



KONGSBERG

Coastal Monitoring

2025 & 2026

Who am I?

Sigurd Nordbye

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



**UNIVERSITY
OF OSLO**



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

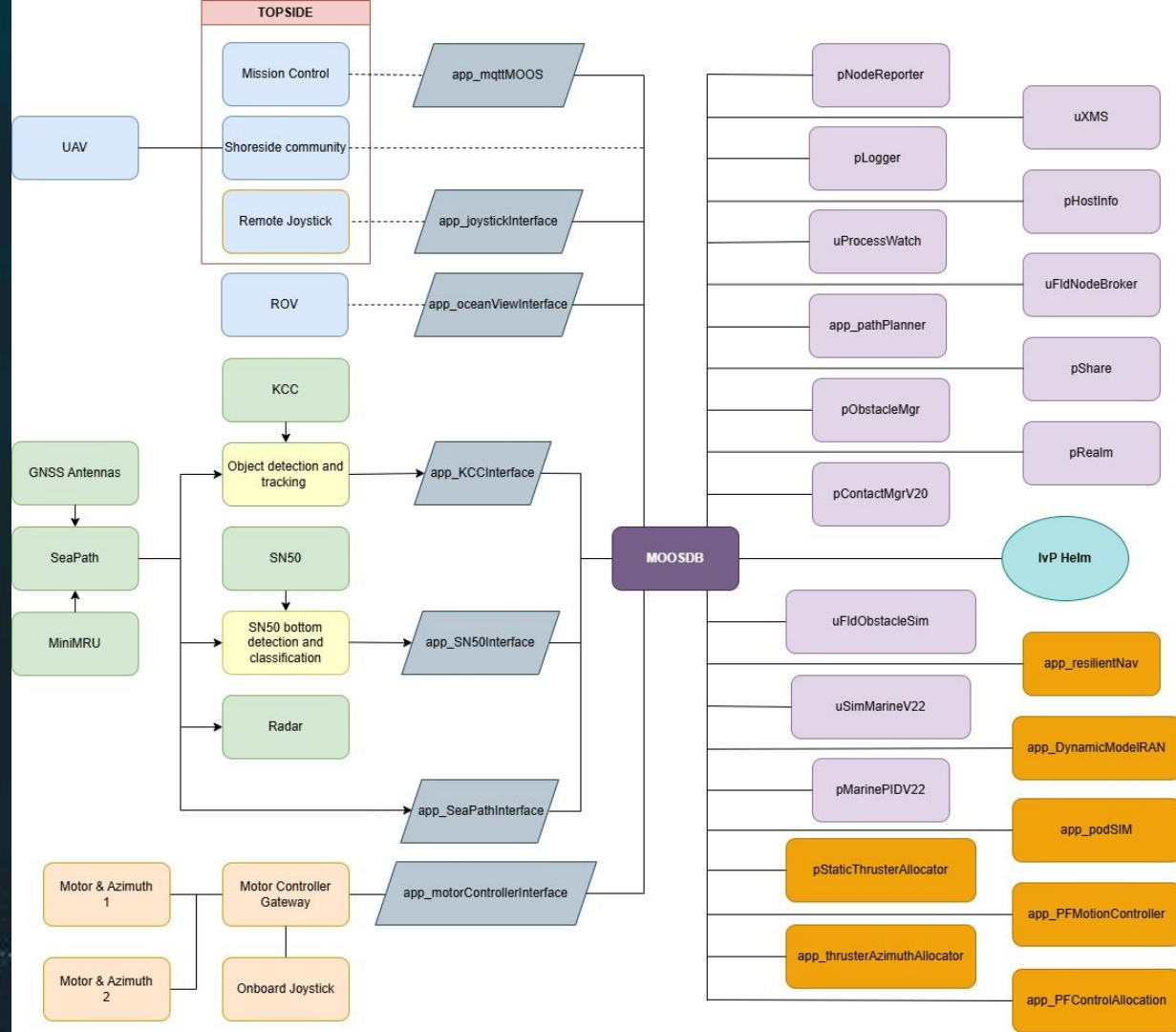


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Overview of systems on the vessel



