NAVAL C-UxV SOLUTION

South Korea's C-UxV Solution, which is currently being integrated

K-HUMUS's Naval C-UxV Shield "NEPTUNE" Solution has to be installed on different classes of vessels for surveillance and first deterrence against small dimensions UAV and USV (UxV as a general description).

Naval C-UxV Shield "NEPTUNE" is based on the following solutions:

- From 4 to 8 Elijiah X-Band AESA Radar panels → TORIS (ROK)
- Lattice OS → Anduril (US)
- 1 Elijah-RS RF Scanner → TORIS (ROK)
- From 1 to 4 Drone Hunter FD jammer → Dymstec (ROK)
- 2 Ellijah-M900 MWIR Cameras → Global Systems (ROK)
- 1 Simulation & Training Package → 3DI (ROK)
  - ➢ Physically integrated onboard by ENISSKY, including all the onboard activities and the provision of a dedicated radome(Radar Dome), if necessary

And related activities will be managed as follows:

- System integration – 3DI, TORIS with Anduril Lattice OS
- C/S Integration – CSI selected by the end-User
- Physical onboard Integration – EINSSKY
- Simulators and training – 3DI Korea
- The system will be managed as a C-UxV independent cluster, with dedicated

interfaces as follows:

- Towards CMS for enriching the Tactical Picture and for requesting Soft kill actions using Naval jammer for small drones and Hard Kill actions using Naval guns (30 mm or above) for bigger and biggest drones and USVs.
- From NDDU for acquiring navigation data necessary for Equipment stabilization (i.e., radar roll & pitch correction, camera stabilization, jammer calculations, etc.)
- From onboard EO/IR camera/IRST in case of absence of a dedicated EO/IR system installed in the cluster.

Proposed System Performances are:

- **Radar Detection** Class → 2 micro drone (RCS 0,02m²/80Cm) : **13 km**
- **Radar identification** Class →1 nano drone (RCS 0,01m²/35Cm) : **10 km**
- **RF EO Detection** Class →1 nano drone (RCS 0,01m²) : **5 km**
- **EO Detection** Class →1 nano drone (RCS 0,01m²) : **5 km**
- **IR Detection** Class →1 nano drone (RCS 0,01m²) : **2.5 km**
- **EO identification** Class →1 nano drone (RCS 0,01m²) : **3 km**
- **IR Detection** Class →1 nano drone (RCS 0,01m²) : **1.5 km**
- **Jammer effective range** → **5 to 8 km** (depending on the selected system)
- **HK effective** range → from **3 to 5 km for 30 mm, up to 10 km for 76mm**

