

Overview of the Research activities of the



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

The screenshot shows the homepage of the GRC website. At the top left is the GRC logo and the text 'GRUPO DE REDES DE COMPUTADORES'. At the top right is the logo of the Universitat Politècnica de València. Below the header is a navigation menu with links for Home, Members, Papers, Projects, Teaching, and Software. The main content area starts with a paragraph about the group's founding in 2000 and its focus on data communication solutions for mobile systems. This is followed by a bulleted list of research areas, a photograph of a man with a telegraph machine, a section for 'Infos and News' with links to research overviews and a YouTube channel, a section for 'Events and CfPs' listing various conferences, and a section for 'Journals Special Issues' with a link to a special issue on visual language models.

The **Grupo de Redes de Computadores (GRC)** (*Networking Research Group*) of the Universitat Politècnica de València (UPV) was founded in 2000. The group research efforts focus on offering **Data Communication Solutions for Mobile Systems**. The main areas of application are:

- ▶ AIoT infrastructures for environmental sustainability
- ▶ Drone-based networks
- ▶ Efficient IoT infrastructures development
- ▶ Intelligent Transport Systems
- ▶ LPWAN-based networks
- ▶ Mobile edge computing
- ▶ Pub/Sub systems
- ▶ Social sensing

Infos and News:

- ▶ [Overview of GRC research \[Sept. 2023\]](#)
- ▶ [GRC YouTube channel](#)

Events and CfPs:

Conferences:

- ▶ **INTERACT: The First Workshop on Communication and Networking for TinyML based Consumer Applications, in conjunction with ACM/IEEE Symposium on Edge Computing 2024**, Rome, Italy, 4-7 December 2024.
- ▶ **2024 IEEE/ACM International Symposium on Distributed Simulation and Real Time Applications (DS-RT 2024)**, Urbino, Italy, 7-9 October 2024.
- ▶ **ACM 4th International Conference on Information Technology for Social Good (GoodIT 2024)**, Bremen, Germany, 4-6 September 2024.
- ▶ **EuCNC & 6G Summit 2024**, Antwerp, Belgium, 3-6 June 2024.

Journals Special Issues:

- ▶ [Visual Language Models and Large Language Models for Unmanned Aerial Vehicles](#), 2024.

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.



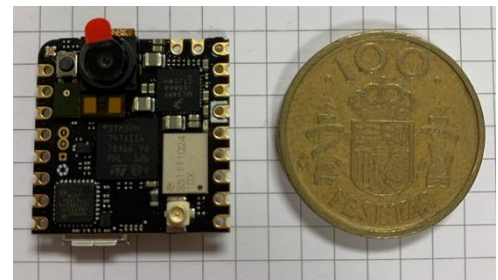
Drone and Swarm Communication

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)



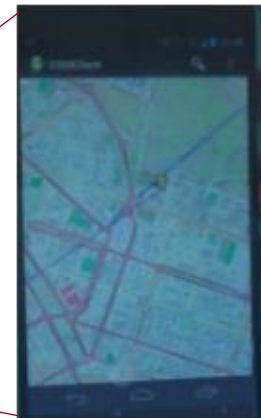
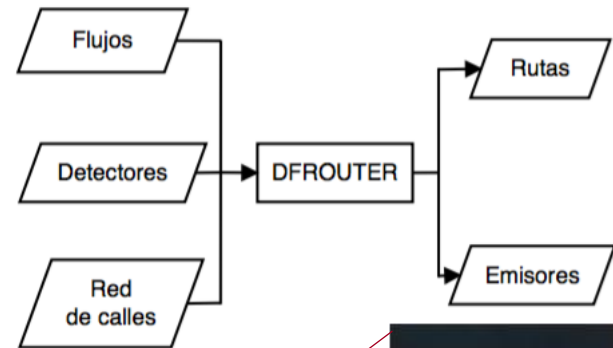
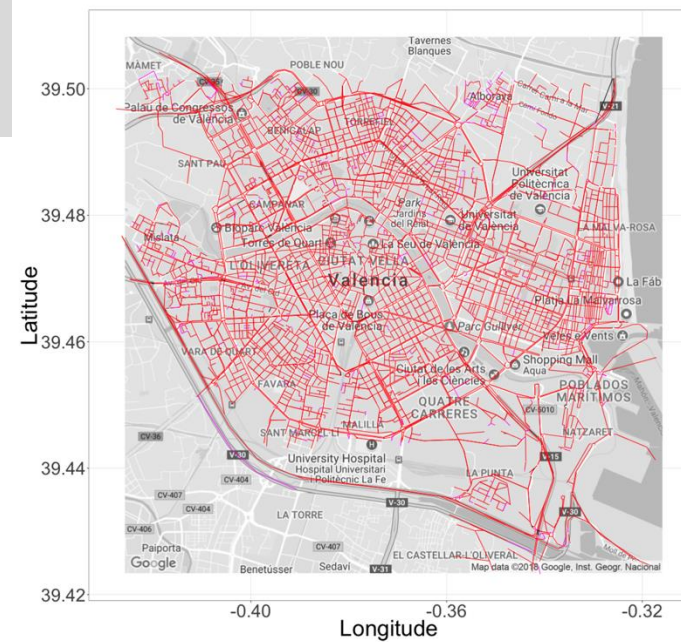
ABATIS

ABATIS Project: Centralized traffic monitoring and management

Based on:

