

Vertical Landing Aids Design & Test Tool Utilizing Microsoft Flight Simulator™ for Modeling, Simulation & Visualization

**MSV'05- The 2005 International Conference
on Modeling, Simulation and Visualization
Methods**

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- **Objectives**
- Approach
- Design / Solution Overview
- MS flight Simulator: Benefits, Enhancements & Limitations
- Current System
- Status & Deliverables

Objectives (from Topic)

- Develop an analytic test tool that can be used to support (VTOL)/rotorcraft ship VLA analysis and testing
 - Fly specific aircraft shipboard approaches on a personal computer with a realistic view from the cockpit
 - Adjust ship VLA components and environment lighting
 - Useable at test team member's work area

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Approach Overview

- Simply build a system that approaches the fidelity of high-end simulator
- Constraints
 - cost 2 orders of magnitude less money to develop
 - Require 2 orders of magnitude less cost in hardware to operate.
- I.e., 1/100th the cost

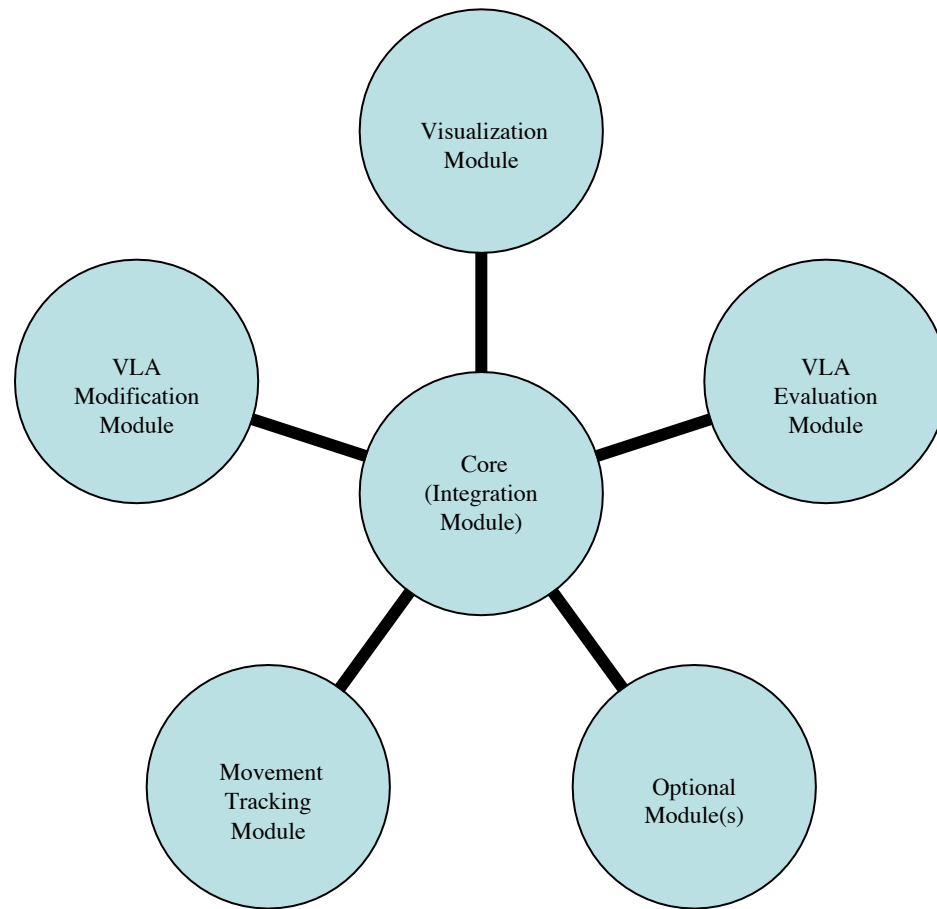
Iterative Development

- Design, implement, evaluate, repeat
- Keeps client in the loop
- Allows for more feedback and guidance

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VERTICAL Architecture



Visualization & VLA Mod Modules

- Try MS Flight Simulator as Visualization Module
- Custom built VLA Modification Module

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MS FS: Benefits

- Low cost: ~\$50 per seat
- Relatively open platform
 - API & FSUIPC
- Real world & user settable weather
- PC-based & supported by other products
 - E.g., Graphics cards, Motion trackers
- Many low-cost add-ons available
- 2 year upgrade cycle
 - This project migrated from 2002 to 2004

MS FS: Limitations

- NVG capability
- Chromaticity and Photometric quality
 - Need to investigate quality versus other COTS tools



MS FS: Needed Enhancements

- High-definition Ship models
 - With lighting
- VLA Modification Module (Light Controls)
 - Color
 - Intensity
- Ship Motion
 - Speed, bearing
 - Pitch & roll



Can MS FS Support Detailed Models?

