V Convención Científica Internacional UCLV 2025

DIGIWATER

Water Quality IoT Sensors

Towards an Open Source Platform for Research and Education

[Logo partner]

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23/10/2025

Cuba – Santa Clara

Goals

- The establishment of a water quality monitoring system in Brussels
- An innovative approach that makes the system more accessible and efficient, both economically, practically and pedagogically
- In order to think about solutions to sustainably improve the quality of Brussels aquatic ecosystems

The establishment of a
Global Open Source Water Quality Assessment system

IoT for Water Quality Monitoring
There is no such thing as a FIT for ALL

Infrastructure		Data-Density		TechnologicalSolutions
Power	Communication	Time	Space	
Available	Available	Low/Medium	Low/Medium	NB-IoT / LoraWan
Available	Available	High	High	4G/5G
Available	AdHoc	Low/Medium	Low/Medium	Private Lora, LoraWan
Available	AdHoc	High	High	Private WiFi Network Private Lora/ Zigbee/...

Sensors for Long term Static measurements

Several open source prototypes implemented as proof of concept

Supports:

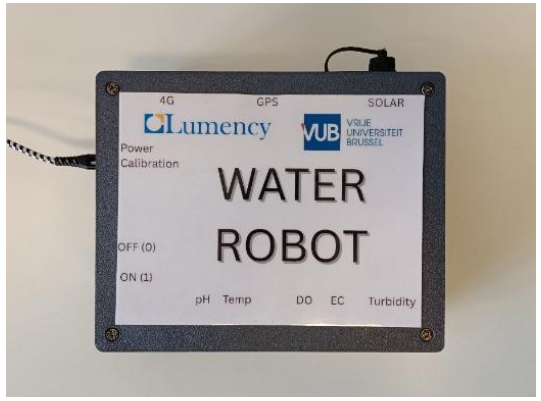
- **Conductivity**
- **pH**
- **Temperature**
- **Turbidity**
- **Dissolved Oxygen**
- **ORP**

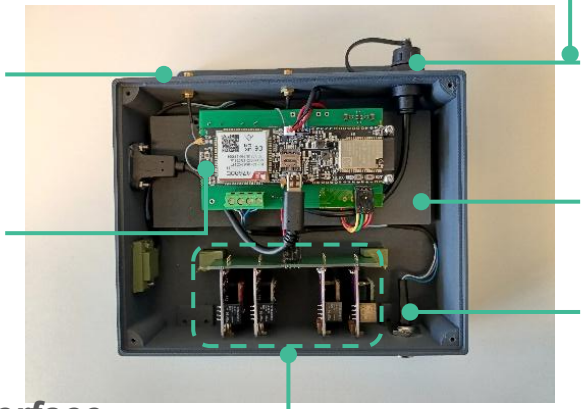
Version 1: Support for LoraWan

Version 2: Support for 4G

Components

Electronics and water quality probes





GSM Antenna port

Micro controller

Solar power port

Battery (encased in 3D printed contraption)

Turbidity sensor port

Sensor Interface Circuit boards with SMA connection

pH and Temperature

Dissolved oxygen

Electric conductivity

Turbidity

Processes:

- Probes measure every 5 mins
- The system formats the data
- The system sends the data to the server
- Users utilize the data