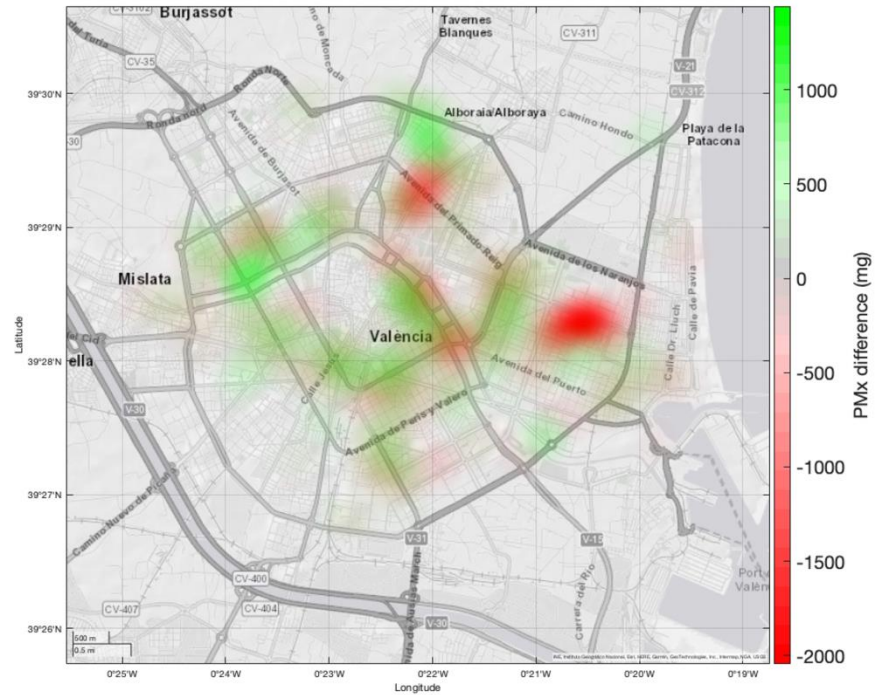
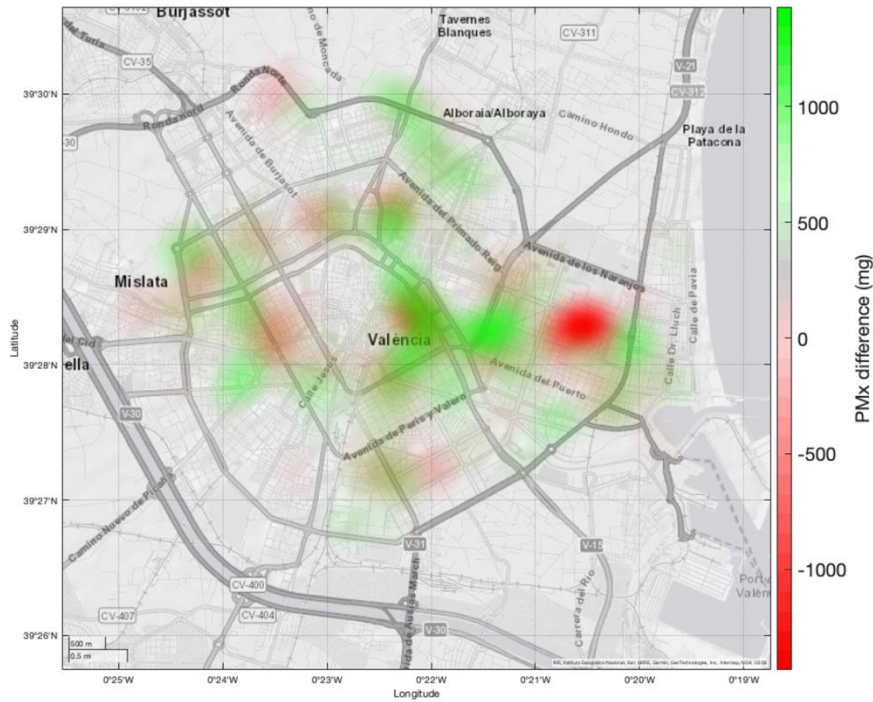
- Historic data
- collaboration with Valencia City Council
- Real time data

Adaptable towards achieving many different goals



Differential heatmaps

- Full traffic isolation
- Partial traffic isolation



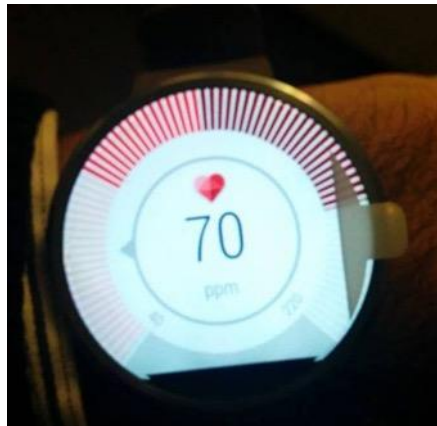
DrivingStyles

- ❑ 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:



