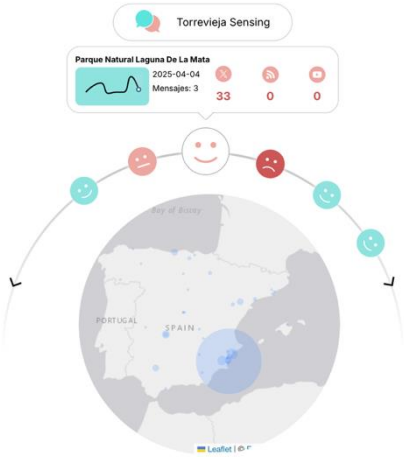


AIoT: Sentiment analysis

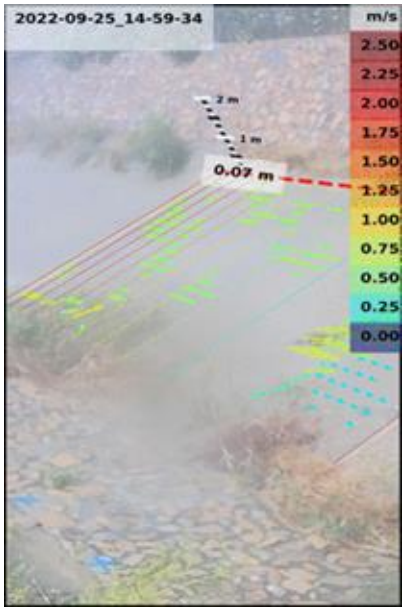


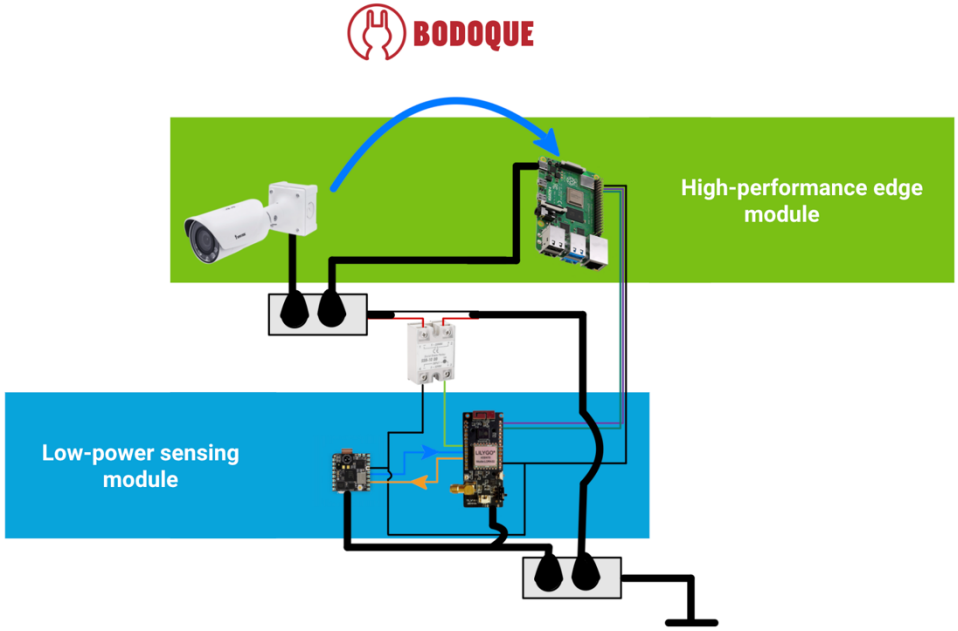
AIoT: Sentiment analysis





AIoT: Water Monitoring

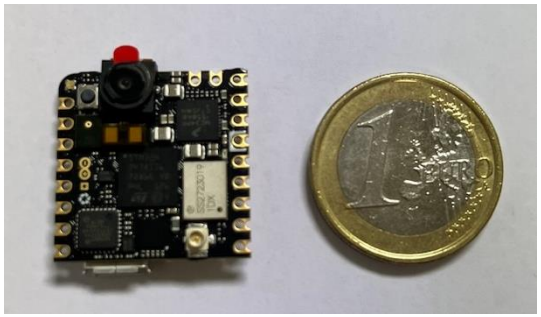




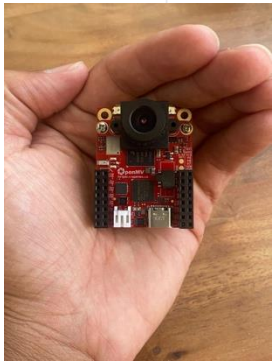
Benjamín Arratia, Javier Prades, Salvador Peña-Haro, José Maria Cecilia, and Pietro Manzoni. 2023. BODOQUE: An Energy-Efficient Flow Monitoring System for Ephemeral Streams. In Proceedings of ACM MobiHoc '23; 358-363. https://doi.org/10.1145/3565287.3616526

