ESCUELA NAVAL DE CADETES
"ALMIRANTE PADILLA"
Honor y Tradición

Editorial

Engineering and Technology for Naval Innovation, Defense, and Digital Transformation

Ingeniería y Tecnología para la Innovación Naval, la Defensa y la Transformación Digital

It is an honor to present this new volume of OnBoard Knowledge Journal, which consolidates the journal's trajectory within the disciplinary fields of Engineering and Technology, areas that are increasingly essential to the advancement of maritime, riverine, and defense capabilities in Colombia. The eight contributions included in this issue reflect a robust academic ecosystem that aligns scientific inquiry with the operational and strategic needs of the nation's naval sector. Such alignment is particularly relevant to the mission of the Escuela Naval de Cadetes "Almirante Padilla" (ENAP), whose role as a national benchmark for naval education positions it at the forefront of technological development, scientific training, and innovation with impact.

The first thematic axis in this volume centers on artificial intelligence, autonomous systems, and computational models for decision-making and training. These works explore the development of adaptive intelligent agents, the implementation of reinforcement learning strategies, and the formulation of comparative analytical frameworks for national AI governance. Such contributions demonstrate how advanced computational methods can enrich training environments, improve situational awareness, and guide institutional strategic planning. For a naval academy that prepares future officers to operate in complex, data-driven scenarios, these approaches strengthen the pedagogical and technological foundations required for modern maritime operations.

A second group of studies focuses on defense-oriented engineering, sensor technologies, and the strengthening of national capabilities in advanced naval systems. These contributions discuss the relevance of designing and developing electro-optical components for Remote Weapon Stations, the importance of surveillance technologies for autonomous aquatic vehicles, and the operational benefits of reducing reliance on foreign suppliers. Engineering efforts of this nature directly support the self-sufficiency goals of the Armada Nacional de Colombia and resonate with ENAP's long-term commitment to cultivating a national culture of research, innovation, and technological independence in the naval sector. Through these investigations, engineering becomes a strategic instrument to improve precision, responsiveness, and security in maritime and riverine environments.

A third thematic axis brings together research on cybersecurity, digital education, and ethical formation in technological contexts. These works highlight the vulnerabilities associated with digital environments, propose tools that promote cybersecurity awareness, and emphasize the importance of integrating ethical frameworks into technological education. For an institution like ENAP, whose professionals will lead naval units reliant on digital networks, autonomous systems, and mission-critical communications, such studies reinforce the necessity of fostering responsible, secure, and resilient use of technological infrastructures.

Finally, the volume includes research oriented toward instrumentation and educational innovation, exemplified by the development of interactive sensor-evaluation kits for IoT learning environments. These engineering tools strengthen the practical formation of students and support ENAP's mission to train officers capable of understanding, operating, and maintaining increasingly complex technological architectures aboard naval platforms.

Collectively, these studies reaffirm that Engineering and Technology are essential pillars for the scientific and operational advancement of the naval sector. They illustrate how academic research can respond to institutional needs, contribute to national development, and prepare officers and professionals to navigate the technological challenges of the 21st century. As Editor-in-Chief, I extend my gratitude to the authors, reviewers, editorial committee, Dean of research and doctoral studies, and collaborators whose rigorous work makes this volume possible and strengthens the scientific mission of the Escuela Naval de Cadetes "Almirante Padilla."

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