<http://www.drivingstyles.info>

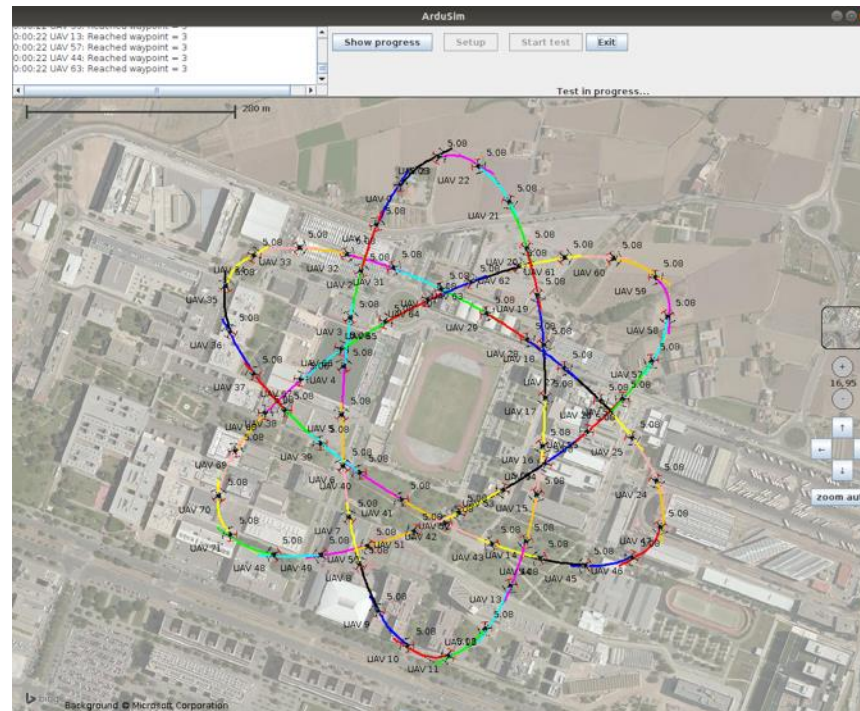


Drone and Swarm Communication



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



Droning

	logging	logged	connected	configured	started	running	stopped
Server							
Client							

Test configuration:

Base filename: x100m | Send configuration

Duration (sec): 60


Tx rate (packets/sec): 50


Packet size (B): 1500

Broadcast Unicast

Distance: 21,090 m

Server altitude: 18,700 m Client altitude: 15,020 m (dof: 3,680 m)

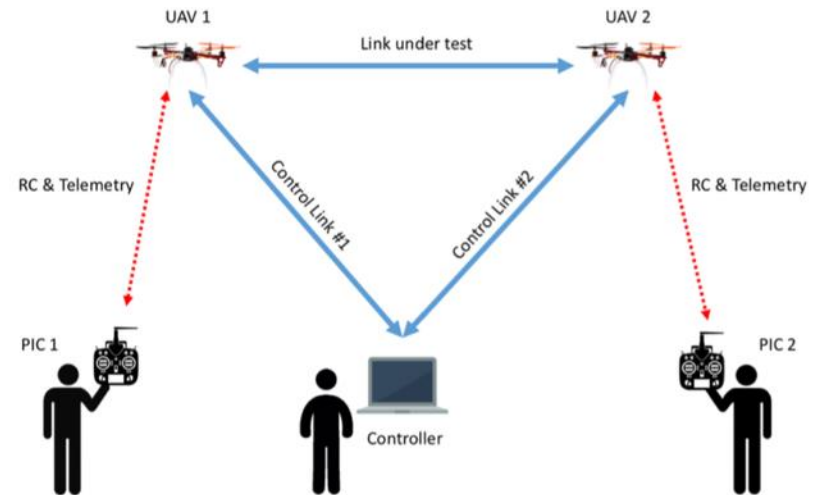
Server yaw:  -100,71 °

Client yaw:  74,59 °

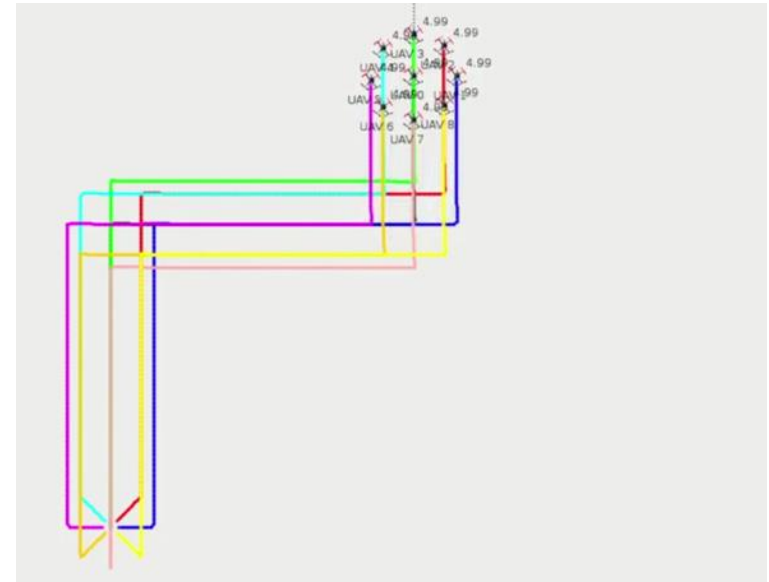
Current throughput 48,29 p/sec

Loss ratio 4,6223 %

Packets lost 134



Swarm Management



Drone photogrammetry

Context and Motivation :

