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St Lawrence Seaway Autonomous Marine Testbed

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St Lawrence Seaway Automation

Marine trade

Value of marine trade in Canada estimated at $210B (2017)

Automation

Global trend in shipping towards increased use of automation and autonomous operations

Open problems in R&D - Navigation

Navigation in ice-covered waters (NRC-OCRE)

Collision avoidance

Docking / close-proximity operations

High-level navigation / remote operation

SLS Autonomous Testbed

Geographic basis

Numerical simulation geographically located along St. Lawrence river

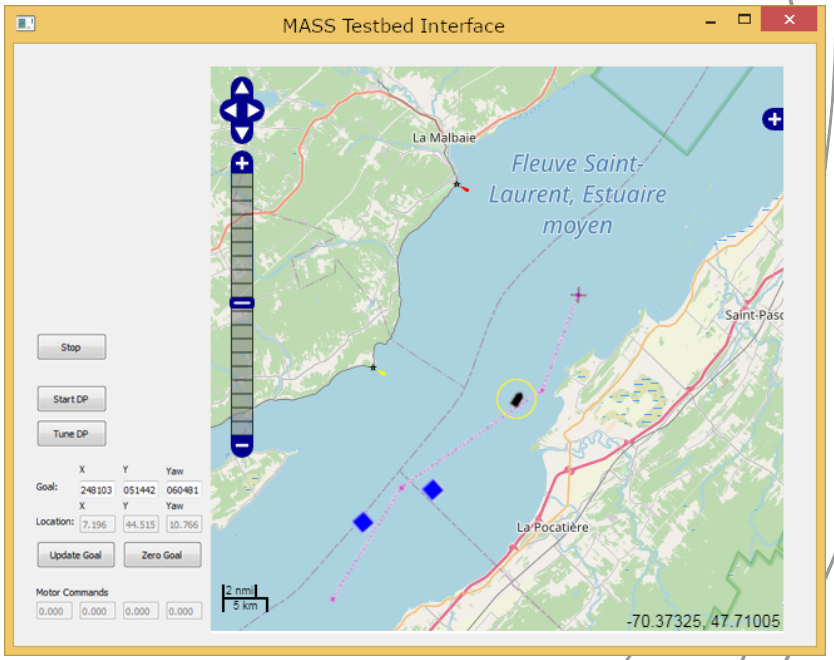
Adaptable GUI

Interface is easily changed to support experimental configuration

Sandbox Visualization

Interface has two main purposes:

- Present results to stakeholders
- Provide feedback for experimenters/users to visualize what is happening



Testbed Software Architecture

Modular architecture

Primarily written using Python – easily modified

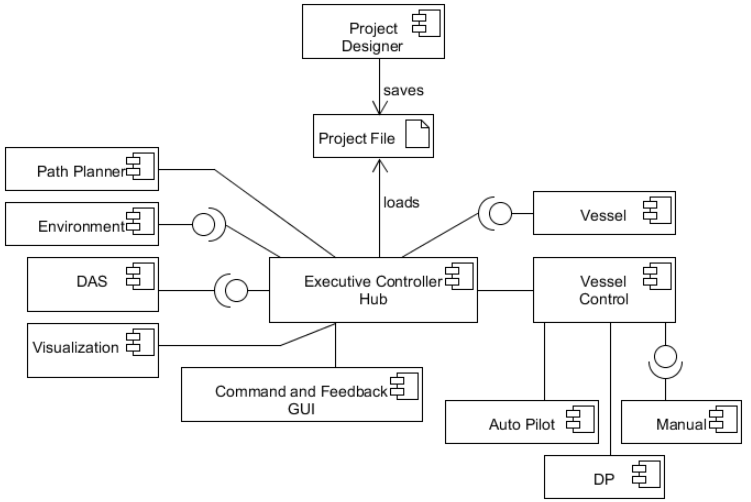
Interfaces between modules are designed to allow exchange of numerical back-ends: environment models, ship models, autopilot

Configuration file based

Config files provide parameters for experiment setup, allows for batch processing

Logging function

Leveraging OCRE's existing GDAC data logging infrastructure, data logging and synchronization is accurate and robust



OCRE Autonomous Testbed

Testbed based around physical test basins

Scalable from numerical simulation / physical test basin / full scale - HEAVET

Largely dependent upon software architecture

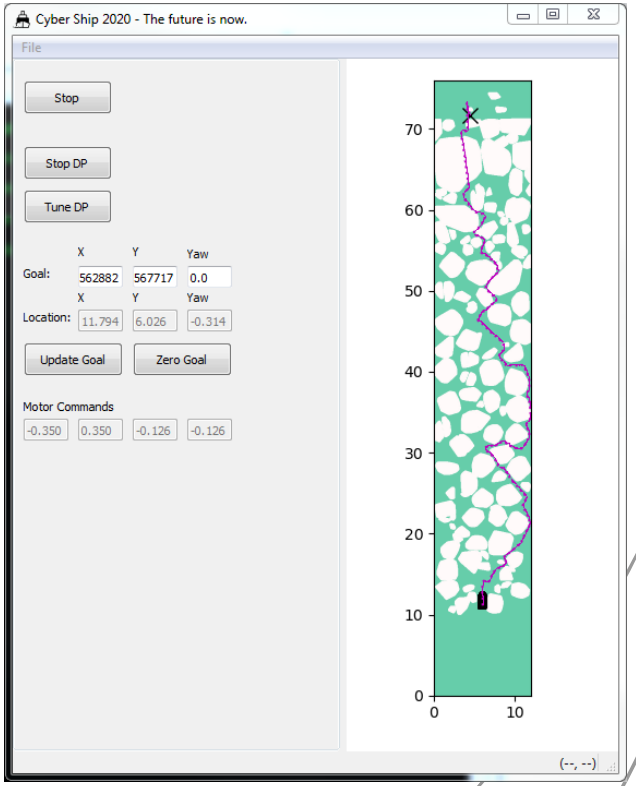
Autonomous navigation in ice

Demonstrative experiment conducted in NRC ice basin – Successful in showing integration

Experimental basis for multiple fields

Autonomous testbed is intended to abstract away the functionality from the researcher

Allows focus on specific aspect of ship autonomy while leveraging world-class facilities



THANK YOU

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