SafeSea project

Turku University of Applied Sciences, Business Turku, Novia University of Applied Sciences

TURKU AMK

BUSINESS TURKU

NOVIA UNIVERSITY OF APPLIED SCIENCES

1.3.2023 - 28.2.2025, ERDF budget 475 000€

Intelligent maritime security solutions, digital test platform and service pilots together with companies

Euroopan unionin osarahoittama

Varsinais-Suomen liitto

SafeSea test platform

- Consists of versatile company ecosystem, digital solutions and piloting concepts together, aiming to support local RDI activities

- We started first building the ecosystem to get actors participating and discussing various themes

- Next we thought data is important and started collecting sensor data and developed digital data platform

- We found in various discussions that specific closed testing area is not needed, since the need is related to development maturity level. Fixed testing route is good in the beginning. Later on versatile data is needed and fairways are more suitable collecting data during normal operation. However fixed route is good for such as TUAS boat for developing and testing towards autonomy.

Ecosystem

- We have arranged six workshops on various maritime safety and security related themes for companies and organisations operating within maritime business. These participating companies and organisations are the basis for the ecosystem created in the project

- We organized a Hackathon event for specific autonomy topics

- Internationalization workshop will be arranged in near future

Digital solutions

- Digital data platform collects, stores and shares data that is sent by TUAS boat, Novia simulator or other sources

- We have created datasets for machine learning purposes

- Co-operation testing has been done with specific companies

- Local universities lab infrastructure clarification is ongoing


Euroopan unionin osarahoittama **Varsinais-Suomen liitto**

Business Turku LinkedIn

Data Spaces

- Importance of data for autonomous system development

- Cost of collecting data

- Data spaces provide the ability to share the results

- ...while keeping the data sovereignty secure

- End goal is to enable interoperability between organizations

- We implemented and tested the data space connector

- Integrated the connector to existing data platform

- Defined metadata for data assets

- https://github.com/TurkuAISLAB/dataspace-connector

- Demo of the connector integration is available here today
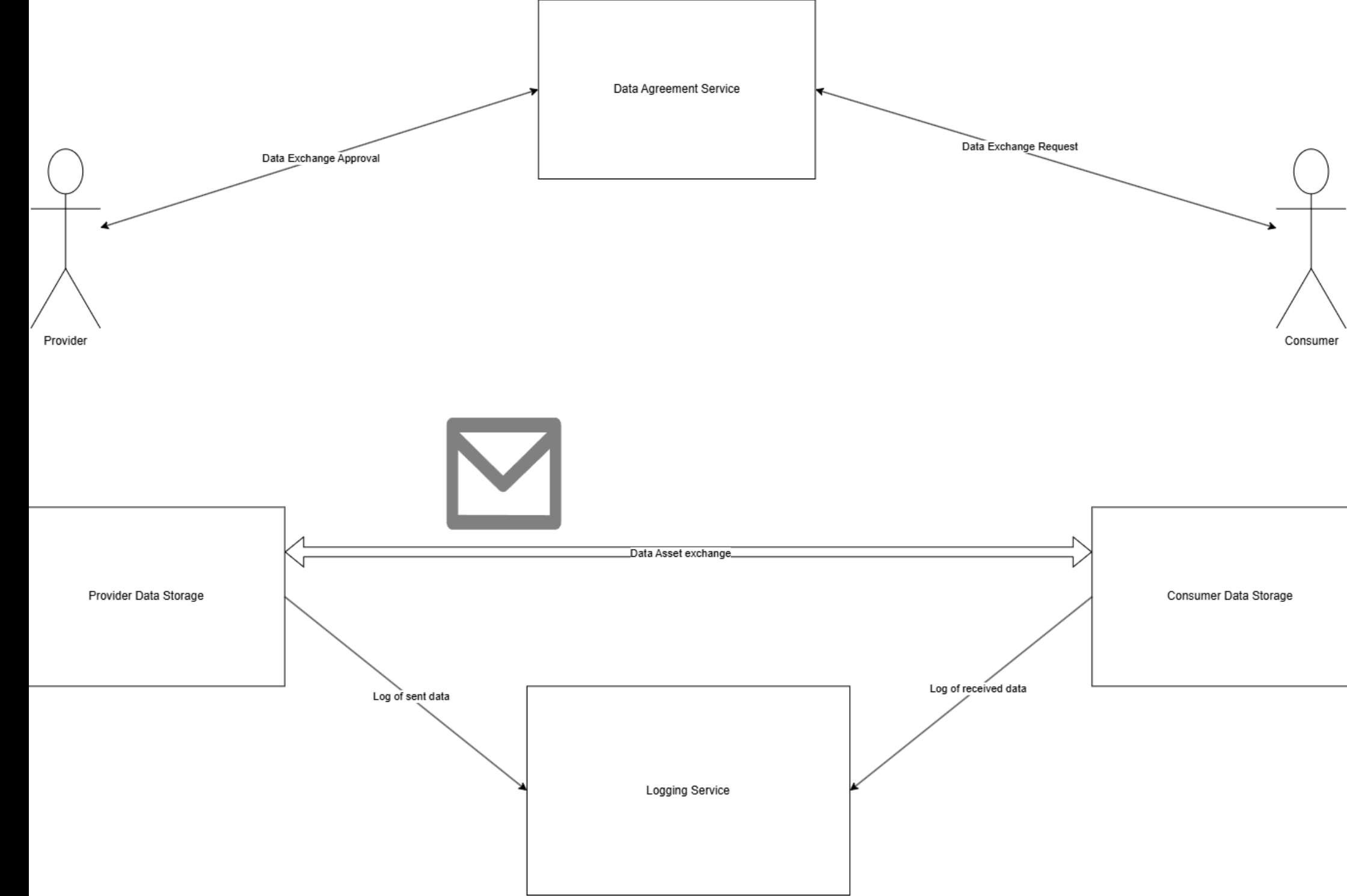
Data Collection Setup & Process