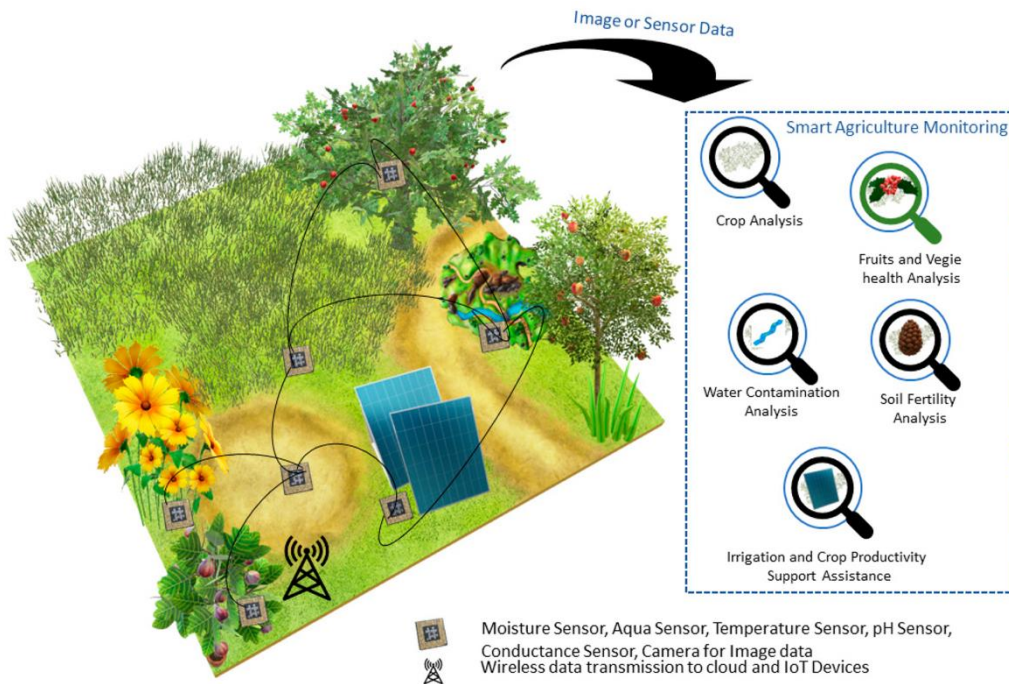
- Drone photogrammetry is increasingly used in surveying, agriculture, and 3D modeling.
- However, planning complex flight paths manually is tedious and error-prone.
- DJI Fly has limitations in mission planning (like waypoint limits).



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





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



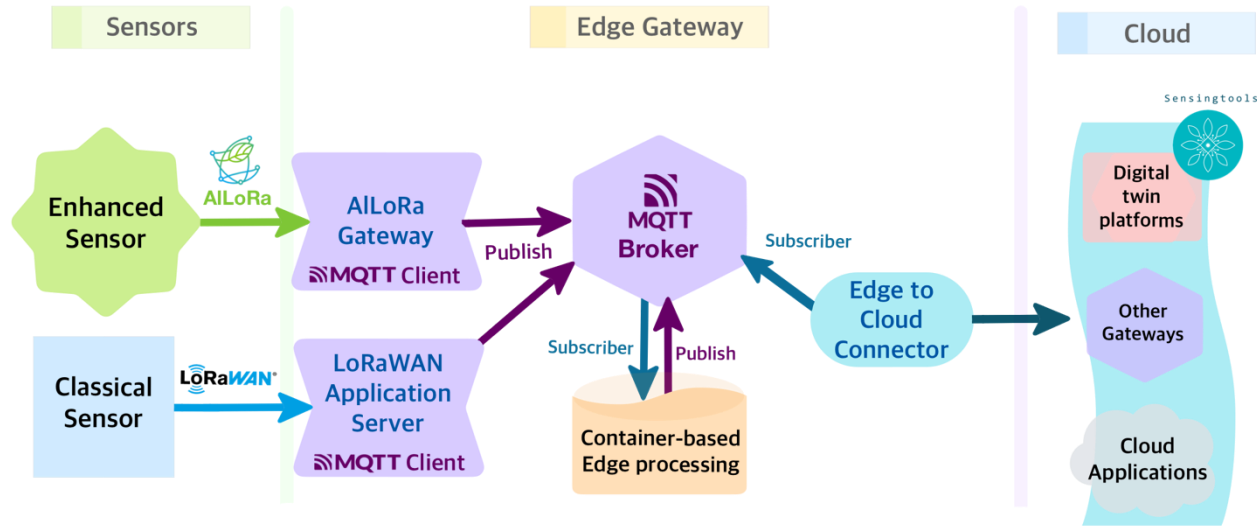
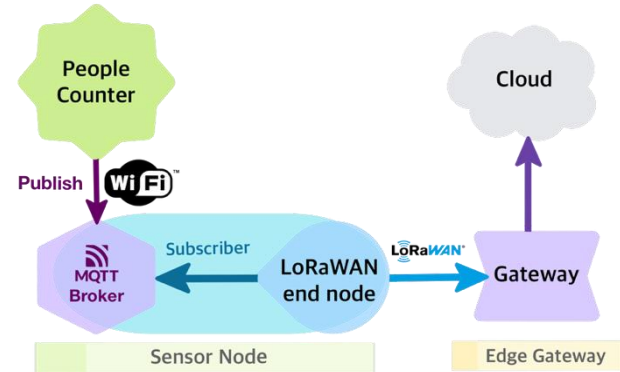
<https://github.com/SMARTLAGOON/AlLoRa>



