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Coastal Monitoring

2025 & 2026

Who am I?

Sigurd Nordbye

- University of Oslo
  - Program: Informatics: Programming
- Kongsberg Discovery Intern

The team

20 students across 5 universities

The Coastal Monitoring Project

- RAN, an autonomous surveying vessel made by students.

- Built on the moos-ivp platform and Kongsberg technologies.

- Protecting the health of our ocean.

The beginning




The usv today

Location: Horten, Norway

MOOS Integration

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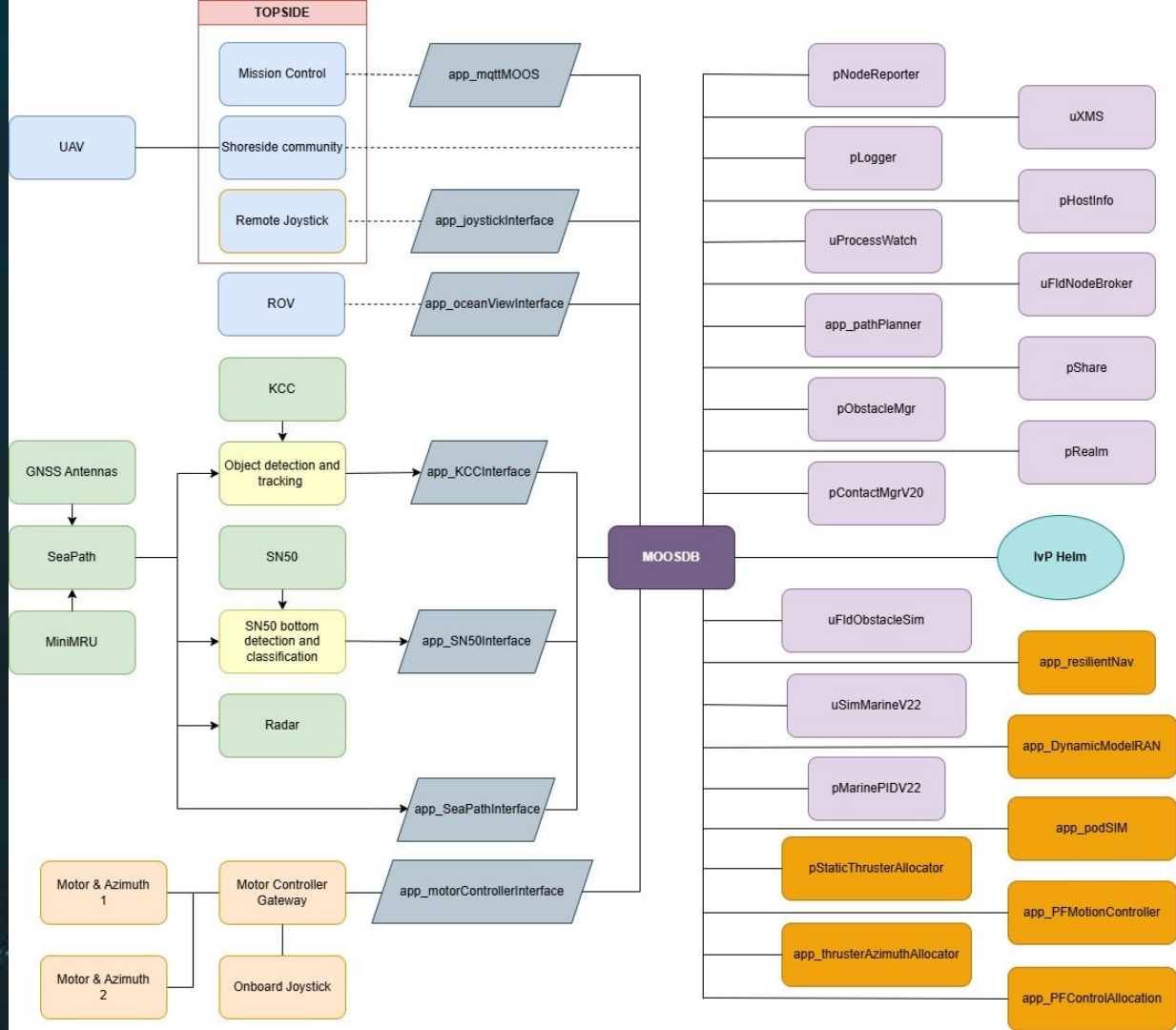
Overview of systems on the vessel



Shared MOOS programs we use

Core / infrastructure	Autonomy	Fleet / shoreside	Simulation	Monitoring & tooling
• MOOSDB	• pHelmIvP	• uFldNodeBroker	• uSimMarineV22	• uProcessWatch
• pShare	• pContactMgrV20	• uFldShoreBroker	• uFldObstacleSim	• uLoadWatch (new)
• pHostinfo	• pObstacleMgr	• uFldNodeComms (new)		• uMemWatch (new)
• pLogger	• pMarinePIDV22	• pMarineViewer		• uXMS
• pRealm				

Our moos applications

Mission & autonomy

- app_pathPlanner (incl. TrafficAvoider)
- app_docking
- pBoatTracker
- pTrailAngle

Control & allocation

- app_PFMotionControl
- app_PFControlAllocation
- app_thrustAzimuthAllocator
- pStaticThrusterAllocator

