



See how Zerynth developed an **IoT Marine Gateway** device for monitoring, in real-time, vessels performance

## The Challenges

Nowadays, billions of goods are transported from one part of the planet to the other, which makes **shipbuilding and ship maintenance** key components for this industry. The speeds, quality, and optimum plan movement on the water depend on how technically equipped the sea vessel is at the time, which directly affects the **safety of the crew members and the vessel**, as well as the **financial costs of transportation**. This is why the maritime sector has begun to take advantage of new technologies and digitization.

For optimization improvements of this sector, the **LINCOLN project** was developed, which is part of a cluster of European projects for innovation and digitization in the maritime sector. This includes the HOLISHIP (HOListic Optimization of SHIP design and operation for lifecycle) and SHIPLYS (Ship Lifecycle Software Solutions) projects, which are also funded under Horizon 2020.

The main goal of the LINCOLN project was **to improve the operation of marine vessels with IoT technologies**. Especially, in regard to their safety and effectiveness. But, the project participants had to understand the reasons why current IoT solutions are not flexible. There is the problem of high availability of onboard electronic and software equipment. This makes the vendor locked in and unable to create **flexible or adaptable solutions**. In addition, **connectivity is critical** and needs to be solved by providing different connectivity options and allowing direct transportation of data between the system and those being observed. Finally, the current IoT solutions are **difficult to configure and maintain** for operators with minimum technical knowledge.



### PROJECT NAME:

**Lincoln project** – Lean Innovative Connected Vessels

### PROJECT

#### DESCRIPTION:

LINCOLN is a 36 month research project funded by the European Union's Horizon 2020 program.

### RESULTS:

- **INTEGRATION:**  
Adaptable to different analog or digital on-board equipment.
- **CONNECTIVITY:**  
Multiple connectivity options available.
- **DATA SECURITY:**  
hardware cryptography.
- **EDGE COMPUTING:**  
local intelligence for data filtering and On-edge weather forecasting algorithm.

## The Solution

**The Marine Gateway** is a Zerynth powered electronic board designed to be installed on a commercial vessel to gather operational data during its lifecycle and enable communication with the Cloud Platform for remote diagnostics. The Marine Gateway is based on a **32bit microcontroller** and embedded sensors that are able to acquire navigation data (position, acceleration, velocity, etc.) and elaborate operational information for boat manufacturers and end-users.

It is equipped with a series of interfaces to connect a boat engine and other main appliances via NMEA 2000 standard protocols. Also an onboard accelerometer and inclinometers, a battery and an incorporated local memory and GPS storage are included. The Marine Gateway has **plug-and-play interfaces** for temperature and humidity, sensors, microphone, vibration and other external sensors to create a digital data parameters collection which allows for predictive algorithms to determine weather conditions and forecasting.



### MAIN FEATURES

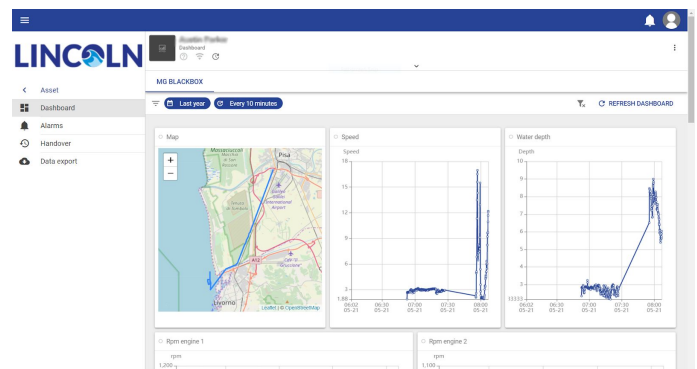
- Prototype developed on existing reference design (4ZeroBox)
- Highly configurable and customizable at hardware and firmware levels
- On-edge weather forecasting algorithm developed in Python via the Zerynth embedded development environment
- Ready for over-the-air (remote) firmware updates via GSM connection

### PRODUCTS USED:

**4ZeroBox**

## Custom Dashboards

Wi-Fi and GSM connectivity allows for easy and secure integration with the Lincoln IoT Platform. The system is secure and reliable thanks to an **industrial 32bit microcontroller crypto element**. It can be easily configured in the programming language Python through the user-friendly dedicated development environment of the external Cloud platform. Moreover, Zerynth technology enables the **custom dashboards** to present the most important parameters of the vessel (speed, oil transmission, battery status, etc.) and external weather criteria in **real-time** with easy-to-understand tables and graphs.



## The Results

Thanks to Zerynth's technology, a complete **IoT Marine Gateway** device that improves vessel operations significantly for technological and security reasons, was created. In just a few months the Zerynth team enabled a more efficient knowledge-based (i.e. intelligent) **after-sales service** for the maritime industry.

Furthermore, the IoT Marine Gateway device actualizes a **digital vessel infrastructure** which fosters the **new Blue Economy business model**. In the Lincoln Project, Zerynth successfully did its part by providing the monitoring, management, and optimization for operational processes of vessels and boats, as well as, **real-time analytics** for „intelligent“ sailing.



## IoT system for monitoring the performances of boats



For practical purposes of the project, the IoT Marine Gateway was installed on different types of commercial vessels with different performance parameters:

- Aquaculture Catamaran;
- High Speed Patrol Vessel;
- Emergency Response and Recovery Vessel.

This was done to demonstrate the **feasibility of monitoring the 3 vessels**. To prove this concept, a fluid dynamics and structural simulation test that uses high performance computing, was performed on each of them. After testing, all vessels presented great results and proved the **IoT device's functionality**.

Moreover, the Marine Gateway has been also used as a data acquisition unit for sail boats that participated at the Italian **Platu25 Championship** in Livorno.



## About Zerynth

Zerynth helps companies easily get their industrial processes digitized and bring innovative connected products to the world. The Zerynth IoT Platform is a full set of hardware–software tools designed by IoT experts to enable digital transformation in a fast, flexible and secure way.

Founded in 2015, Zerynth has grown steadily. Today Zerynth has 30+ team members with deep IoT expertise and industry knowledge with over 3000 successful IoT implementations in companies across many industries. Headquartered in Italy, Zerynth provides support globally thanks to an extensive network of partners in Europe and pan-global locations.

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### GET STARTED WITH ZERYNTH

Ready to see what Zerynth can do for your business?

**LET'S TALK!**