Download as CSV file

Analysis

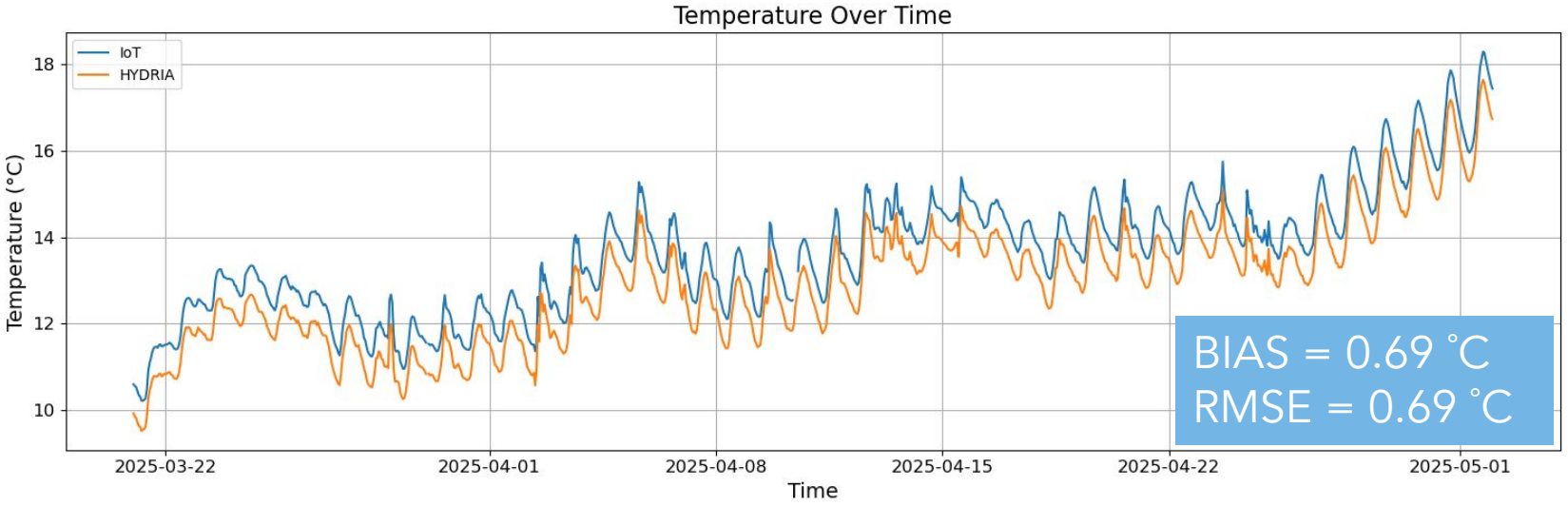
Policy

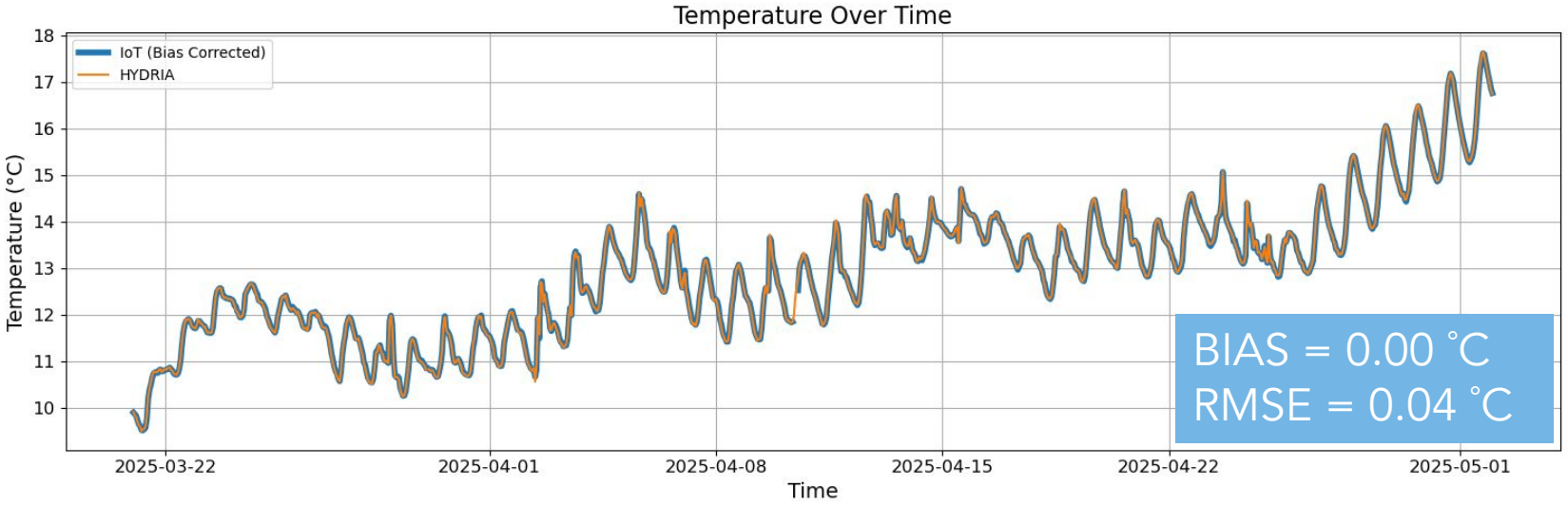
Action!