Sensors & perception

- pRadarBridge (22 missions — biggest omission)
- app_SeaPathInterface
- app_oceanViewInterface
- app_KCCInterface
- app_resilientNav / app_adcpInterface (branch)

Actuation & HMI

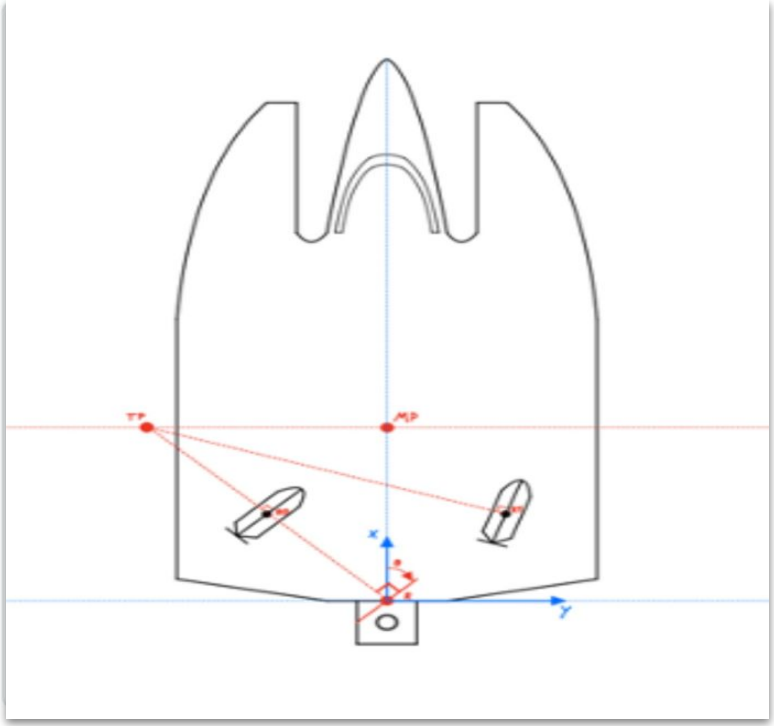
- app_motorControlInterface
- app_joystickInterface

Simulation & test

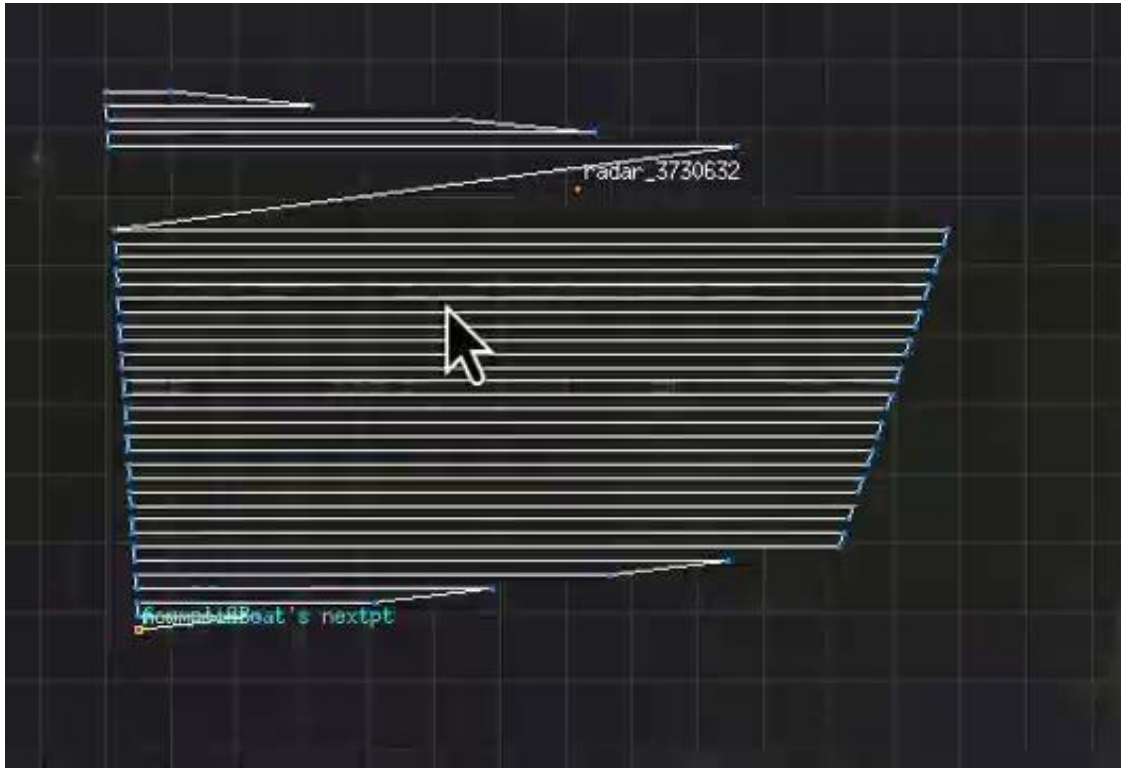
- app_podSIM
- app_DynamicModelRAN
- app_bollardPull
- app_moosMqtt
- app_otterMOOSIVPInterface / app_otterOnlyReceive