Shared MOOS programs we use

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

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_adcplInterface (branch)

Actuation & HMI



- app_motorControlInterface
- app_joystickInterface

Simulation & test



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

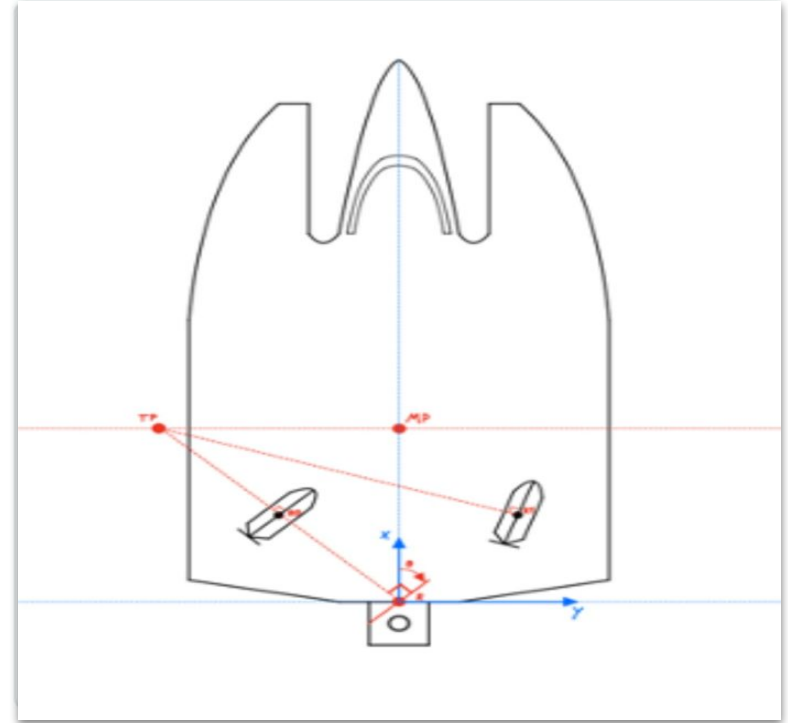
app_PFControlAllocation

3 desired forces $\rightarrow$ 4 actuator commands

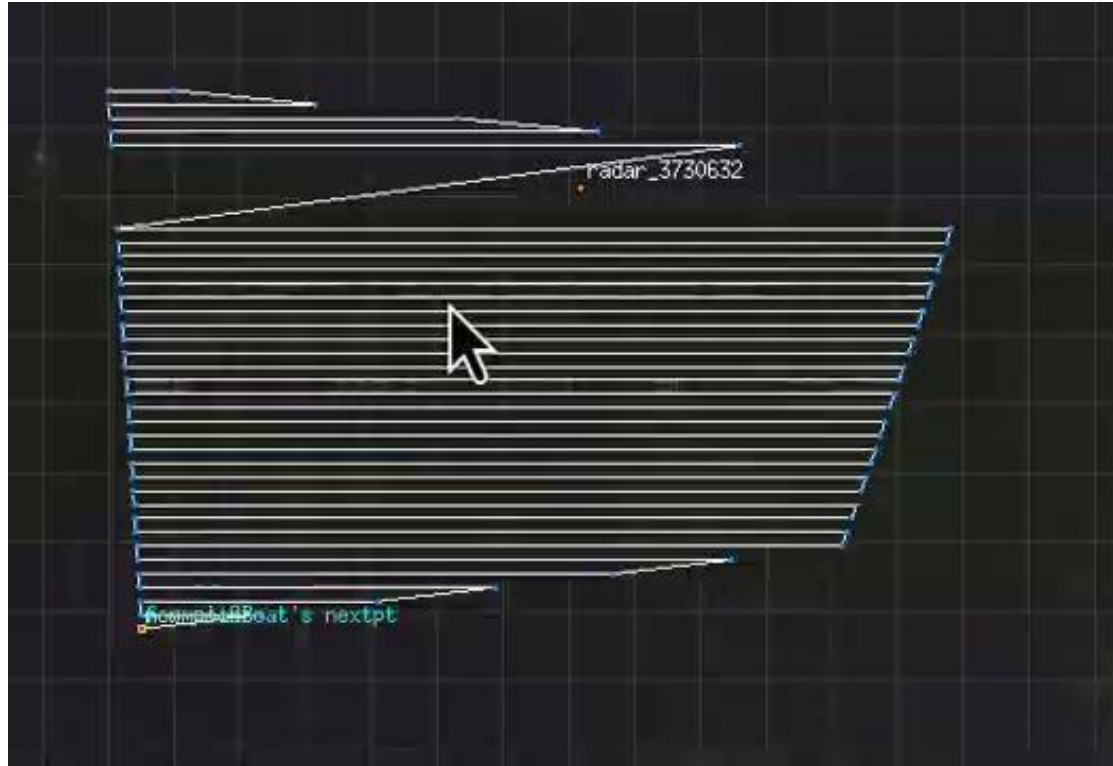
Controller asks for $\tau = (X, Y, N)$; pods take $n_1, \alpha_1, n_2, \alpha_2$