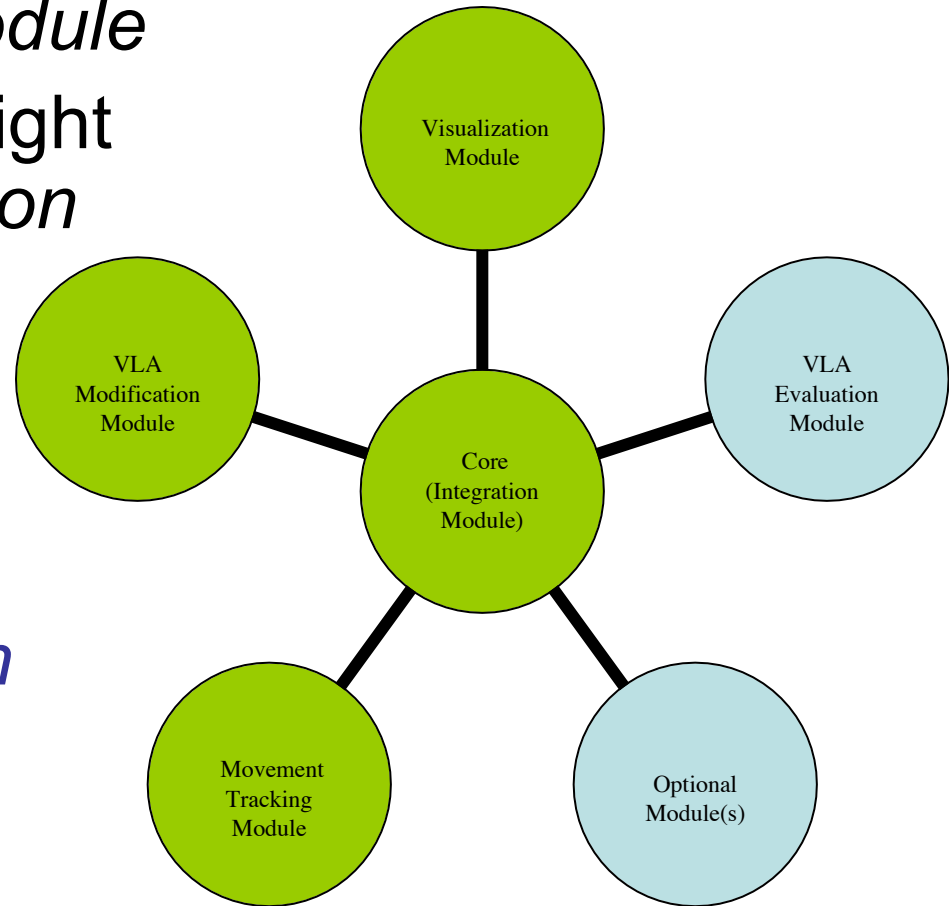
- Aechelon considered by many to be top-of-the-line for high-end simulation
 - [Video of Aechelon's best presented at I/ITSEC 2004](#)
- Example of MS FS
 - [Harrier Landing on LHD](#)