app_PFControlAllocation

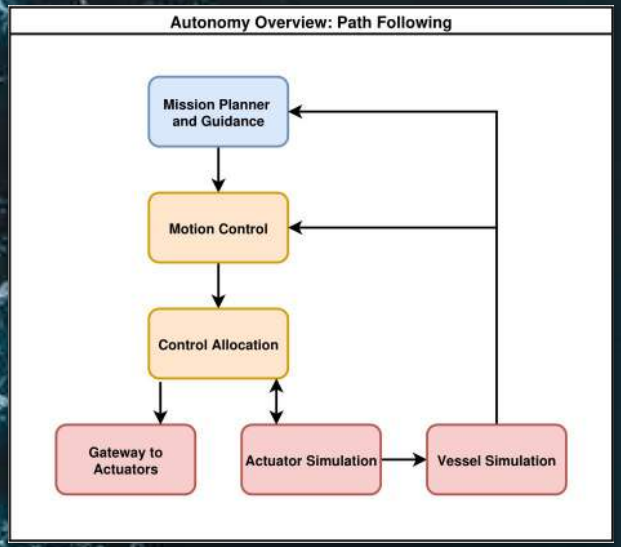
- 3 desired forces → 4 actuator commands
- Controller asks for $\tau = (X, Y, N)$; pods take $n_1, \alpha_1, n_2, \alpha_2$
- Nonlinear program, CasADi + IPOPT, 10 Hz
- ±180° pods → every force has two solutions



app_pathPlanner + TrafficAvoider + BHV_AvdColregsV22



Autonomy: Path Following



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Mission Planning

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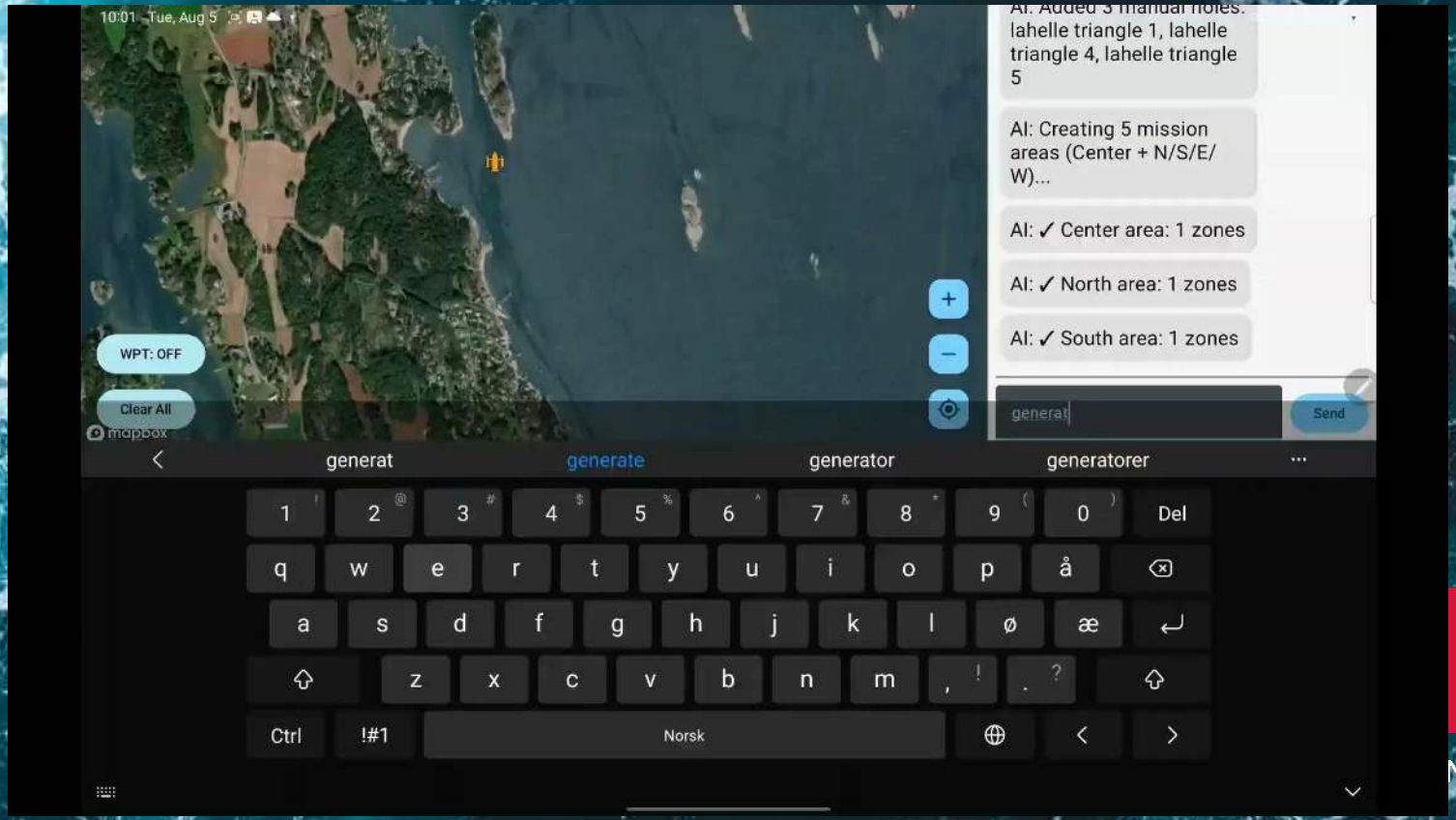
Mission Planning



