Embedded Systems Competition 2024

Flood Monitoring and Prevention Float

Boia para Monitoramento e Prevenção de Inundações

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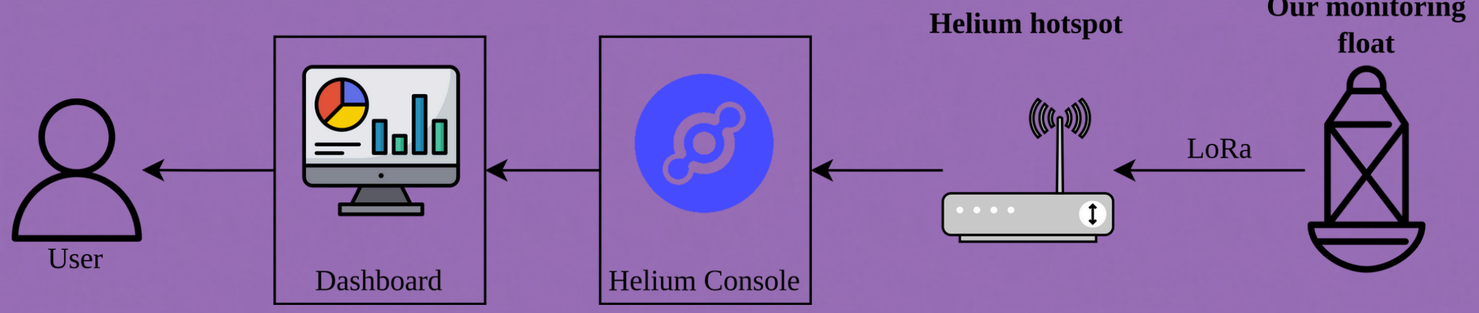
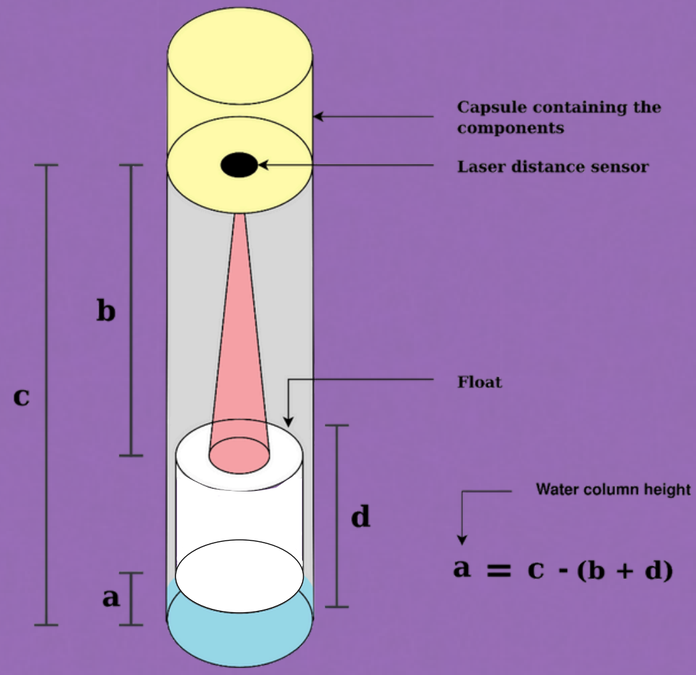
What is the project

- Floating device for real-time water level monitoring;
- Autonomous, solar-powered with battery backup;
- Uses LoRaMesh and Helium Network (when available) for data transmission.