AIoT: People counting

https://store.arduino.cc/products/nicla-vision



Microcontroller	STM32H747AII6 Dual Arm® Cortex® M7/M4 IC: • 1x Arm® Cortex® M7 core up to 480 MHz • 1x Arm® Cortex® M4 core up to 240 MHz



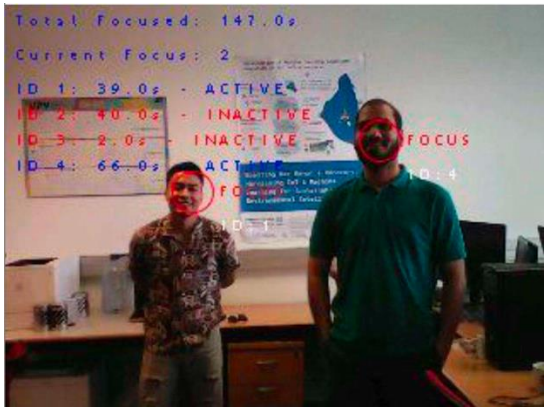
https://openmv.io/collections/cams/products/openmv-cam-rt

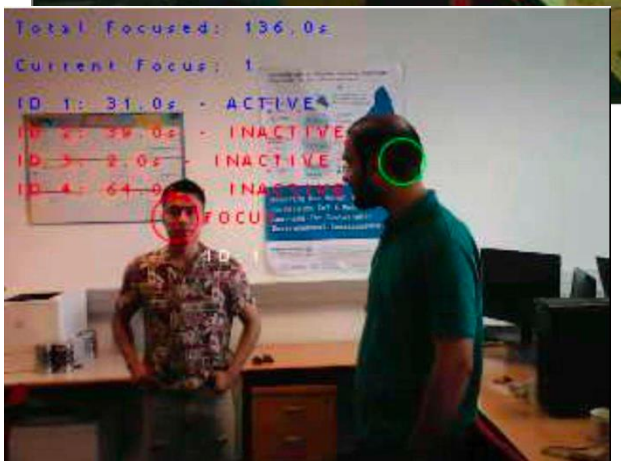
People counting: more results

AIoT: Evaluate art object attractiveness in museums

Jeenah Moon for The New York Times, 2024

Are they watching or are they simply standing by?