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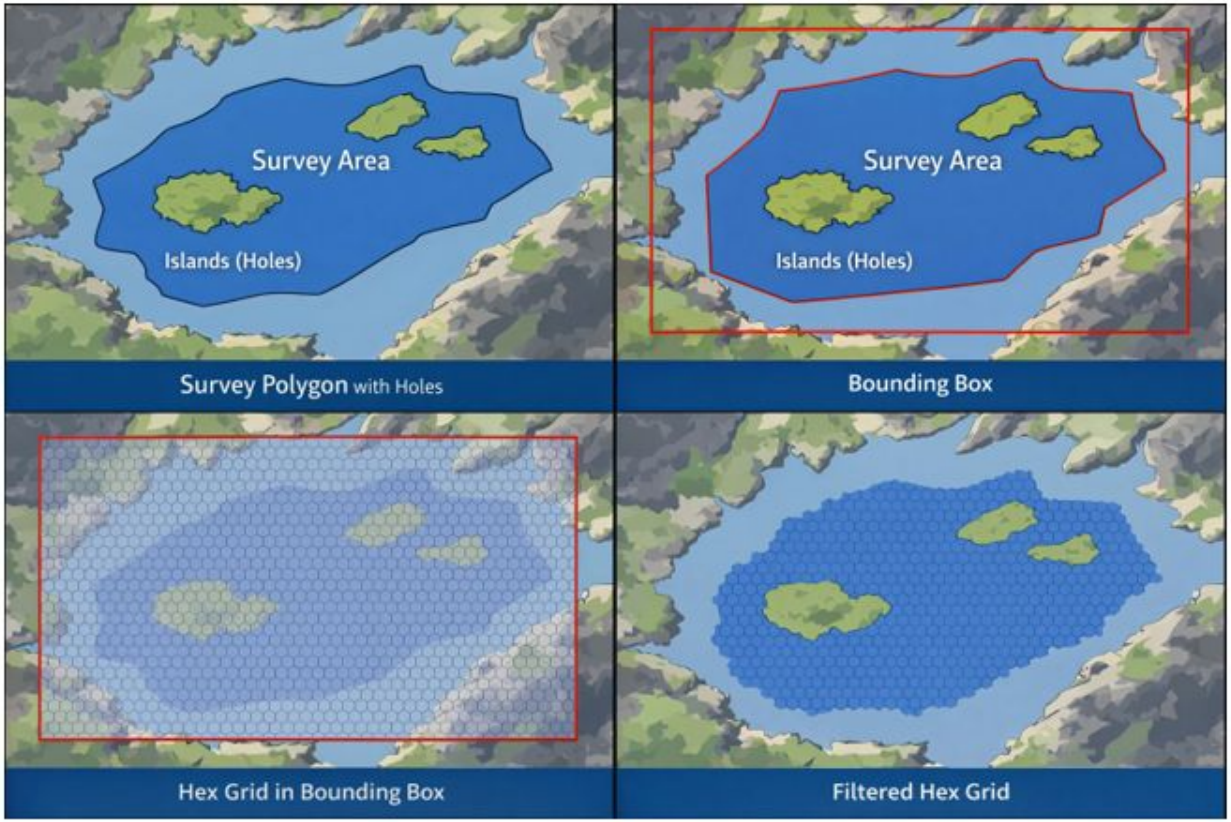
Path Planning

4 month research project
Goal: create a path planning algorithm that can traverse complex polygons optimally.

Daren LER

Senior Lecturer (Educator Track)
Deputy Director, Centre for Nurturing Computing Excellence (CeNCE)