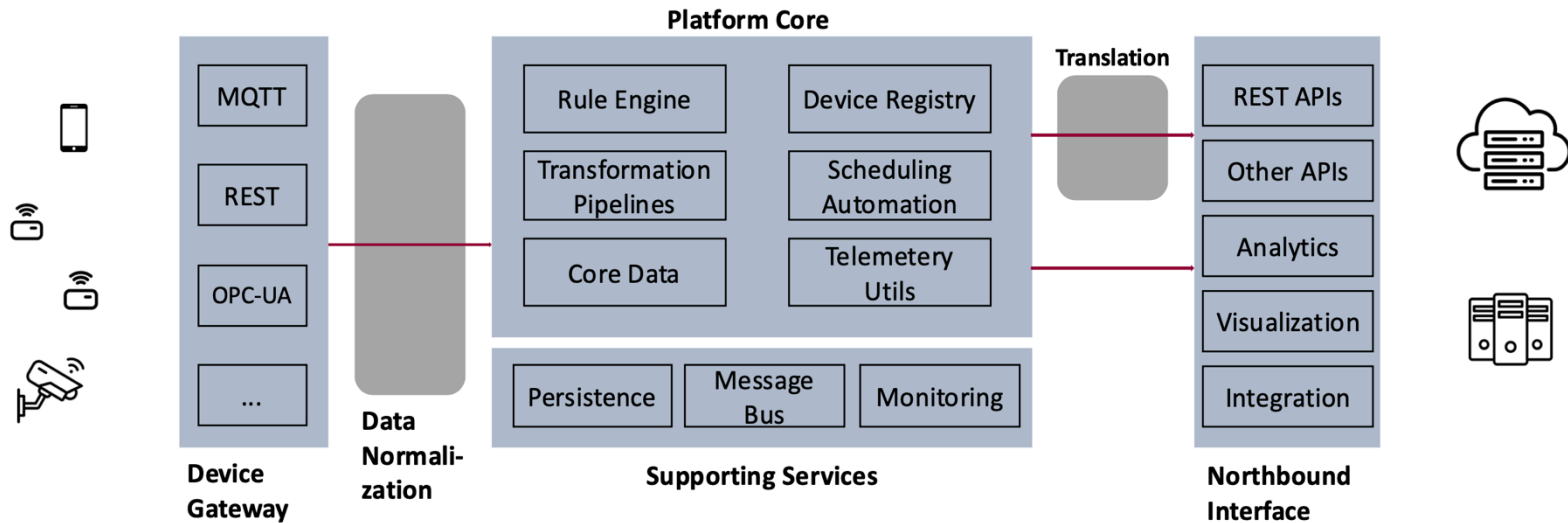
Multiple sources data collection



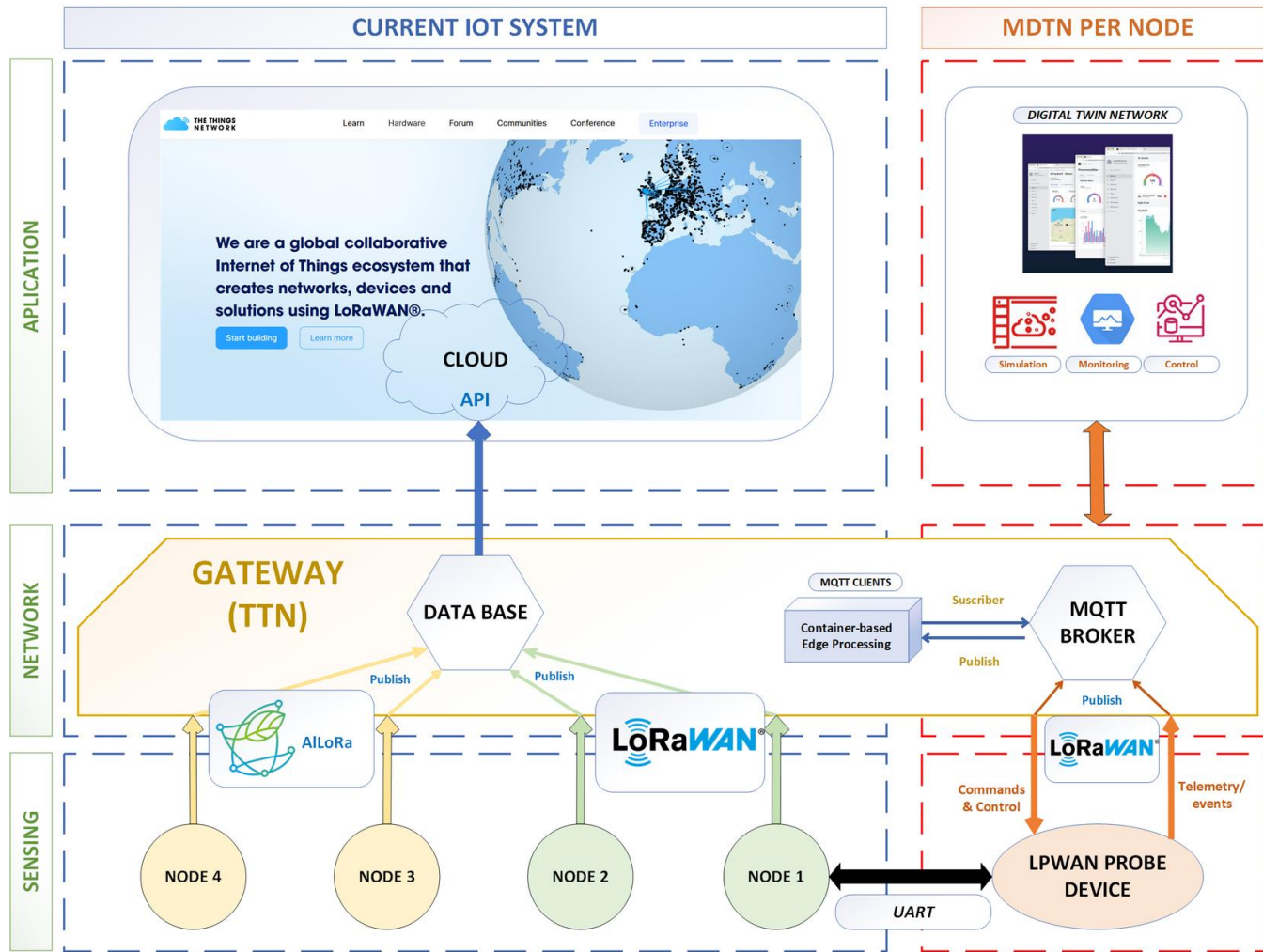
RAK7391 WisGate



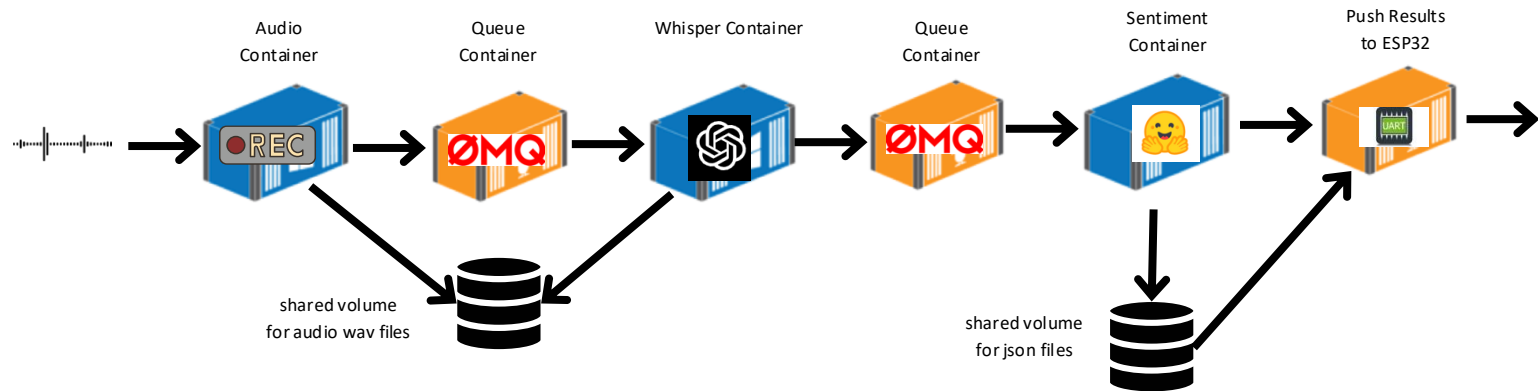
Multiple sources data collection