Nonlinear program, CasADi + IPOPT, 10 Hz

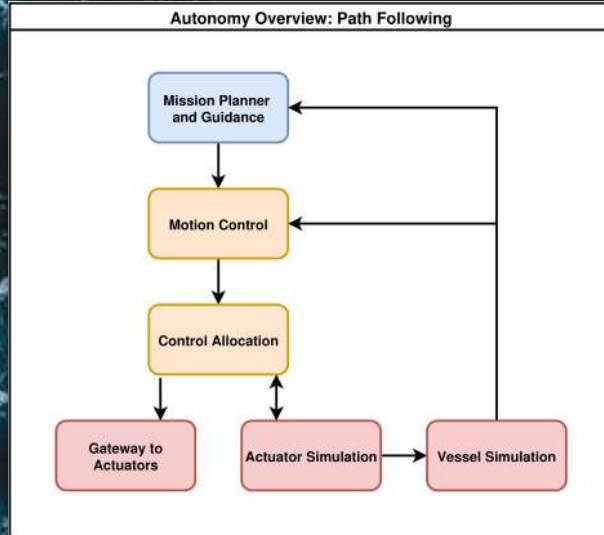
$\pm 180^\circ$ pods $\rightarrow$ every force has two solutions



app_pathPlanner + TrafficAvoider + BHV_AvdColregsV22



Autonomy: Path Following



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Mission Planning



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Mission Planning

10:01 Tue, Aug 5

WPT: OFF

Clear All

mapbox

generat generate generator generatörer

AI: Added 3 manual notes. lahelle triangle 1, lahelle triangle 4, lahelle triangle 5

AI: Creating 5 mission areas (Center + N/S/E/W)...