Path planning tessellation



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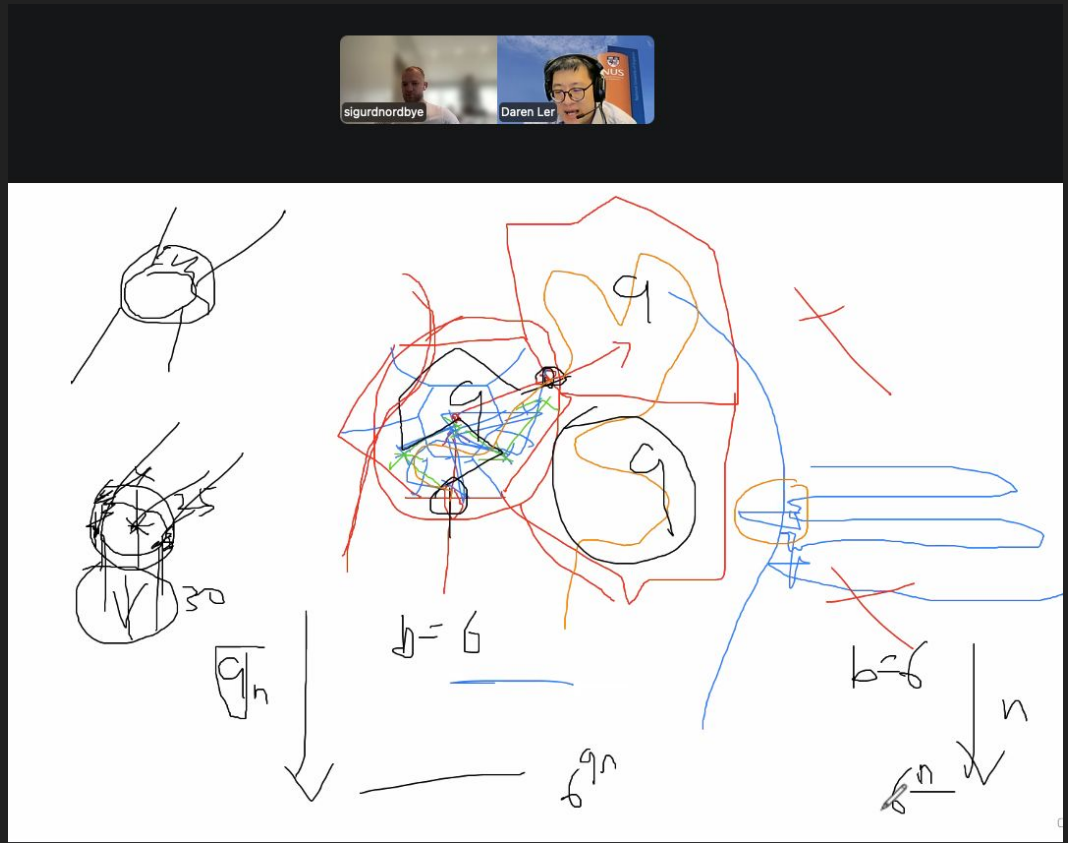
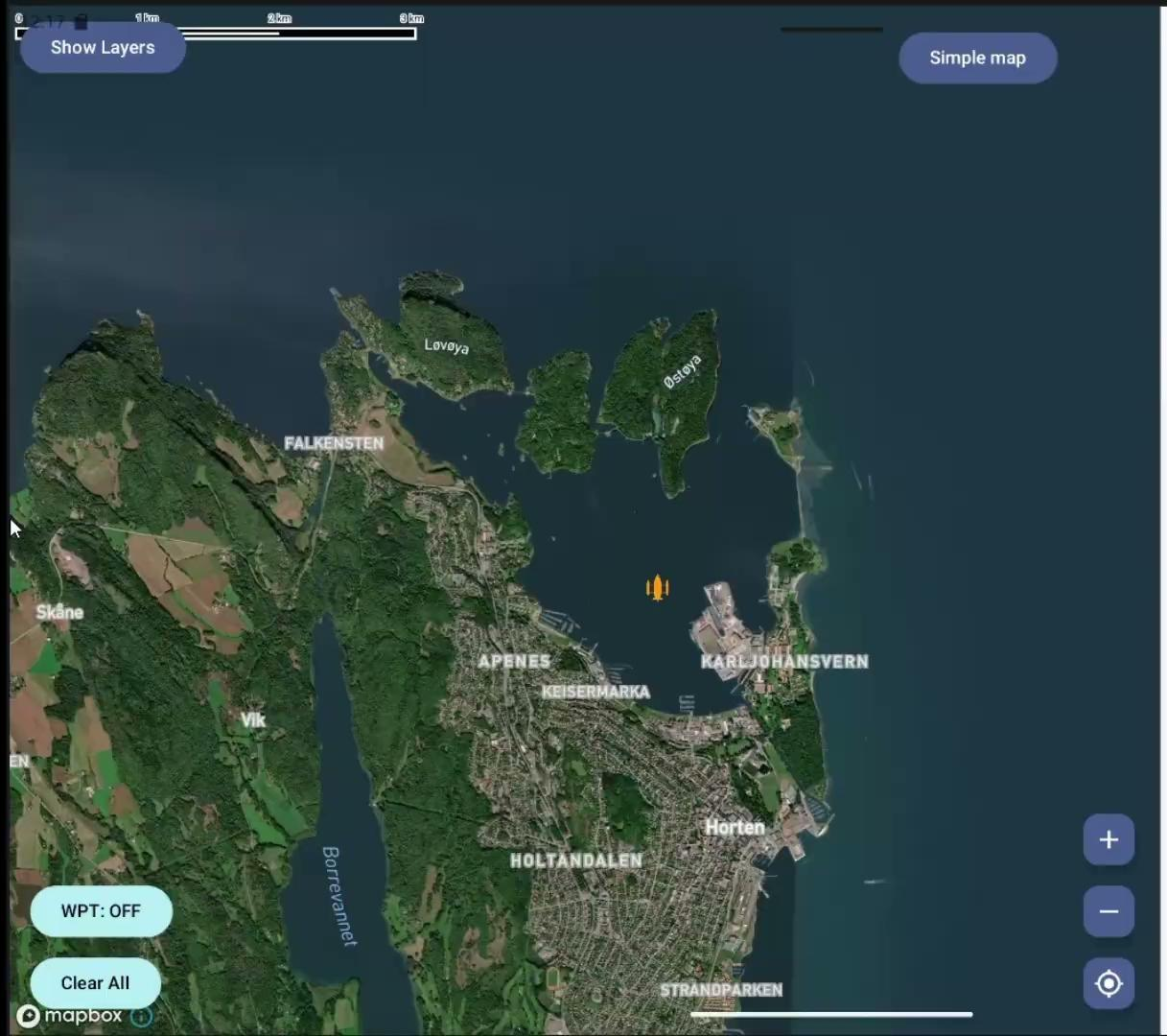
The start