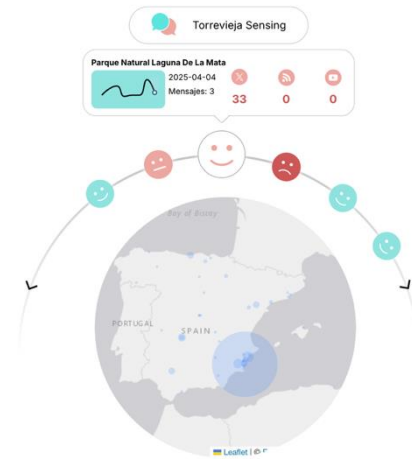
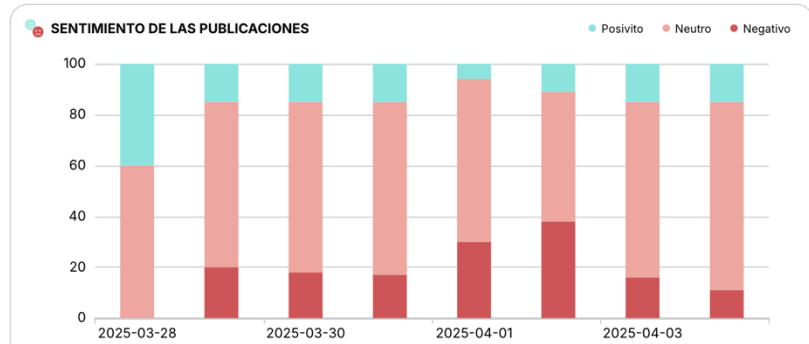
IoT deployments monitoring



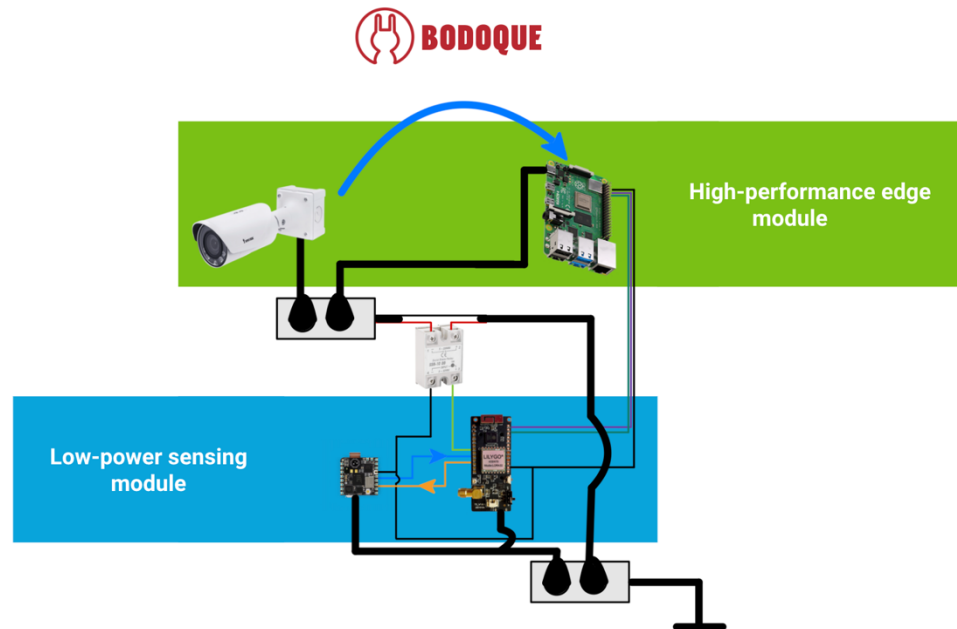
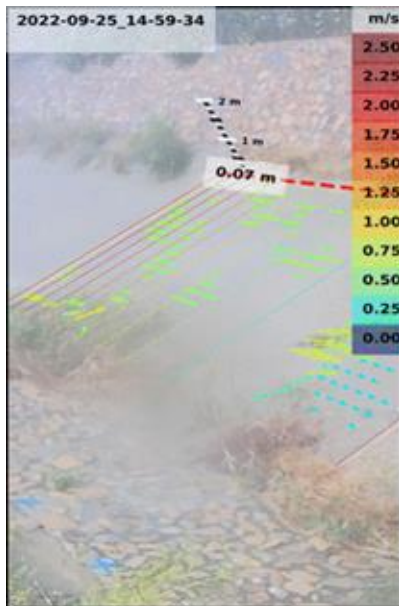
AIoT: Sentiment analysis