Testing in the Senne River

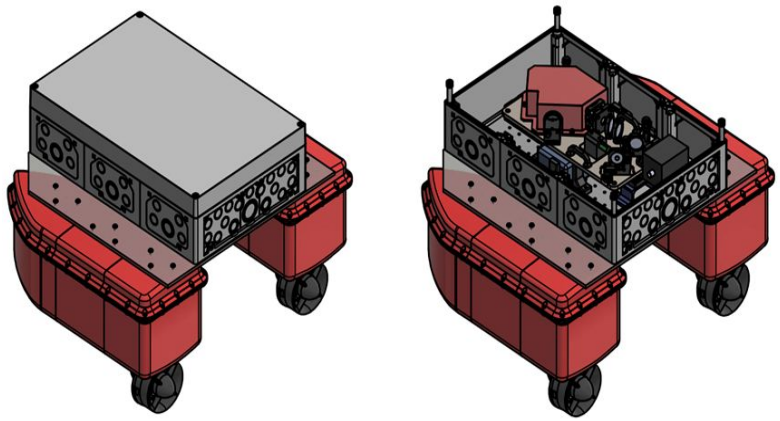
17 March

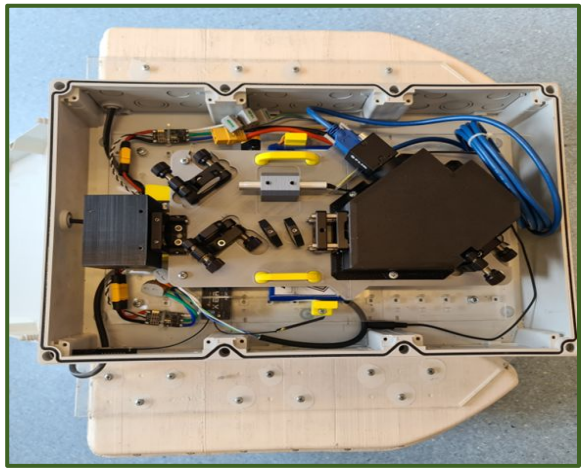
IoT WQ sensor vs commercial sensors

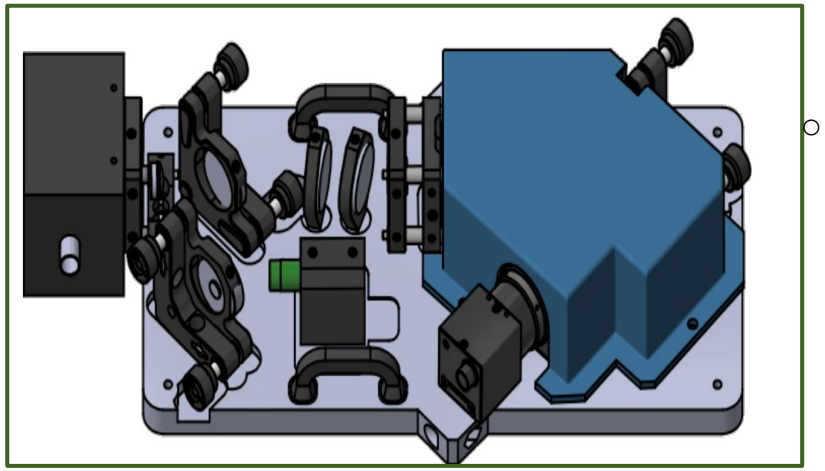




Sensors for mobile measurements







Version 1: Raman Spectroscopy

Potential Game changer

- Analysis of multiple pollutants
- Mobile
  - Can measure on different/difficult locations
  - Can Measure on different depths

