ODIN

The Underwater Warfare Software Simulation Toolset

Underwater model of choice for the UK Ministry of Defence.
ODIN is the complete underwater warfare software simulation combining environment, weapon, sensor and C2, with the capability to design, evaluate and determine maritime security requirements in the 21st century.

ODIN key feature

- Acoustic modelling
- User selectable fidelity
- Extendable functionality
- Easily configurable
- Interfacing with other models
- Validated models
- Modularised design
- Autonomous behaviours
- Tactical doctrine
- Proven Impact

ODIN provides an advanced capability to model the complete maritime engagement scenario at unit and force level. The model has a rich heritage of development which has resulted in a consistent integrated approach to performance assessment and algorithm development. ODIN models the detailed interaction between individual elements such as torpedoes, countermeasures, ships, submarines, or other seabed objects (e.g. rocks, reefs) whilst retaining an execution speed sufficient for both real time operations and detailed studies.

The model provides a ‘whole system’ approach, enabling modelling of diverse applications using one tool. It has flexibility to model arbitrary entities in both single shot and Monte Carlo modes.

Applications Include

- Fleet engagement simulation
- Platform detect to engage
- Anti submarine warfare
- High definition torpedo homing
- Torpedo defence on and below the surface
- Weapon and countermeasure design
- Tactics effectiveness evaluation
- Tactics development
- Procurement decisions
- Assessment of novel concepts
- Threat assessment

... a sound decision
Scalable and Agile

ODIN’s object oriented design allows all entities, whether ships, submarines, torpedoes, mines or sonobuoys, to be handled with the same common interface. Consequently there is no restriction on scenario size or complexity which can be as simple as a torpedo vs ship assessment or a Carrier Strike Group deploying ASW rotary wing aircraft employing sonobuoys hunting modern AIP submarines using countermeasures to evade air and ship launched torpedoes.

Acoustic Modelling

- Extended target signatures
  - Targets, wakes, false contacts
- Sonar processing
  - Beamforming, detection association
  - Doppler processing
  - Tracking, classification
- Multiple Fidelity
  - Simple sensors, sonar equation or time series
- Acoustic Environment
  - Self-noise, reverberation, ambient noise
  - Propagation loss can be:
    - Iso-velocity or Multi layer
    - Complex profiles using multi-path and ray bending

User selectable fidelity

ODIN allows detail and fidelity to be tailored to particular requirements, for example:

- Entities
  - Single salvo, multiple salvo and Fleet engagements
- Target signature
  - Single or multiple highlights
  - Omni directional or aspect dependent
- Sonar
  - Hull, towed, dipping, off-board above and below the surface

Diverse use

ODIN can be easily modified to integrate into current systems and there are recent examples of controlling hardware at sea, in real time. The model can also be combined with live assets to provide a realistic combat scenario for Tier One and Tier Two training at sea.

Autonomous behaviours

Platform tactics can be written in C++ and/or in ODIN’S High Level Language (HLL). This flexibility provides the user with versatile tools for controlling and developing individual platform behaviour and determines a level of autonomous war gaming to the user for C2.

Interfacing with other models

ODIN has proven flexibility in model integration providing greater functionality. Examples include:

- Virtual Battlelab – gives the commander realistic weapon and countermeasure representations
- Nereus – enables higher fidelity signal processing and time series data analysis
- SURVIVE – allows better prediction of likely platform vulnerability
- Matlab – allows the scientist to develop algorithms in a familiar COTS package
- SIMDIS – provides a runtime interface to this graphics tool. Output can also be visualised post run
- Debrief – scenario visualisation and analysis and NMEA compliant

Machine independence: ODIN, written in ANSI C++, runs under MS Windows, Linux