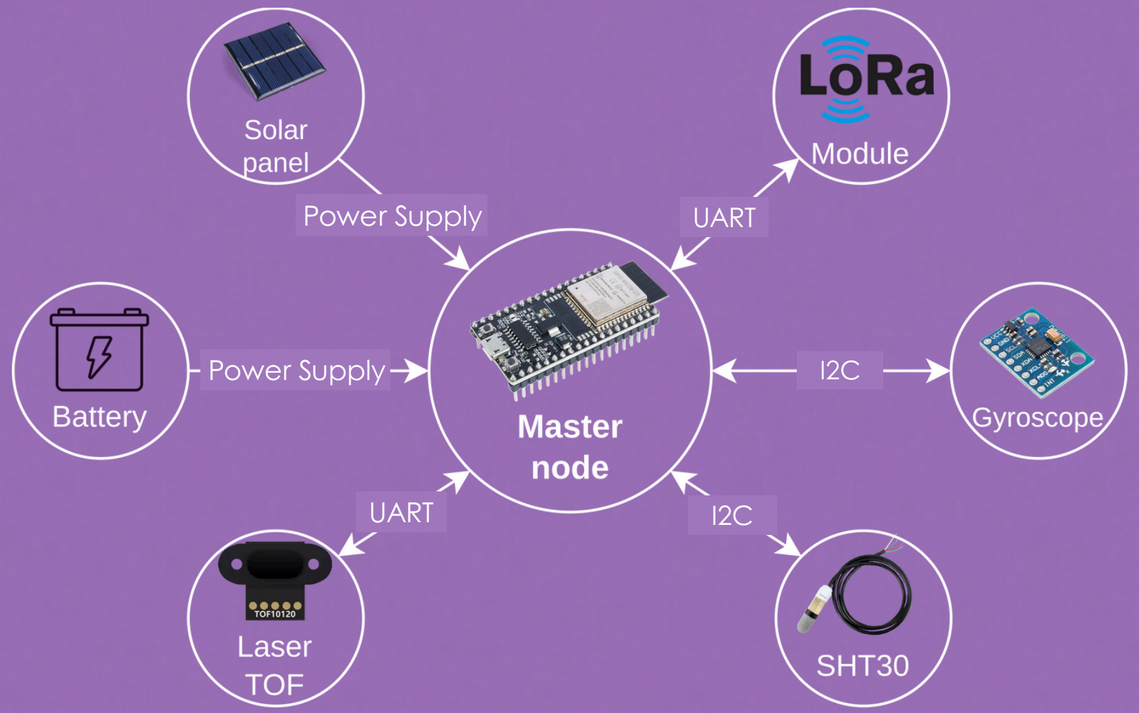


Motivation

- Rising frequency and intensity of extreme weather events;
- Impact of high rainfall in Brazil: floods, landslides and infrastructure damage;
- Lack of monitoring in many regions.

Project technologies

- Hardware

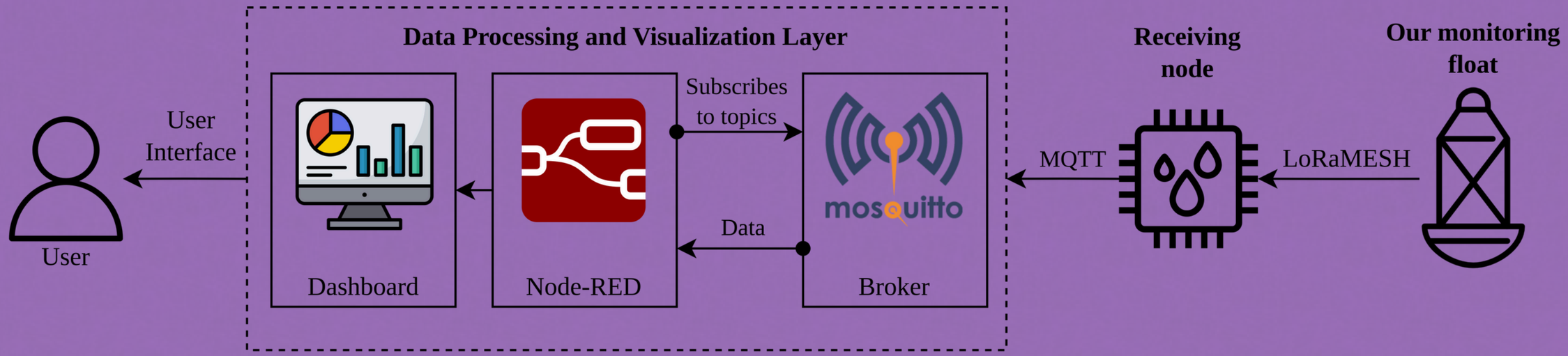


Biggest technical issue

- Helium network incompatibility;
- Low coverage in our area;
- High cost to acquire the hotspot.

Workaround

- MQTT and Node-RED;
- Node Bridge.



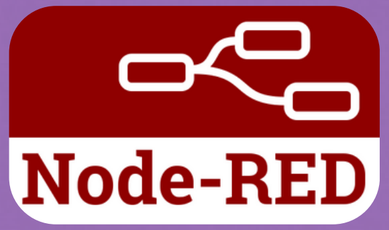
Project technologies

- Operating System

Task	Description	Core
vTaskAcclerometer	Gets angles, prepares LoRa packet, sends to queue	1
vTaskTemperature	Measures temperature and humidity, prepares LoRa packet, sends to queue	1
vTaskLaser	Gets distance, prepares packet, sends to queue	1
vTaskHeartbeat	Checks system, prepares packet, sends to queue	0
vTaskLora	Consumes queue packets, sends via LoRaMESH	0