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Current System

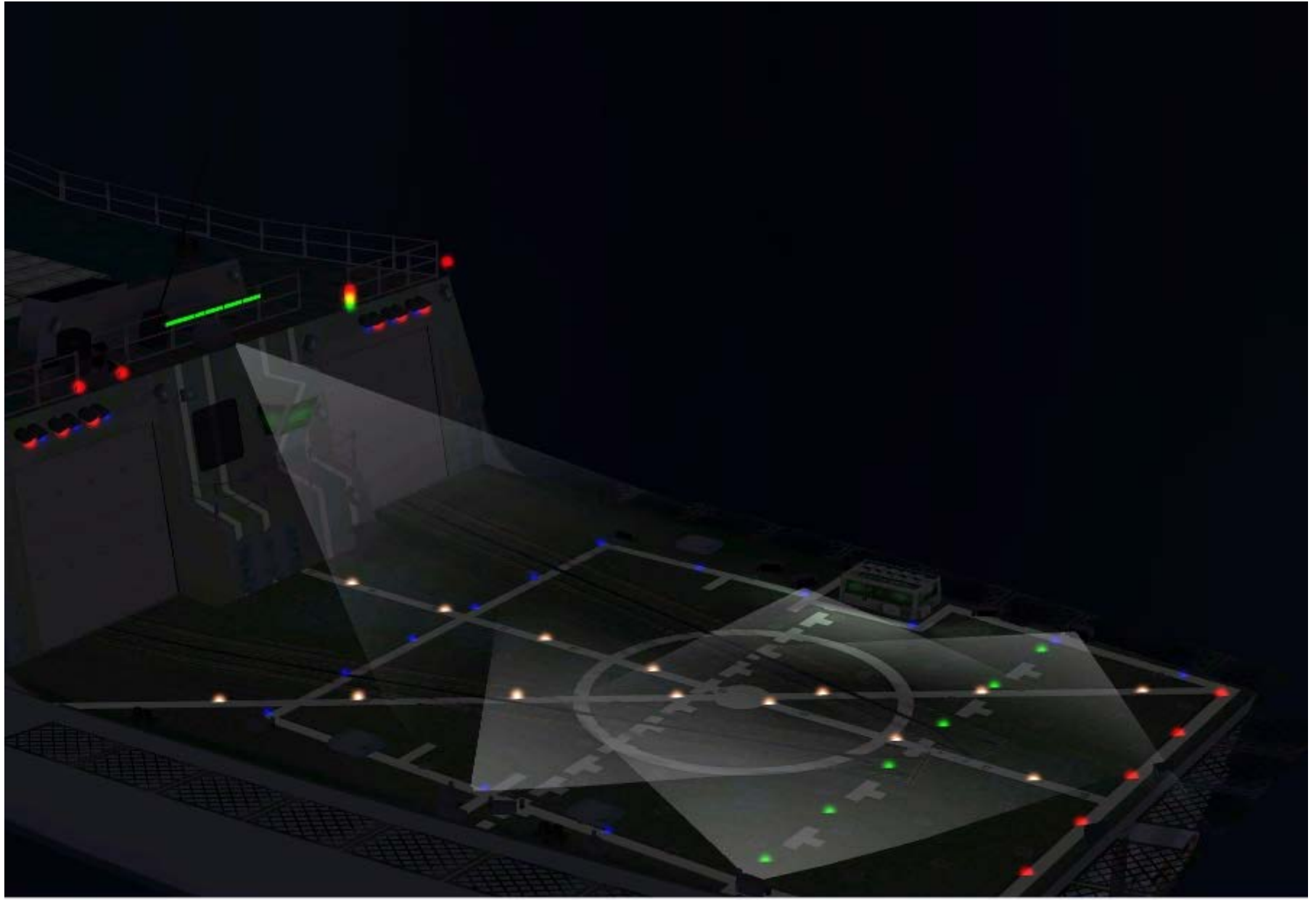
- *VLA Modification Module*
- Combine with MS Flight Simulator *Visualization Module*
- *Movement Tracking Module*
 - *HMD*
 - *InterSense motion tracker*
 - *TrackIR²*