To achieve autonomy in the maritime environment:

- There is a lack of sufficient and high-quality open datasets specific to maritime environments.

- The absence of multi-sensor data hinders the ability to enhance safety under varying weather conditions.

- Calibrating and synchronizing sensor data remains a challenging and complex task.

To advance autonomy in maritime environments:

- We have developed a system utilizing multi-view and multi-modal sensors to enhance data collection and situational awareness.

- We created intelligent auto-annotation methods to accelerate the publication of high-quality datasets.

- We successfully collected over 31 hours of data to support research and development efforts.
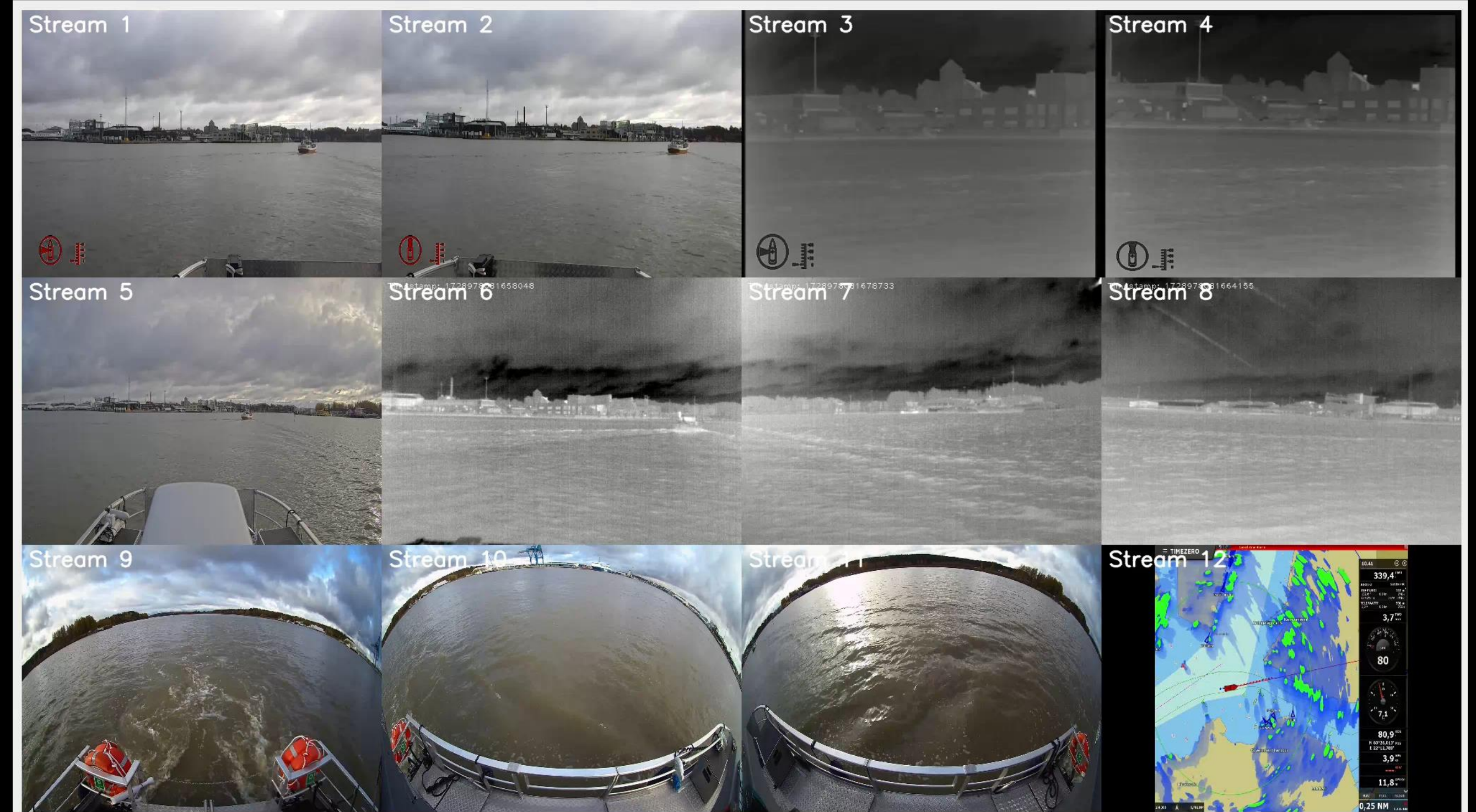
2022
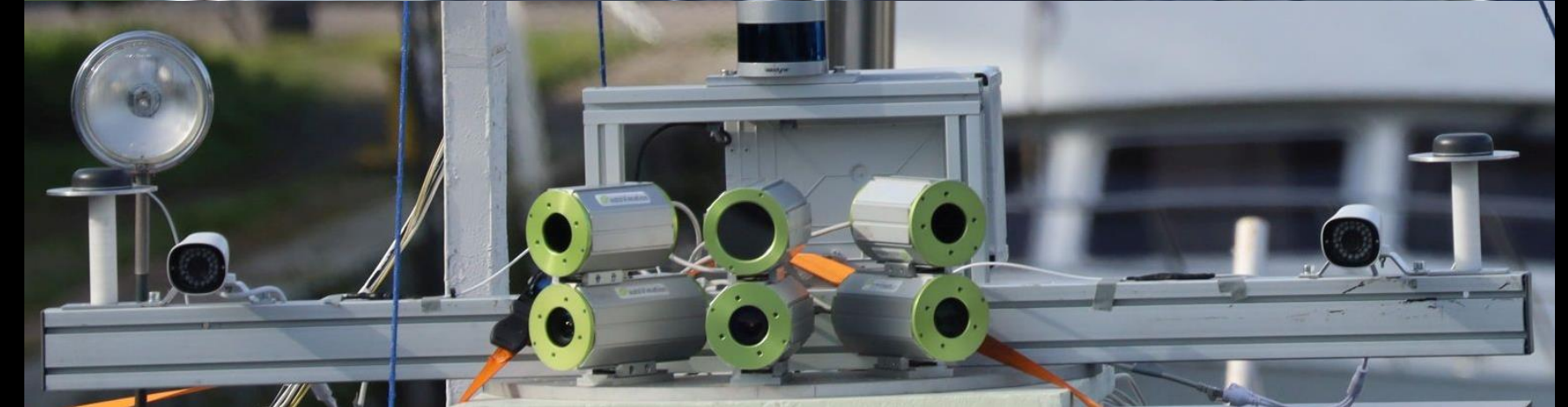
2023

2024

Data Collection Setup & Process

- 6 RGB Cameras
- 5 Thermal Cameras
- RGB Stereo Vision Camera
- Thermal RGB Cameras
- LIDAR
- RADAR
- IMU

- More than 2 million RGB and Thermal annotated frames
- More than 800K stereo vision cameras annotated frames
- Data set includes synchronized LIDAR, IMU and RADAR data

Synthetic Data

- Recognizing that data collection in different weather conditions is highly challenging and costly.

- We utilized GAN networks to simulate 18 distinct weather scenarios, significantly enriching our dataset.

Demo sessions today

During lunch break at 11-12 and after seminar presentations at 14 – 15

- CSG: Cyber digital twin

- SafeSea: Gaia-X Data Space Connector

- SafeSea: Multiview and multimodal maritime dataset

- ADMO: Lifejacket detection using computer vision

- Remote controller demo

- ÅA, "Impact of Electrical Device Disturbances on Signal Transmission Observed Through RFEye Spectrum Analysis"

- Remote controlling robot with VR & Nokia RXRM