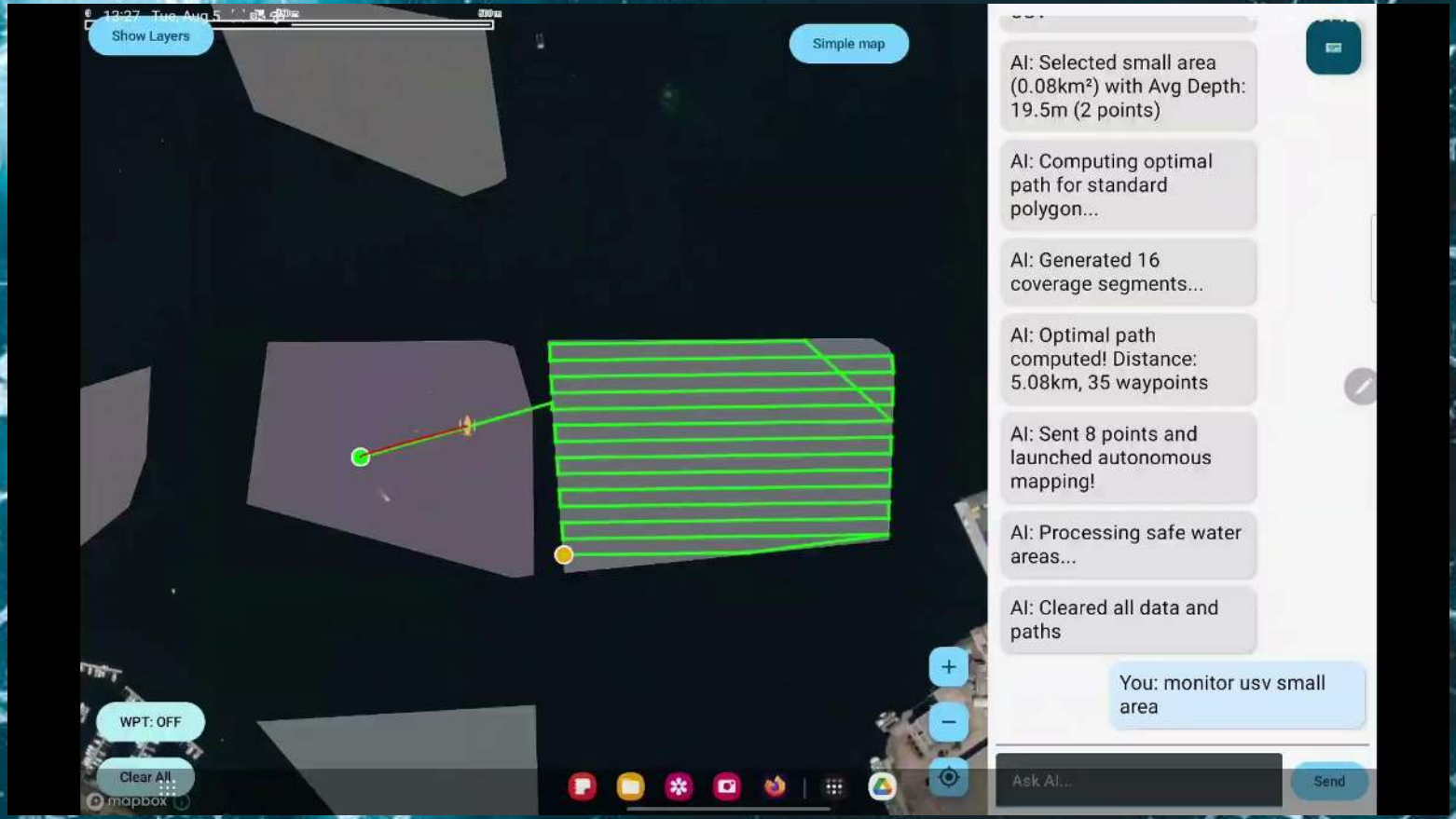


AI: Hello! How can I help you plan your mission?

Ask AI...

Send

Live Mission



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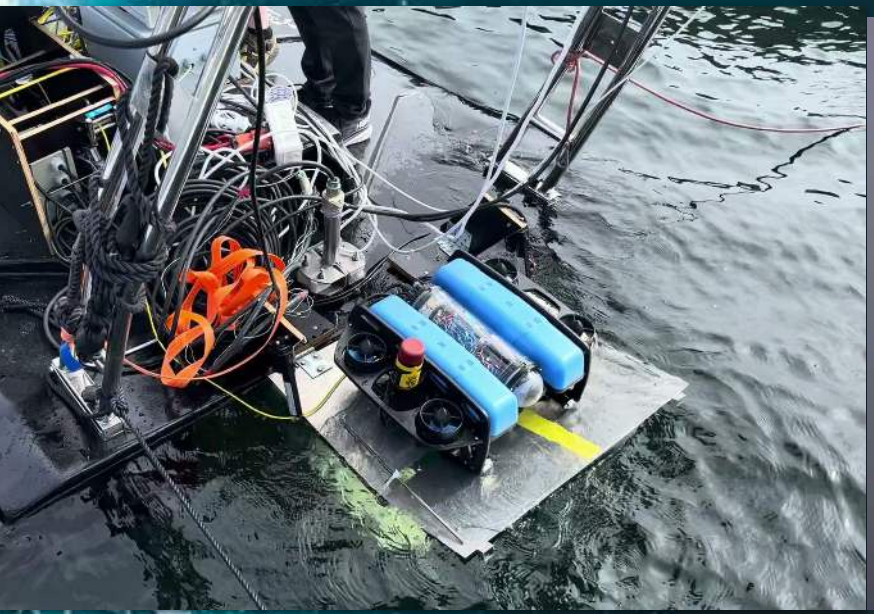
ROV Launch And Recovery