AI: ✓ Center area: 1 zones

AI: ✓ North area: 1 zones

AI: ✓ South area: 1 zones

general Send

Ctrl !#1 Norsk



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Path Planning



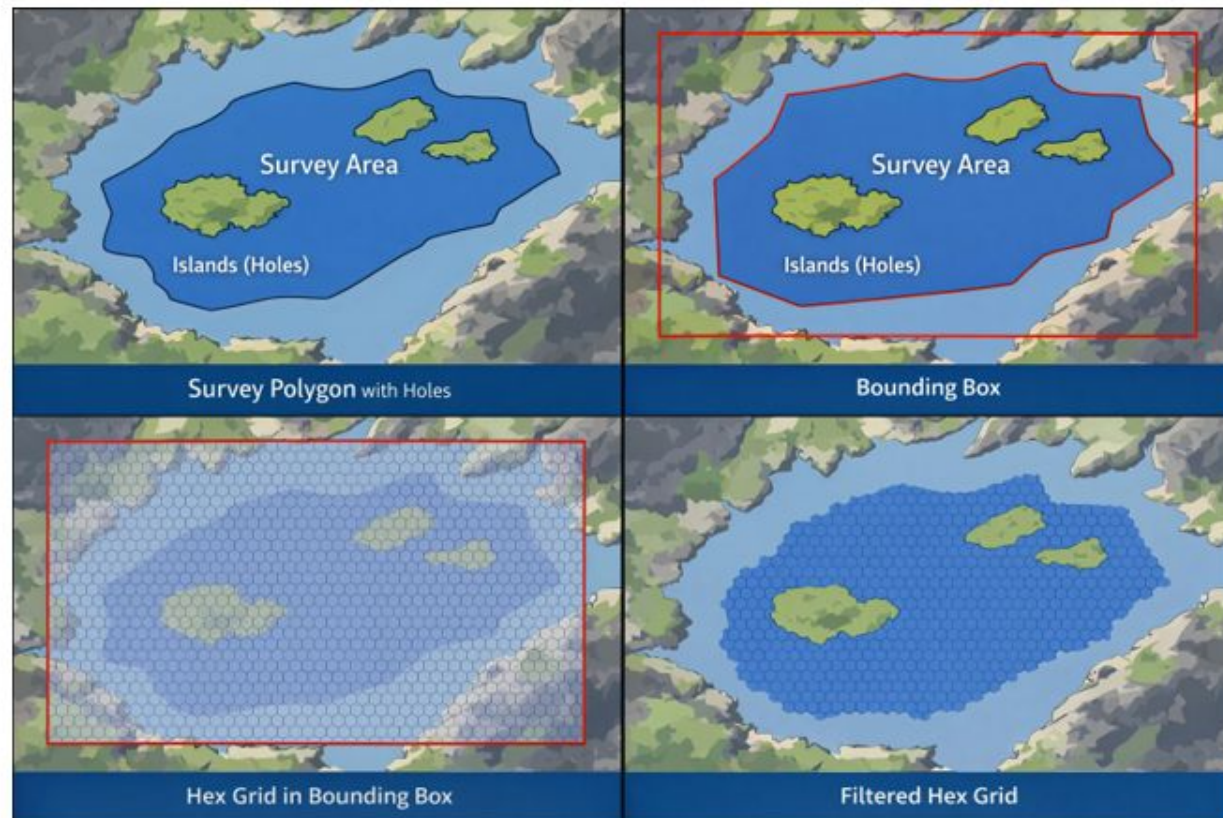
4 month research project
Goal: create a path planning algorithm that can traverse complex polygons optimally.