Project technologies

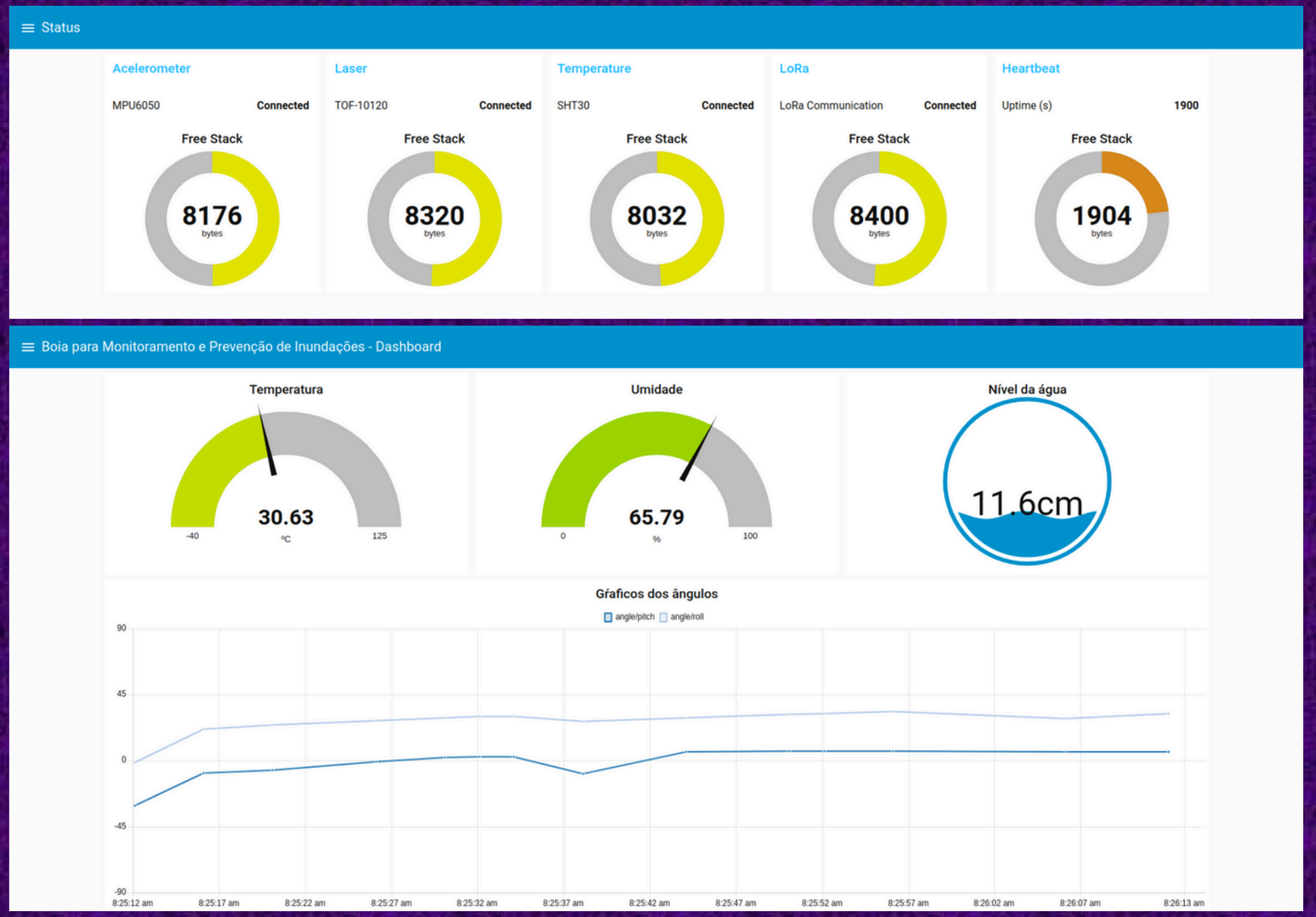
- Software

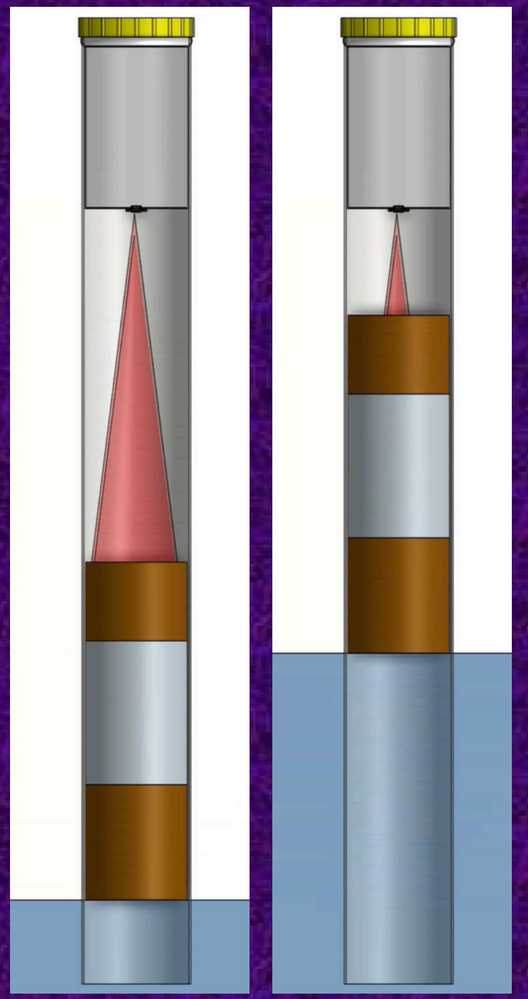


Why the project is innovative?

- Remote water level monitoring;
- Helium + LoRaWAN + HNT;
- 3D printing customization;
- Solar power eficiency;
- FreeRTOS real-time data;
- Open-source and open-hardware.

Results and demo





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Thank you for your attention!

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