AIoT: Sentiment analysis



AIoT: Water Monitoring

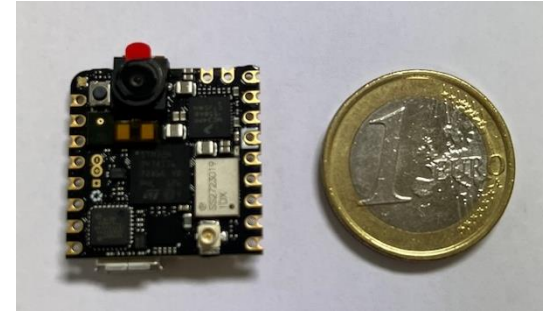


Benjamin Arratia, Javier Prades, Salvador Peña-Haro, José María Cecilia, and Pietro Manzoni. 2023. BODOQUE: An Energy-Efficient Flow Monitoring System for Ephemeral Streams. In Proceedings of ACM MobiHoc '23; 358-363.
<https://doi.org/10.1145/3565287.3616526>

AIoT: People counting



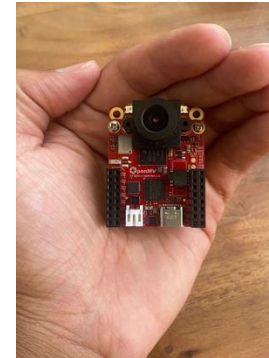
<https://store.arduino.cc/products/nicla-vision>



Microcontroller

STM32H747AI16 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?