Daren LER

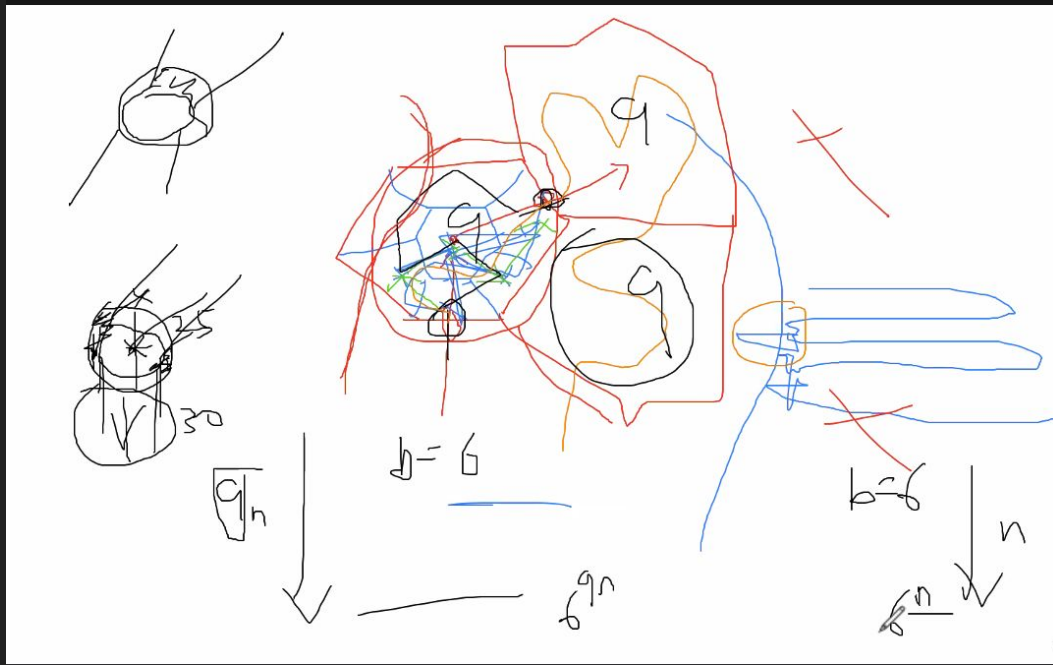
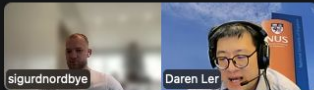
Senior Lecturer (Educator Track)
Deputy Director, Centre for Nurturing
Computing Excellence (CeNCE)

