

Range Interoperable Watchdog Spar Node

(ONR-Aligned Demonstration)

- Core Design Philosophy
 - User-friendly, standardized, operational platform
 - Common pre-agreed mechanical, electrical, and data interfaces
 - Plug-and-play payload integration (Navy, academic, industry)
- Range-Relevant Function
 - Stable spar deployable across Florida and Navy test ranges (e.g., SFOMF)
 - Continuous environmental context (sea state, met-ocean, activity record)
 - Low data-rate alert channel + event-triggered data retrieval
 - Range-user dashboard for customizable data access (real-time & post-test)
- Operational Value to Range Users
 - Persistent reference node during T&E activities
 - Time aligned environmental and activity records
 - Rapid integration with existing range instrumentation
 - Reusable infrastructure across multiple experiments and users
 - **Designed to augment user experiments and not interfere with them**

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- Earlier spar-based experiments, including VHF propagation and near-surface heat flux measurements, demonstrated the Spar buoys unique value set historical precedent for range-relevant environmental reference measurements
- The CCSB builds on this lineage where interface and near surface water expressions were accurately measured
- This efforts directly align with oceanographic and atmospheric sensing interests ONR (Code 32 Marine Meteorology), where high-resolution air–sea interaction data near the interface is operationally valuable.
- Response to Feedback
 - The proposed Watchdog Spar experiment explicitly prioritizes near-surface atmospheric and air-sea interface measurements, combined with stabilized optical sensing using the MEMS FOVEA system previously field-tested at SFOMF



Oceanographic
Spar Experiments
(VHF & Heat Flux)

Range Interoperable Watchdog Spar Node

(ONR-Aligned Demonstration)

- Partnership: SFOMF plus Florida Navy Labs plus NOVA/UF/FAU/UM/HBOI
- Transforms a buoy from “research hardware” into a range-supporting reference infrastructure node.
 - Above-water sensing: cameras, FOVEA, AIS/VHF, meteorology
 - Near-surface sensing: heat flux, wind, wave, air–sea interface
 - Below-water sensing (optional): disturbance, motion, acoustic context
 - Low data-rate alert channel (LoRa / LPWAN class)
 - Event-triggered high-value data retrieval
- Why Navy Ranges and why SFOMF, AUTECH and PCD
 - Different yet the same needs, some history among Florida Laboratories
 - Repeatable experiments
 - Existing instrumentation ecosystem
 - Immediate T&E relevance

A standardized spar node that answers “What was the environment, and what activity occurred, at the time of the test?”

Range Interoperable Watchdog Spar Node

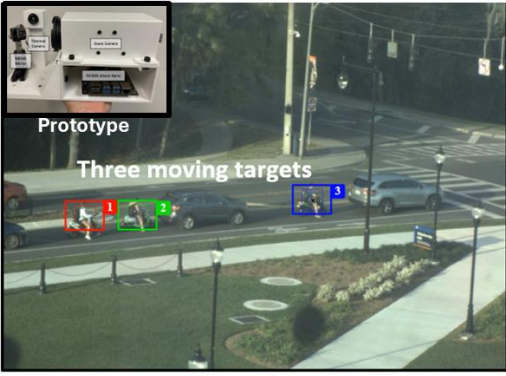
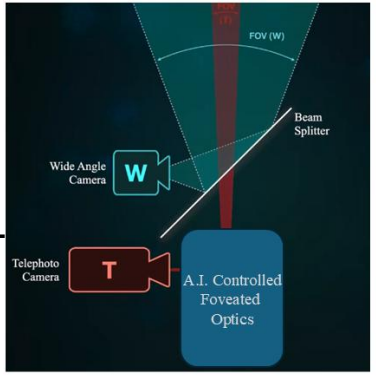
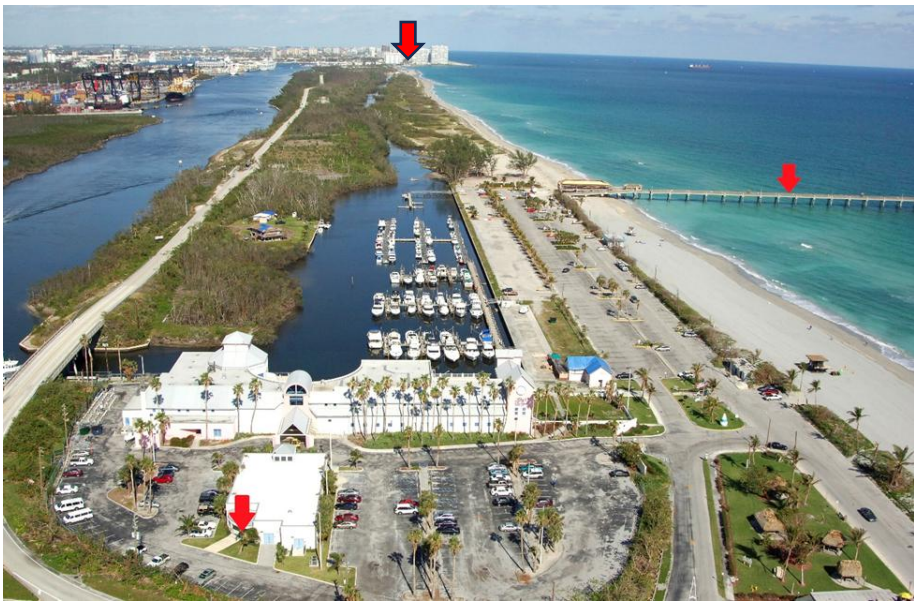
CCSB Progress: Standardized Interfaces, Senior Design, and Prior SFOMF Testing