Development of An Autonomous Surface Vehicle for Real-Time water Quality Surveillance: Master Thesis

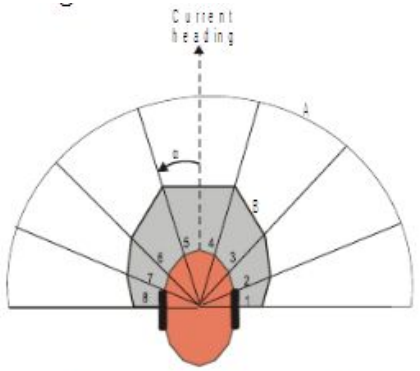


Fig. 6. Robot, ultrasonic sensors, and sensitivity

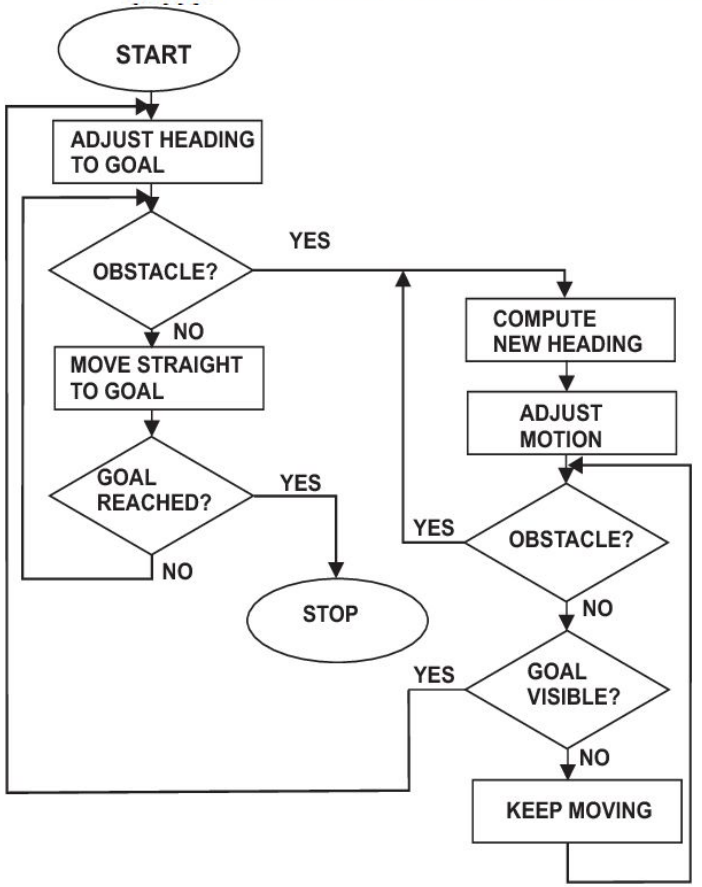
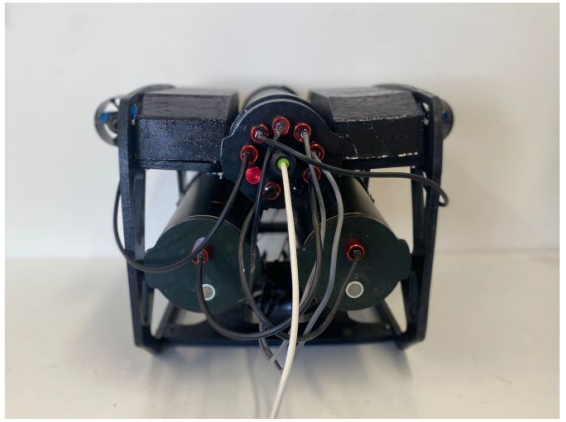