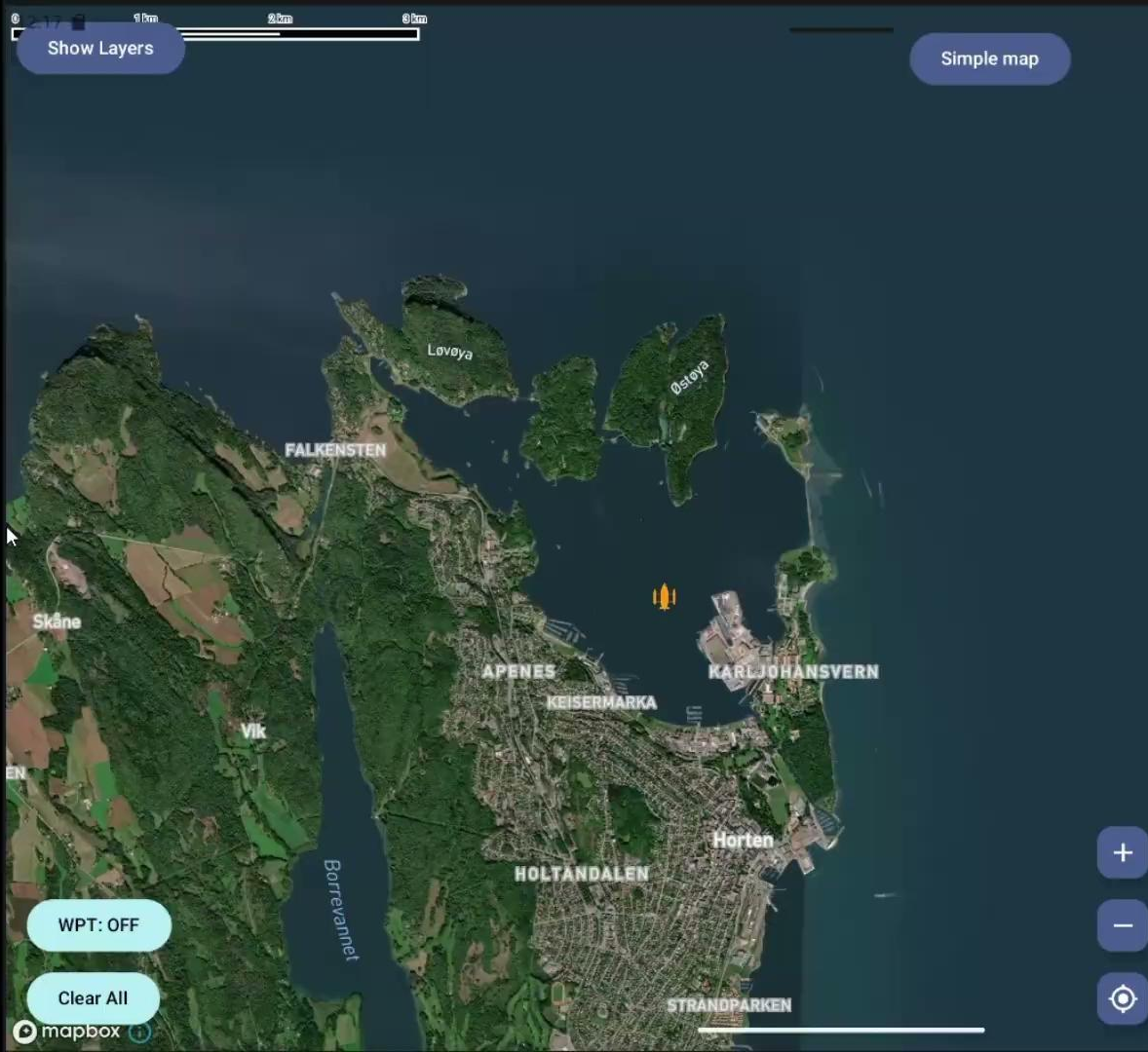
Path planning tessellation



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The start





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

Ask AI...

Send

Live Mission

The screenshot displays a live mission control interface. On the left, a map shows a green path with a red dot at the start and a yellow dot at the end. The path is composed of several segments. The map is overlaid with a grid of green lines. The interface includes a 'Show Layers' button at the top left, a 'Simple map' button at the top right, and a 'WPT: OFF' button at the bottom left. A 'Clear All' button is also visible. The bottom of the screen shows a standard Android-style navigation bar with various app icons. On the right side, a chat log displays the following messages:

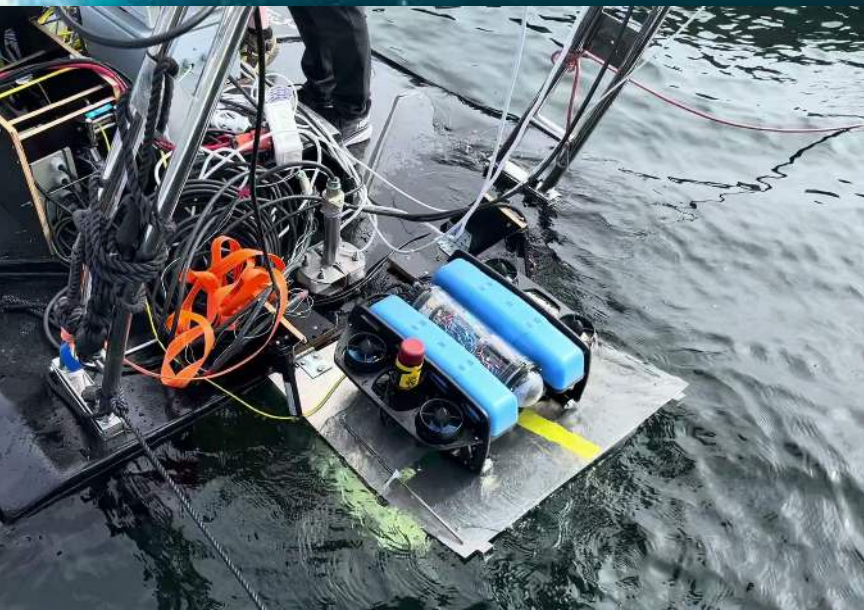
- AI: Selected small area (0.08km²) with Avg Depth: 19.5m (2 points)
- AI: Computing optimal path for standard polygon...
- AI: Generated 16 coverage segments...
- AI: Optimal path computed! Distance: 5.08km, 35 waypoints
- AI: Sent 8 points and launched autonomous mapping!
- AI: Processing safe water areas...
- AI: Cleared all data and paths
- You: monitor usv small area

At the bottom of the chat log, there is an input field labeled 'Ask AI...' and a 'Send' button.