- Demonstrated Progress
 - Senior Design process established with FAU Ocean Engineering
 - Iterative mechanical and sensor integration workflow
 - Repeatable build and deployment methodology
 - Evolution from WETS → CCSB host platform
- Standardization
 - Common mechanical mounting interfaces
 - Modular sensor payload bays
 - Agreed connector philosophy (marine + low-cost options)
 - Low data-rate communications for:
 - Alert events
 - Status monitoring
 - On-demand data transfer
- FOVEA & Prior Navy-Relevant Testing
 - Tested twice in coordination with SFOMF-related efforts
 - Proposed integration onto CCSB as stabilized optical payload
 - Enables persistent surveillance and sensor platform for observation

Watchdog Spar FOVEA Testing at SFOMF

Field-tested MEMS FOVEA imaging at SFOMF (two campaigns)

- Pier-based validation and long-range maritime observation
- Prototype hardware and data workflows demonstrated
- Transition from shore testing to spar-based deployment
- Proposed integration on CCSB for persistent, range-useful sensing



1. Block Diagram

Wide angle image

2. Preliminary Results

Multi-fovea

SHORT POA&M

- Phase 0 – Coordination (0–3 Months)
 - Engage SFOMF range stakeholders and ONR Code 321/32 points of contact
 - Define standardized interface requirements (mechanical, electrical, data)
 - Identify priority payloads (met-ocean, FOVEA, wake/environment sensors)
 - Confirm deployment envelope and range compatibility
- Phase 1 – Prototype Integration (3–6 Months)
 - Integrate FOVEA payload onto CCSB stabilized platform
 - Implement low data-rate telemetry (LoRa / LPWAN class)
 - Develop secure data architecture and dashboard prototype
 - Conduct pier-side and controlled environment validation (SFOMF-style)
- Phase 2 – Initial Range Demonstration (6–12 Months)
 - Deploy CCSB Watchdog Node at SFOMF
 - Continuous environmental logging (met-ocean + activity record)
 - Event-triggered data capture and dashboard validation
 - Compare spar-based measurements to existing range instrumentation
- Phase 3 – Multi-Range Interoperability Demonstration (12–24 Months)
 - Adapt deployment model for additional Navy ranges (AUTEK, PCD, etc.)
 - Validate repeatability and standardized integration workflow
 - Document operational value to range users and T&E programs
- Develop transition pathway for reusable infrastructure adoption

Bottom line (my take)

- WETS: ONR T&E Level 4 → early Level 5 “In my assessment...”
- CCSB (Common Coastal Spar Buoy): ONR T&E Level 5 (bordering on Level 6 for specific functions, In my assessment...”
- Why This Matters Now
 - Increased vessel traffic and shoreline development
 - Greater scrutiny of wake impacts and environmental disturbance
 - Need for objective, time-aligned data rather than anecdotal reporting
 - Need to have some working standardization of products useful to the navy T&E ranges
- Why This Requires Partnership
 - Academic groups advance sensing, modeling, and interpretation
 - Industry builds systems that can be deployed and maintained
 - Navy and government test ranges enable controlled evaluation and transition

Continued progress depends on coordinated academic, industry, and government collaboration