Portfolio

X-Band AI AESA Radar System

Elijah X-Band AESA

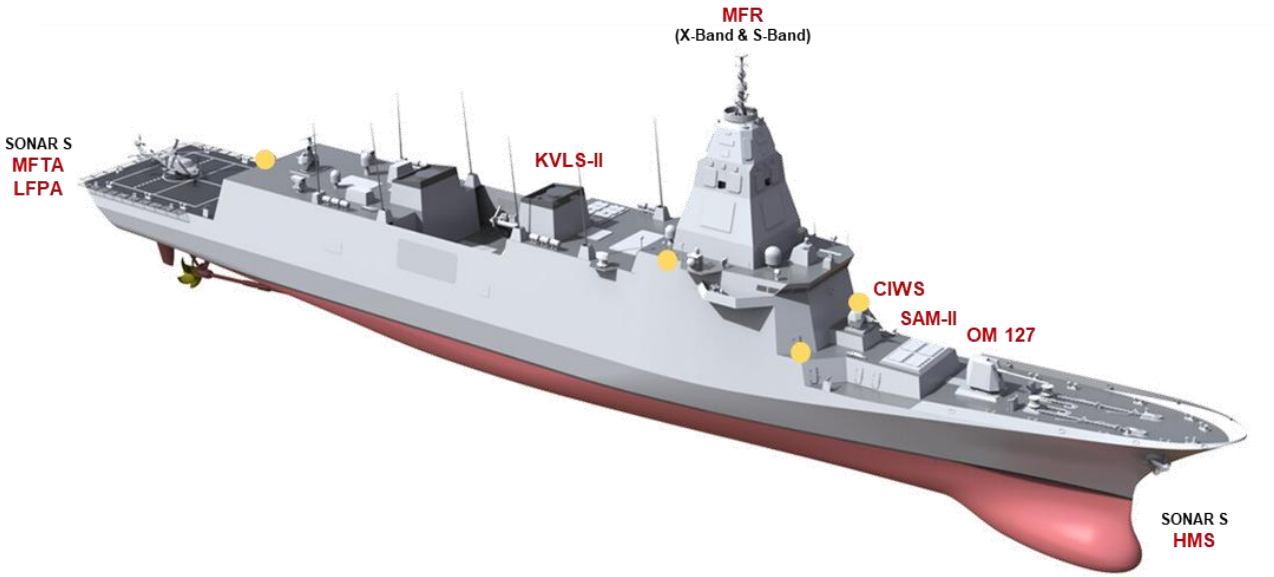
RF Scanner

MWIR Camera

DYMS FD-8 Jammer

NAVAL C-UxV SOLUTION

in Case Destroyer



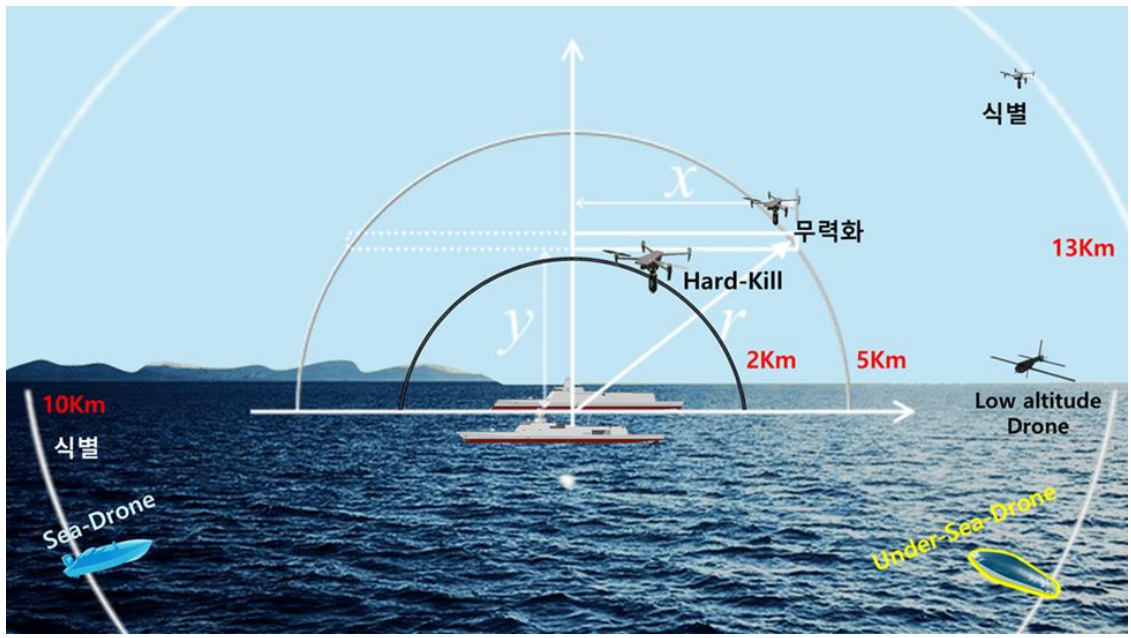
- ✓ 6 Bay X Elijah C-UAS Radar
- ✓ 1 X RF Scanner
- ✓ 2 X Jammer FD-8
- ✓ 2 X MWIR Camera

NAVAL GUARDIAN NEPTUN

Development Direction of Naval CUVS for the ROK Navy (Opinion)

- **Effective drone defense is essential in various scenarios as it extends across the entire range of naval vessels.**
  1. **Coastal operations**: Early detection and mitigation are essential as operations near the coast may expose disadvantaged or vulnerable platforms to drones launched from land.
  2. **Congestion points**: Narrow waterways such as canals and island clusters increase vulnerability, requiring a comprehensive 360-degree defense system.
  3. **Shipyards and ports**: Frigates and other vessels are particularly vulnerable to drone attacks at these stages.
  4. **CCP Militia**: Maritime militias can conduct asymmetric warfare where drone human wave tactics are expected through learning from fish finders, etc. It is necessary to develop a system capable of defending against group, small, suicide, and swarm drones..
- Naval vessels navigating coastal areas, choke points or during transit operations have limited maneuverability (RAM), making them more vulnerable to drone attacks, a factor also important to the International Regulations for Preventing Collisions at Sea (COLREGS) 1972 (restricted mobility).
- **Therefore, the following development concepts should be considered.**
  1. **Detection and mitigation**: 360-degree detection and mitigation capabilities and simultaneous handling of multiple threats to keep the ship safe.
  2. **Information and updates**: Provide up-to-date information on the latest drone threats, including range, payload, and ease of acquisition, with an extensive library, and prepare for the latest drone threats through regular software updates.
  3. **System integration and hybrid capabilities**: Minimize installation space and integrate into existing systems.
  4. **Powerful API**: Enable central control through easy integration with ship platform command and control systems.
  5. **Operate the system** through a dedicated tablet with a c**lear and user-friendly interface.**
  6. **Provide autonomous mode** → No need for constant human intervention, freeing up manpower.
  7. In particular, systems on naval platforms have many specific requirements (must withstand vibration, salt water, not interfere with numerous sensors in the vicinity, and high-quality stabilizers must be developed and operated.
- **Direction of application of the ROK Navy's anti-drone defense system (opinion)**
  - **Electricity** → The integrated mast requires a huge amount of electricity, so the AESA radar system cannot be operated all the time except during 'operations'. However, the operational environment of the ROK is at high risk of being exposed to irregular warfare all the time (operations near the coast, traffic congestion points, vulnerable defense locations such as shipyards and ports, areas where Chinese maritime militia appear, etc.), so the system needs to be integrated but can be operated independently all the time..

- **Defense range** → In addition to high-altitude (over 8 km) infiltration, it is necessary to adopt an anti-drone system that can cover low-altitude & cluster infiltration such as small, high-speed drones, surface infiltration in the form of high-speed boats or underwater propulsion vehicles, and underwater infiltration using Frogman's torpedo launcher.



- **System compatibility. Integration** → Hybrid system application with training mode, normal mode, and operation mode along with integration (or compatibility) with I-MAST
- **Need to expand power generation capacity and cooling performance** → Prepare for the loading of high-energy weapons (directed-energy weapons) such as lasers and HPM electromagnetic waves.
- Defense strategy with a different concept from torpedoes against **Sea-Drone (USV) and Under-the-Sea Drone (UUSV)**

Report
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