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ROV Launch And Recovery



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UAV Boat Tracking



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UAV Boat Tracking



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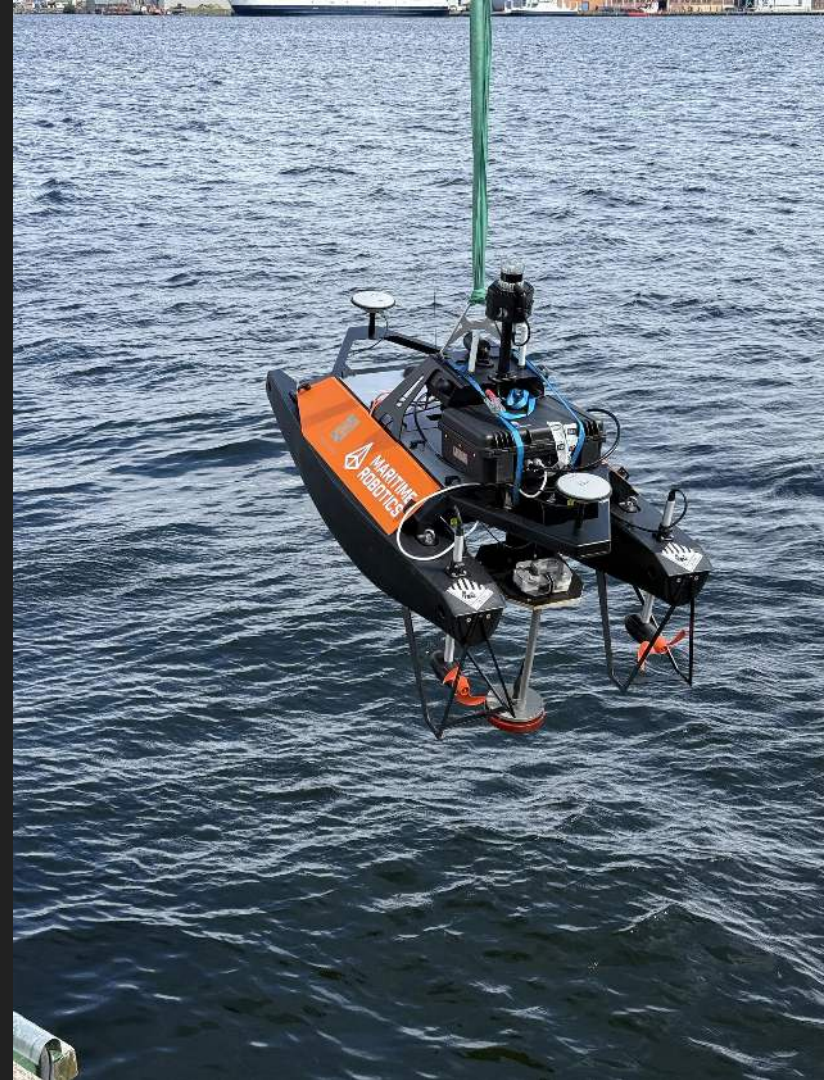
An aerial photograph of a ship's hull, showing the dark water and white wake. The ship's hull is dark, and the wake is a bright white line. The water is a deep blue-green color. The text 'UAV' is overlaid in the center.

UAV



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2026 USV number two



Integrating Otter into moos



Dual Swarm Mission





clideo.com

Final remarks

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



The background of the slide features a marbled pattern in shades of teal and white, resembling stone or liquid swirls. The pattern is more prominent on the left and right sides, framing a darker teal central area where the text is located.

Questions?