Enhancing Underwater Wireless Sensor Networks With Flexible Communication and Positioning

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Abstract*: An innovative approach centred around underwater wireless communication and positioning in Underwater Wireless Sensor Networks, addressing limited coverage by proposing a dual-hop system combining optical fiber and wireless links. Time frame design and Code Division Multiplexing Access enhance multi-user signal transmission efficiency. Proof-of-concept experiments validate feasibility, with the introduction of the hybrid fish eye routing protocol further enhancing performance by intelligently combining fish-eye routing and traditional protocols for improved coverage and reliability. Moreover, the hybrid fish eye protocol incorporates adaptive routing algorithms that dynamically adjust to changes in underwater conditions, ensuring robustness and adaptability in challenging environments. Additionally, the hybrid fish eye protocol optimizes energy consumption by minimizing unnecessary transmissions, thereby prolonging the lifespan of underwater sensor networks. With full-duplex communication, precise positioning, and an extended transmission range, convergent system demonstrates significant potential for supporting high-capacity transmission among mobile nodes in forthcoming underwater scenarios.*

Keywords: Underwater Wireless Sensor Networks, Underwater Communication Networks, Hybrid Fish Eye Routing Protocol, Node Positioning, Environment Monitoring, Network Throughput, Data Collection