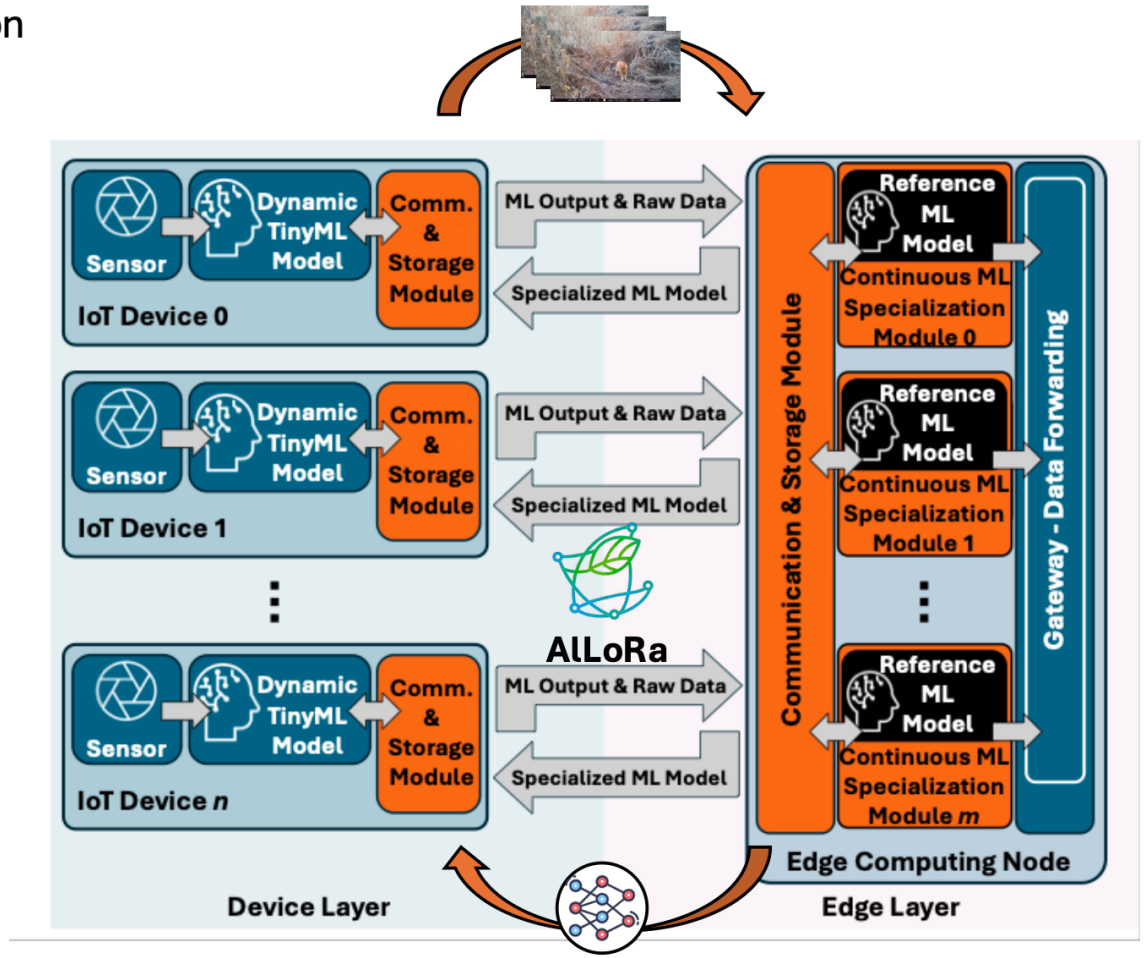




AIoT: Retraining models in the edge

AlLoRa In TinyLoop Architecture

Motivation

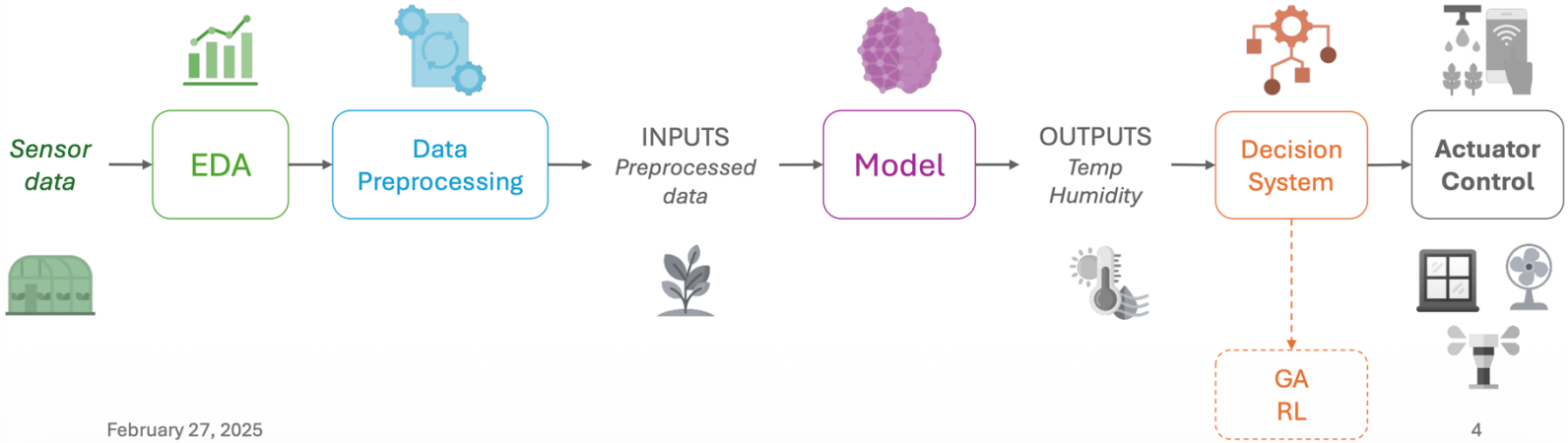


Social Sensing and Human-in-the-loop Systems

Greenhouses

SERGIoT

- *Designing a digital twin strategy for efficient greenhouse management.*
- **My future work**