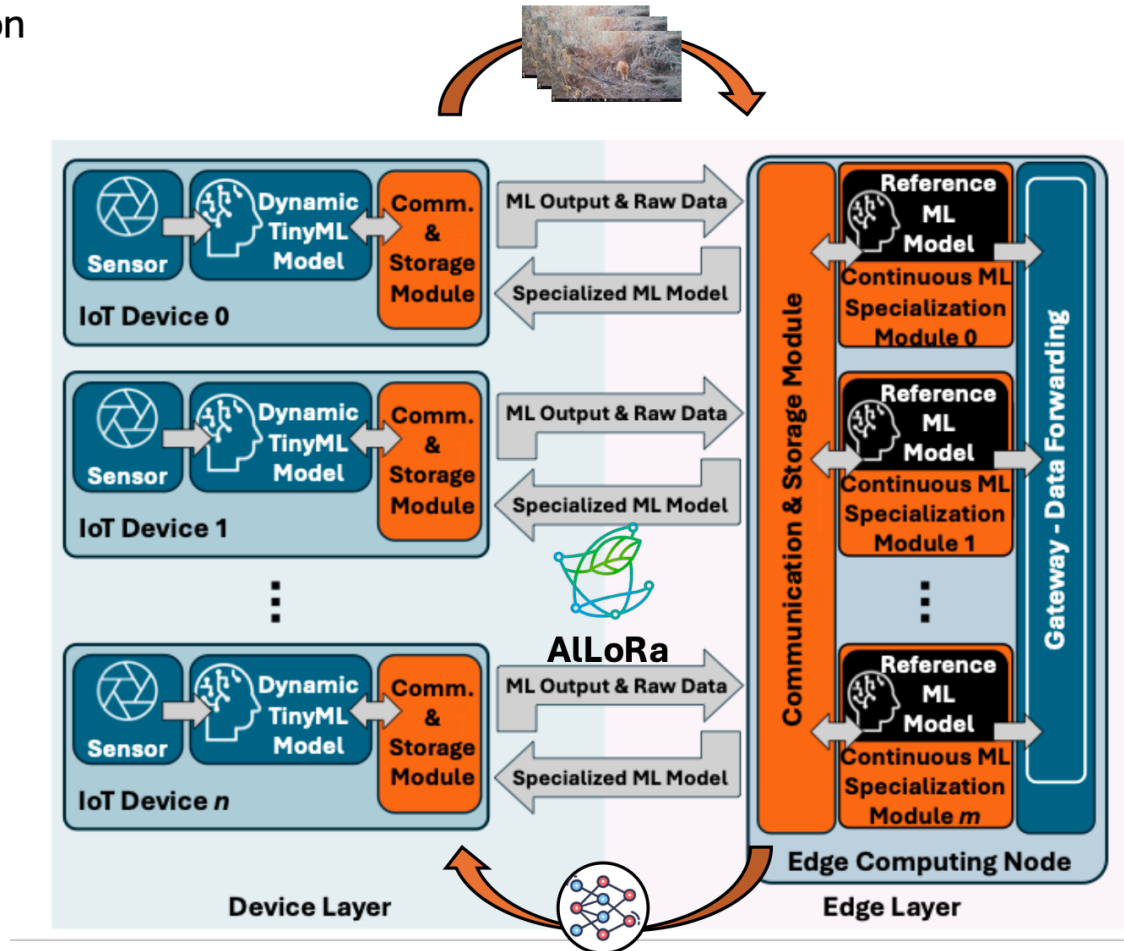


AIoT: Retraining models in the edge



ALoRa In TinyLoop Architecture

Motivation



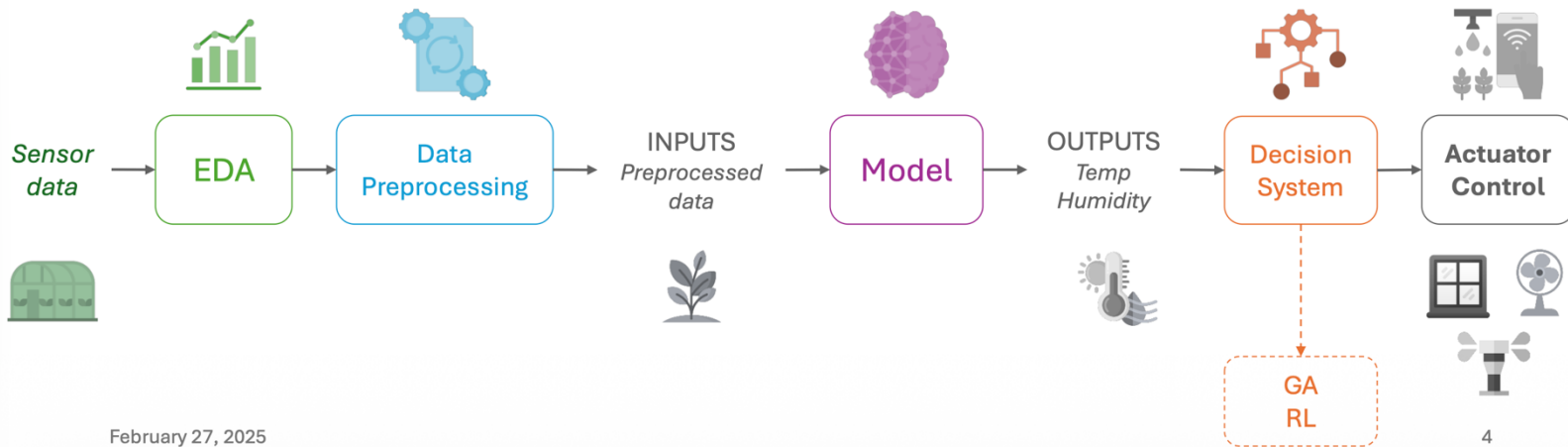
Social Sensing and Human-in-the-loop Systems



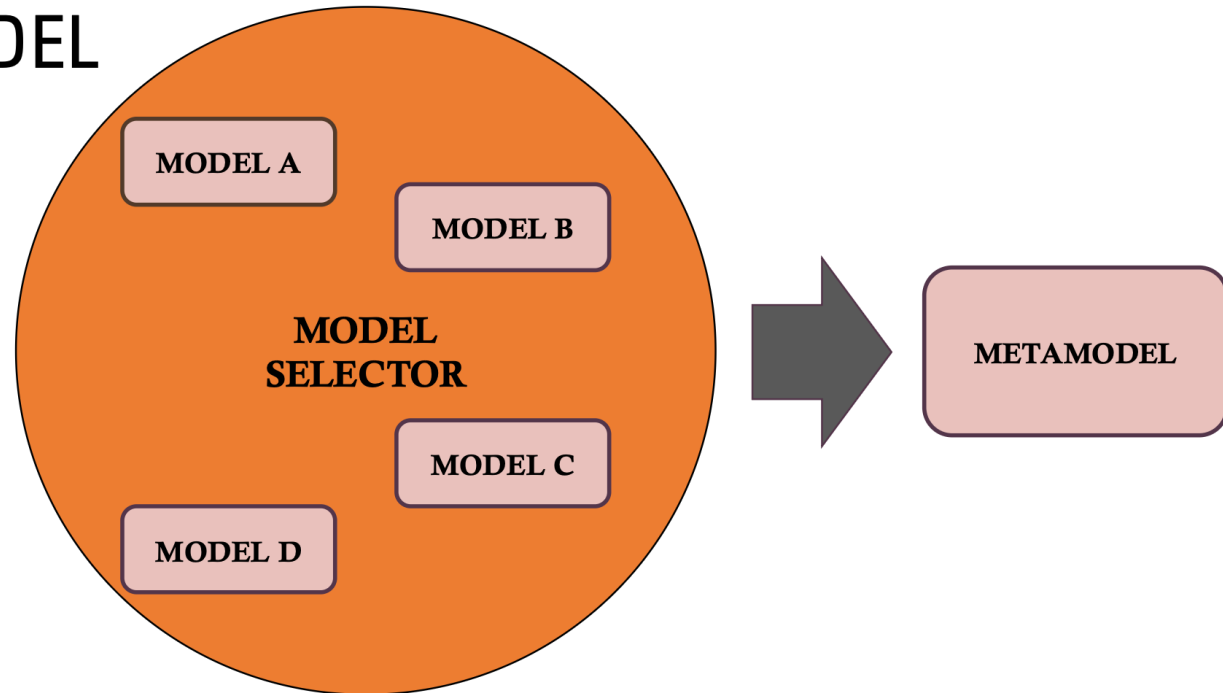
SERGIoT



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



METAMODEL



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