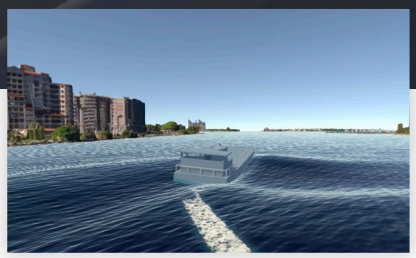
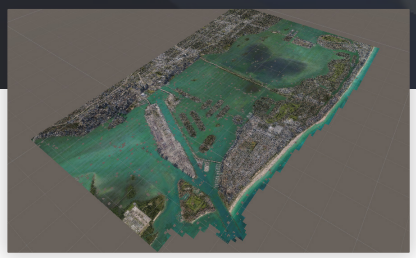
USC Institute for Creative Technologies

Watercraft and Ship Simulator of the Future (WSSOF)

2023 - Current
Project Leader: David Nelson, Co Lead: Dr. Pat Lynett





Background

The Military and Sealift Command fleet routinely operates in international waters worldwide to safeguard freedom of navigation. This has led to adversary countries carrying out dangerous maneuvers to disrupt and prohibit these freedom of navigation operations. There is an urgent need to develop a physics-based simulation environment that supports swarm modeling for maximizing throughput in port operations while maintaining large scale vessel movements as well as allow safe operations in congested conflict areas.

The Army requires a Multi-Domain Operations (MDO) ready force that can seamlessly transition from one domain to the other, such as those during maritime littoral operations. The WSSOF is a tool that can improve transition efficiency by enabling the warfighter to apriori investigate the littoral zone operations in a manner that exercises all possibilities of environmental conditions such as wave heights, winds etc. in a manner that is safe and effective.

Objectives

This collaborative effort between the USC's Institute for Creative Technologies and the Viterbi School of Engineering, working in a cooperative agreement with ERDC's Coastal and Hydraulics Laboratory (CHL), will foster a leap forward in hyper-realistic ship motion using improvements in numerical simulations of vessel motion, Information Technology (IT), as well as computational speeds to enable the physics-based and real-time simulation of these interactions.

Contemporary ship simulations are large, bulky, and stationary with minimal portability. To mitigate these concerns, a network enabled ship simulator equipped with Virtual and Mixed-Reality technology coupled with high fidelity numerical modeling can provide a means to meet these operational needs and enhance ship survivability in operational deployments.

Results

Still in the first year of development, the interdisciplinary team has a prototype virtual reality demonstration integrating terrain data, bathymetry and Nonlinear Shallow Water (NLSW) and Boussinesq wave models with a single ship navigating in a geo-specific simulated coastal environment.

Next Steps

The team continues development and the implementation of a modular software platform, to enable the use of varied wave models as well as different visual rendering platforms as well.

Published academic research papers are available from https://ict.usc.edu/research/publications
(Search engine keyword: USC ICT Publications)

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Established in 1999, the USC Institute for Creative Technologies (ICT) is a Department of Defense (DoD) University Affiliated Research Center (UARC), sponsored by the US Army. Harnessing Hollywood-derived creativity with academic innovation and military-domain expertise, ICT conducts award-winning R&D in Artificial Intelligence (AI), Computer Graphics, Geospatial Sciences, Human Performance, Learning Sciences, Modeling, Simulation & Gaming, Mixed Reality (MxR), Medical VR, Narrative, and Virtual Humans.

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