February 27, 2025

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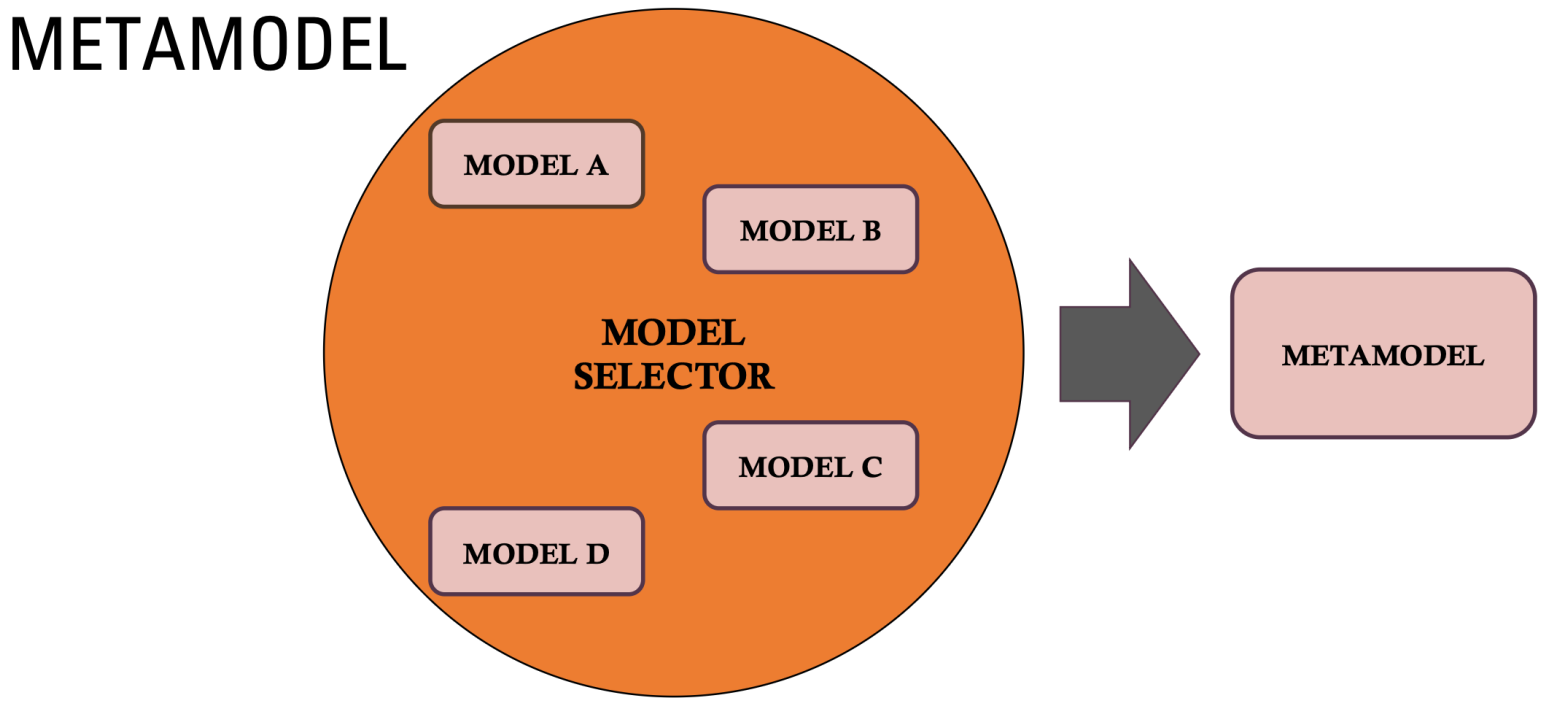
Metamodels


METAMODEL
MODEL A
MODEL B
MODEL SELECTOR
MODEL C
MODEL D
METAMODEL

Process automation

Vuelo de palabras - Overview

- Goal: Automate manuscript evaluation, correction, and publishing workflows.
- Why: Reduce editorial costs (currently 6–8k €/year per editorial).
- How: Use LLMs and automated pipelines to streamline the process.

Vuelo de Palabras

Librería y espacio cultural