

Problem Statement

Maritime is a main transportation for international trade.

80%
by volume

of global shipping done through sea.

Source: United Nations (Review of Maritime Transport 2022)

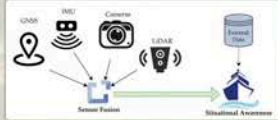
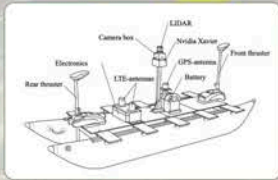
3,000
incidents in 2021

54 ship losses
75% caused by human error

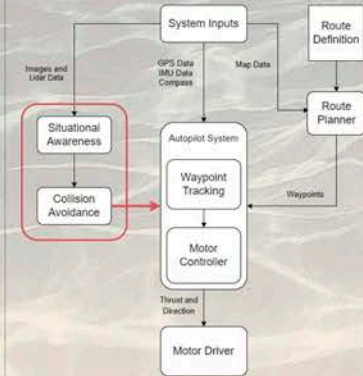
Our goal is to mitigate maritime related casualties by implementing collision avoidance through Åboat.

Åboat

maritime autonomous vehicles (MAV)



Clockwise from top-left: 1. Åboat model structure; 2. System architecture of the automation system; 3. Various sensors as system input.

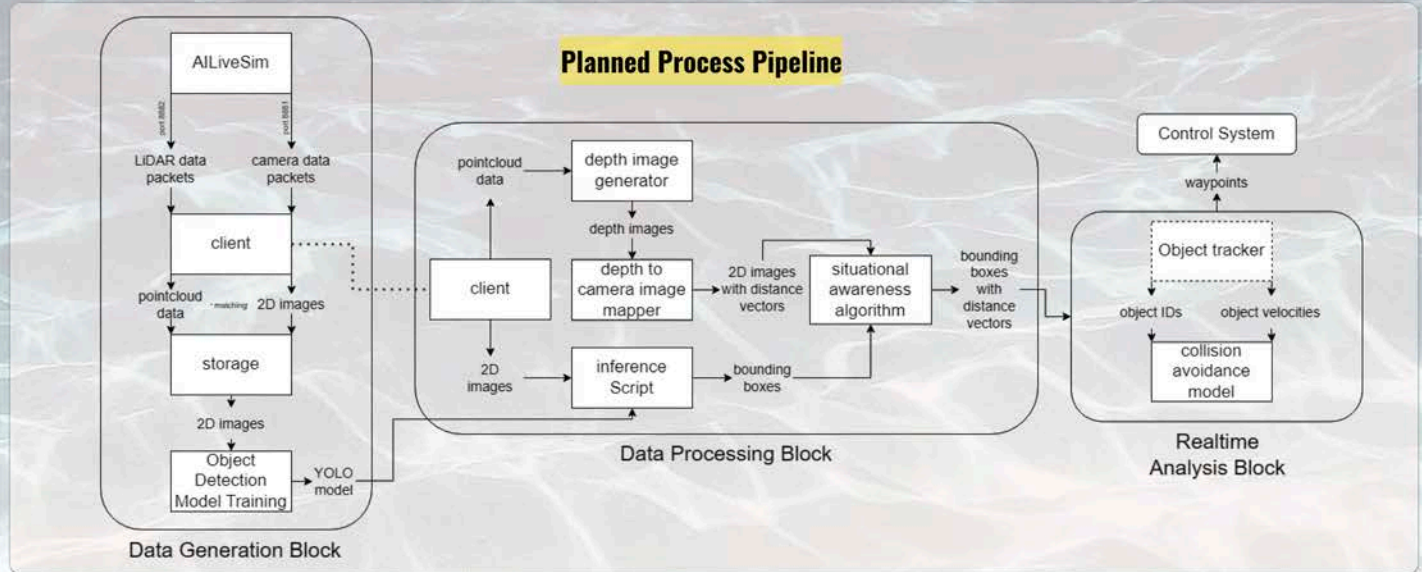


SMART SAILOR



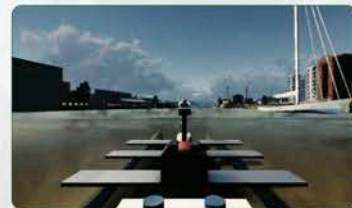
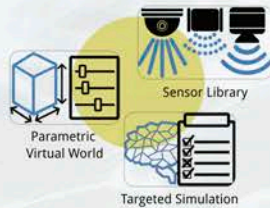
Data Intensive Engineering Project Report
Winter School (February 2023)

Digital Twin Utilisation for Situational Awareness in Maritime Autonomous Vehicles



Digital Twin of Åboat

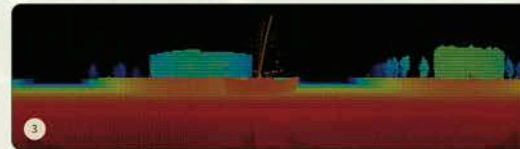
AI LiveSim



AI LiveSim is a simulator software:

- Allows projection of the real boat into a digital twin version.
- Adjust sensors according to utilisation requirements.
- Adaptable in different weather/conditions for testing.

Data Analysis



$$\theta = \text{atan2}(y, x)$$

$$\varphi = \arcsin\left\{z / \sqrt{(x^2 + y^2 + z^2)}\right\}$$

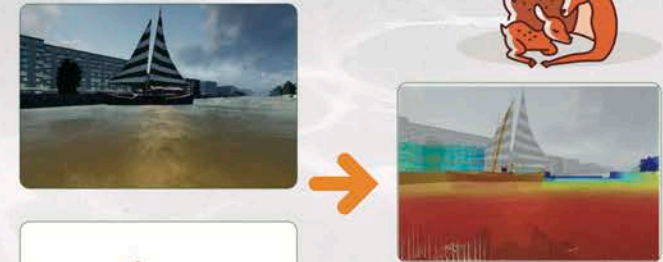
$$r = \theta / \Delta\theta$$

$$c = \varphi / \Delta\varphi$$

Dataset processing:

1. Image data generated from camera.
2. Point cloud data generated from Lidar.
3. Transformed point cloud data into 2D image.
4. Equation to transform Lidar data.

Situational Awareness



Future plan:

1. Training for object detection with generated dataset.
2. Merge to collision avoidance.
3. Possibility to deploy the model into the physical Åboat.

TEAM 5:
amelia.yolanda@abo.fi
husnul.abid@abo.fi
june.manuzon@abo.fi