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UAV Boat Tracking

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UAV

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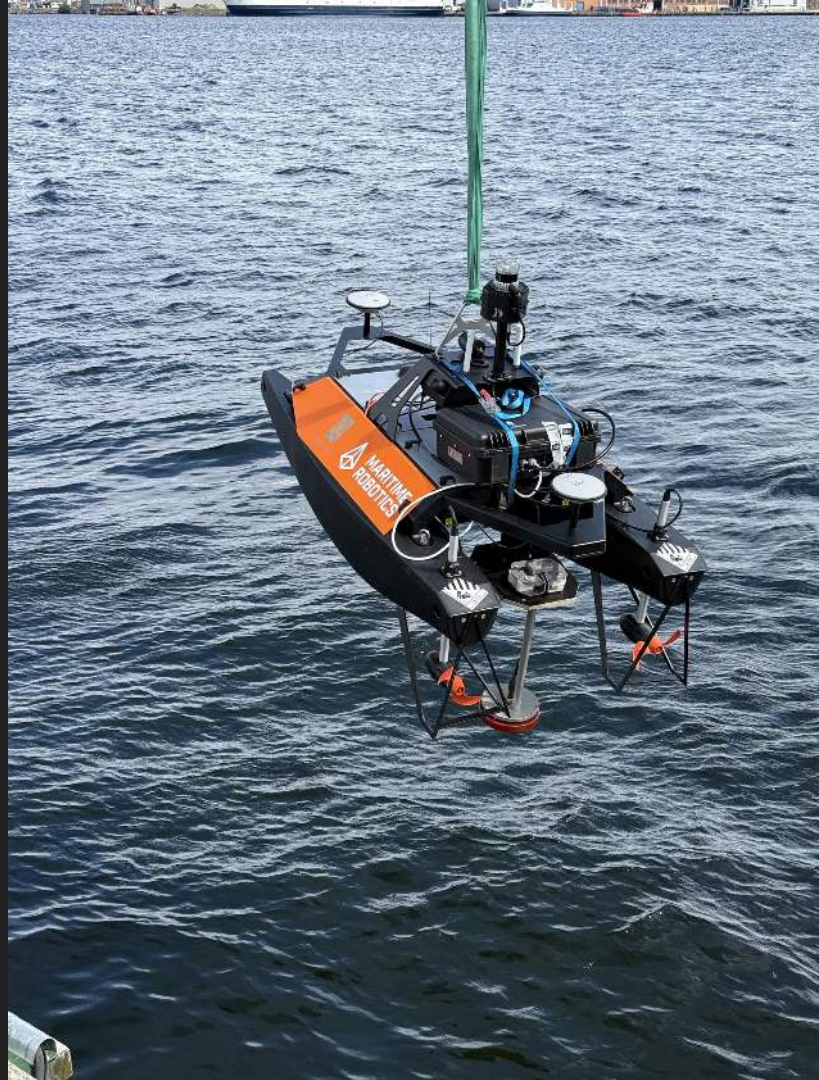
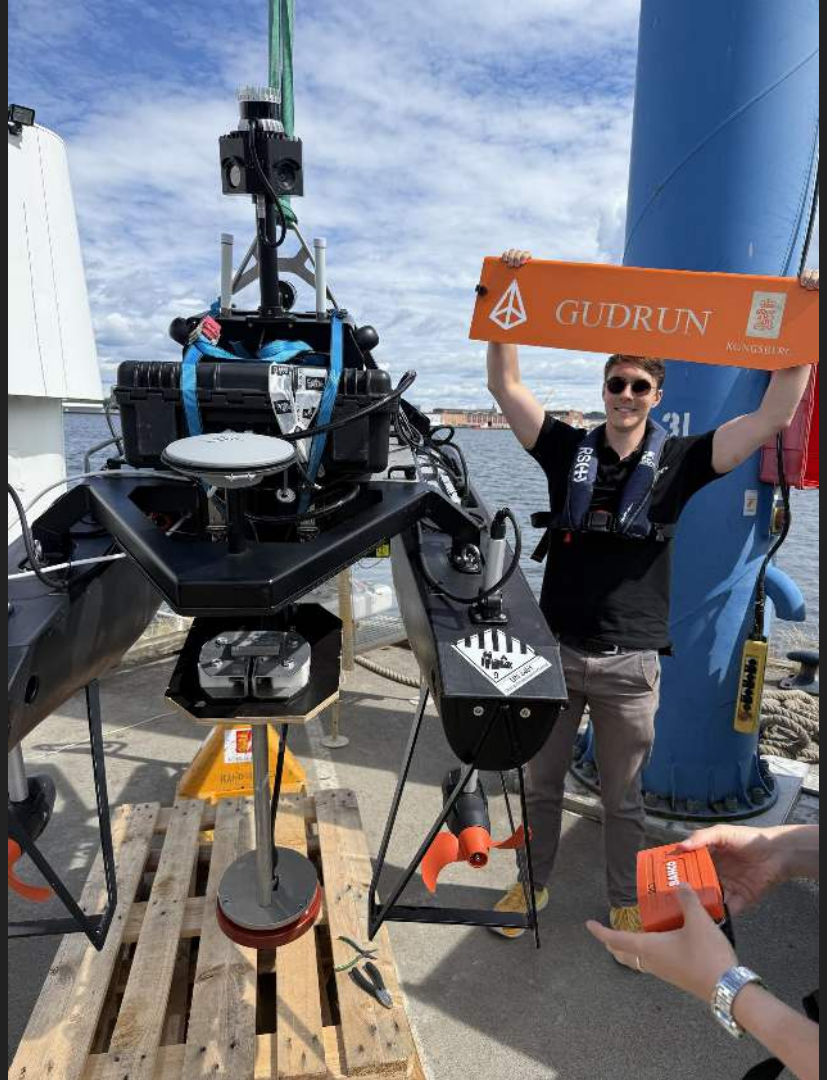
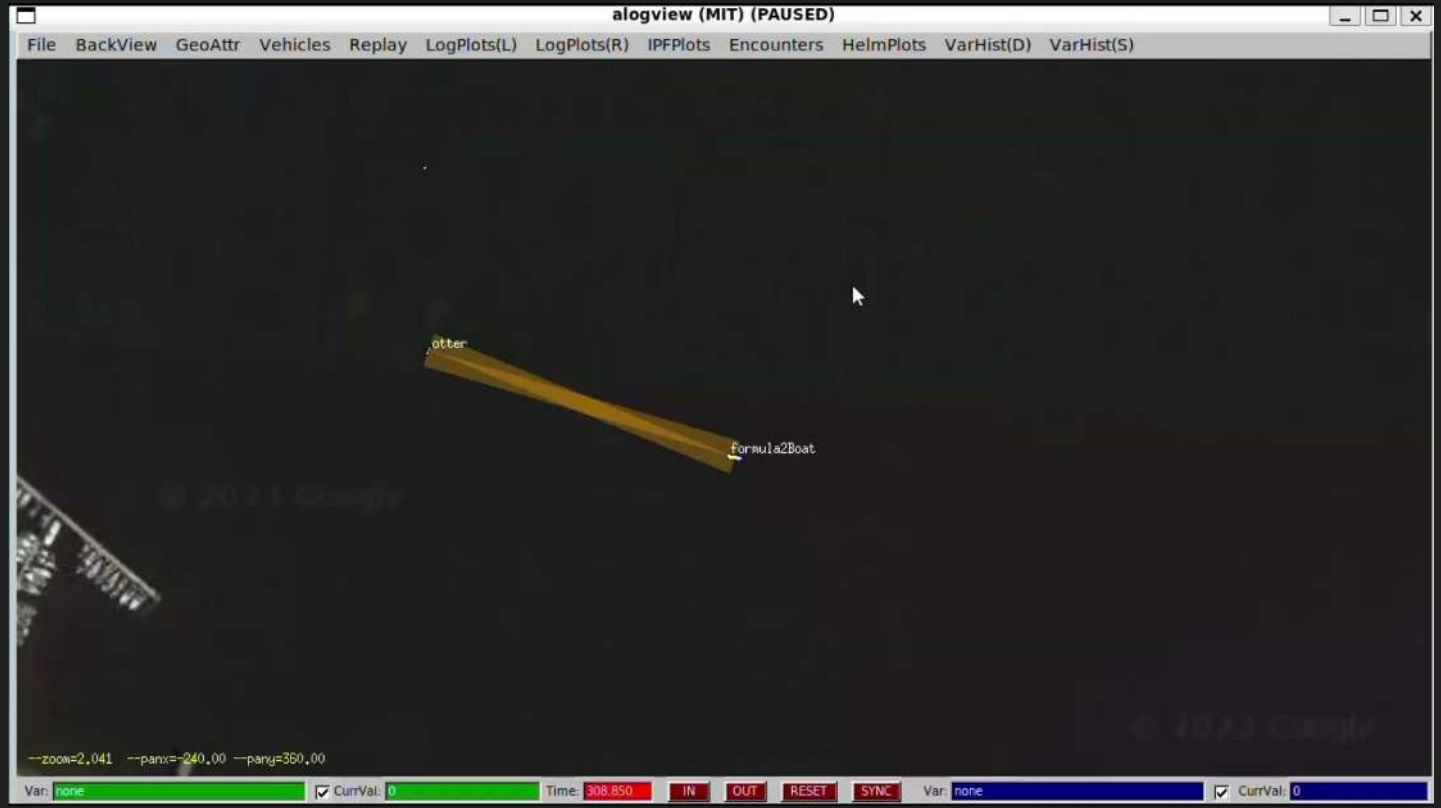
2026 USV number two



Integrating Otter into moos



Dual Swarm Mission

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Final remarks

- No prior moos knowledge
- 30 weeks so far, across 4 summers
- WPT following and Docking
- Dual Mission
- AI Powered Mission Planning


Questions?