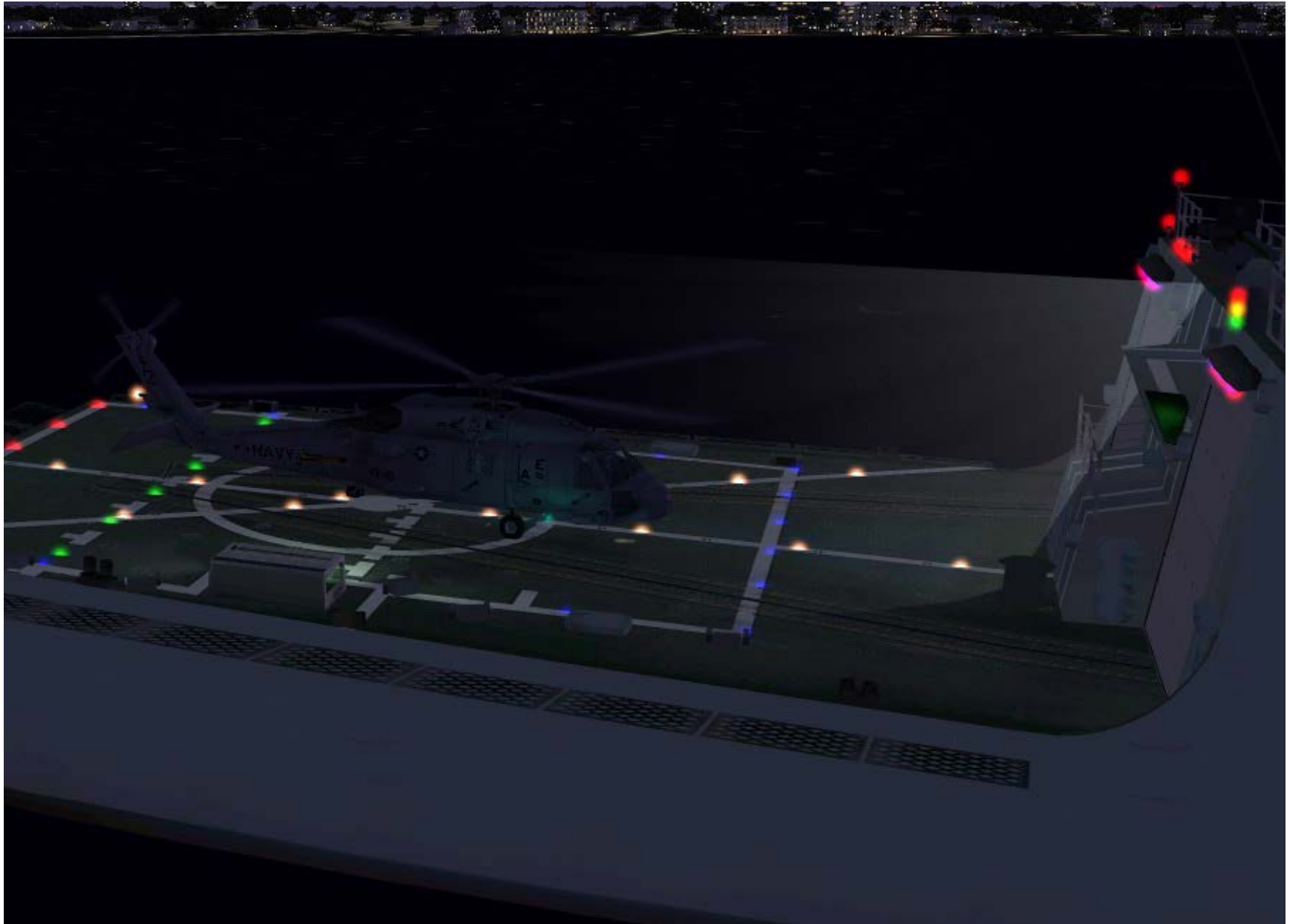
Modeling Visual Landing Aids

- *LHD 6 at Dusk showing lighting*

Lighting on DDG (1)



Lighting on DDG (2)



Field of View:

From cockpit: Unoccluded



Field of View: From Any Spot Outside of Aircraft



Field of View: Harrier

From cockpit: Showing Cockpit



Aircraft

- Most Navy / Marine aircraft available
- More being built / updated



Example: Landings



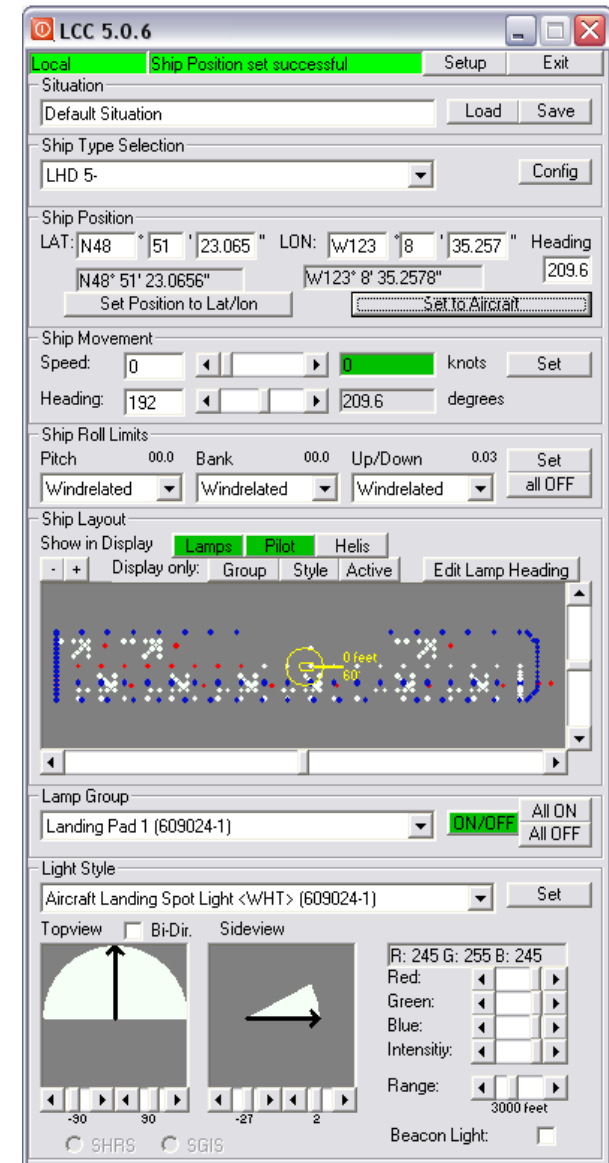
[Images](#)