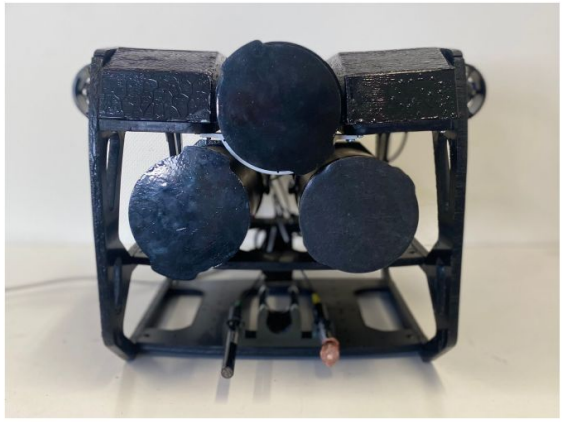
Fig. 8 Flowchart of the obstacle avoidance

Development of An Autonomous ROV for Real-Time water Quality Surveillance: Master Thesis

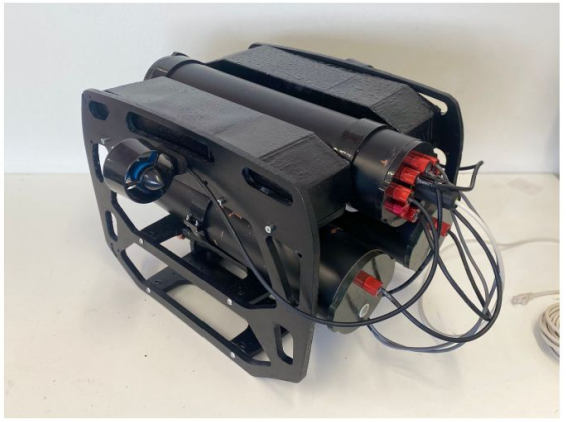


(a) Eerste versie ROV achteraanzicht.

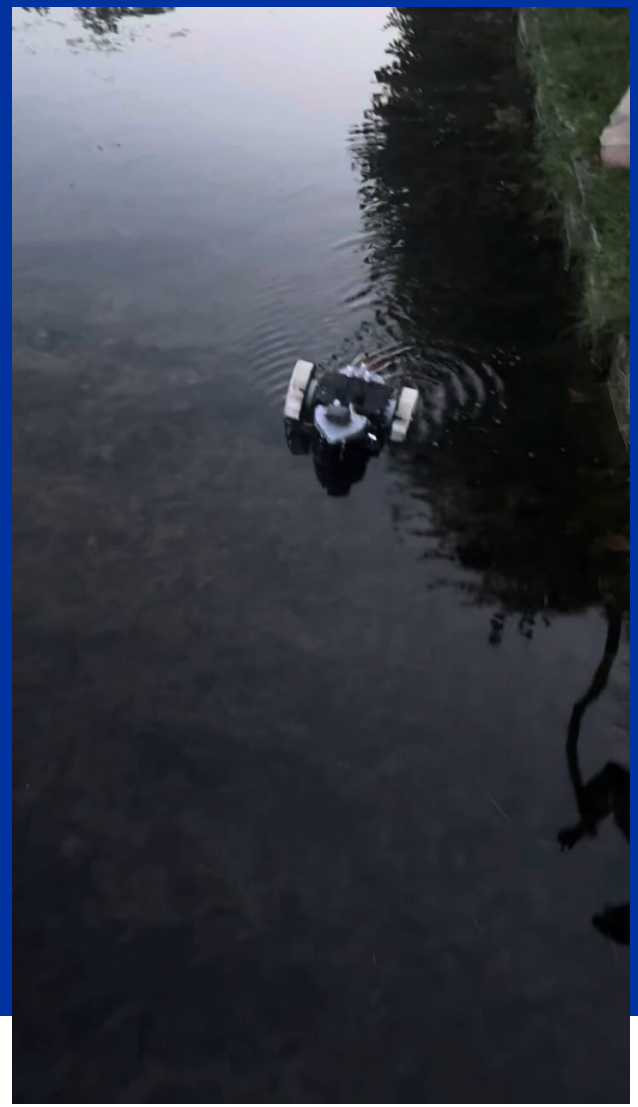
(b) Eerste versie ROV zij-aanzicht.



(c) Eerste versie ROV vooraanzicht.



(d) Eerste versie ROV schuinaanzicht.



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DEMO video’s
Happy to Answer Any Questions