VLA Modification Module Capabilities

- Set lights
 - Color, intensity, beam
- Load desired ship(s)
 - LHDs, DDG, DD(X)
- Set ship speed and bearing
- Aircraft Placement & Status
- Save / load different configurations

[Example with DDG](#)
[Example with LHD](#)



Pitch & Roll

- Currently reacts to weather (wind)
- Will be settable via VLA Modification Module

Ship Motion

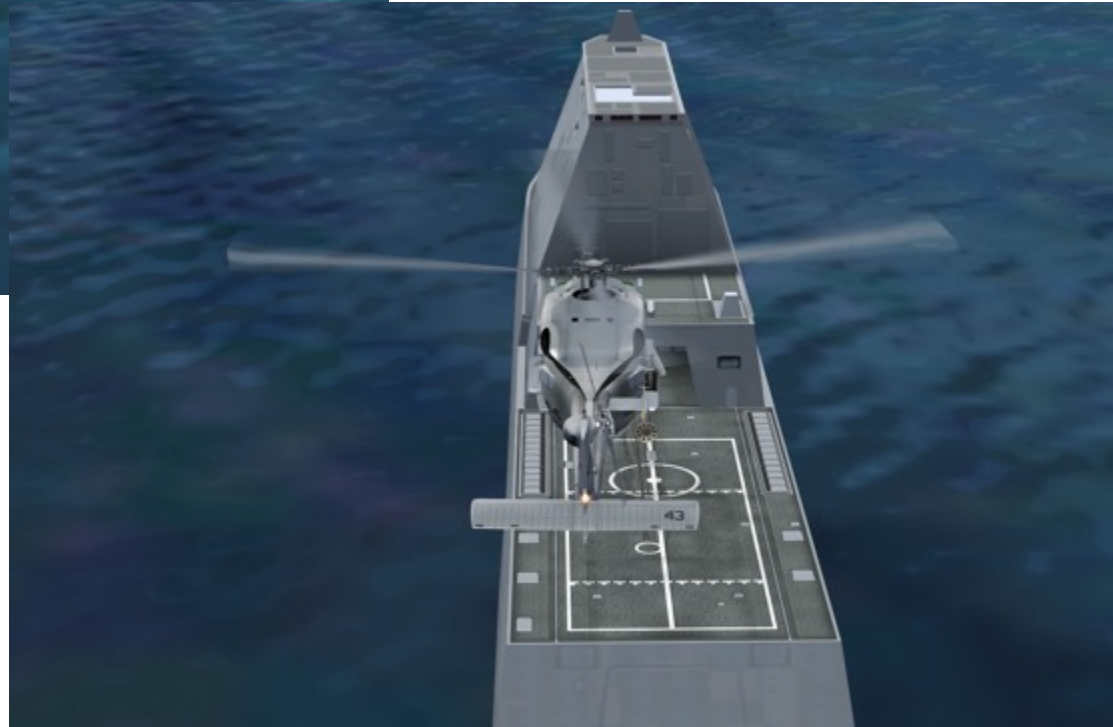
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Status & Deliverables

- Current System
 - High definition LHD, DDG, & DD(X) Ship Models
 - Ship speed and bearing settable
 - Support pitch & roll
 - Light Control GUI
 - Aircraft Placement & Status GUI
 - Ship speed & bearing settable via GUI
 - Windows Installer
- User's Manual
- Proven with movement tracking

DD(X) in Progress



VLA Experimental Resource for Testing Innovative Configurations and Lightings (VERTICAL)

2005 MSV Conference

DDG Flight

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