

# **AIoT-Driven Smart Aquaculture: Technologies, Applications, and the Road Toward Resilient Marine Farming**

Liang-Bi Chen

Associate Professor of Computer Science

National Penghu University of Science and Technology, Taiwan

[liangbichen@gms.npu.edu.tw](mailto:liangbichen@gms.npu.edu.tw)

## **Abstract**

Climate change and increasingly unpredictable marine environments are reshaping the future of traditional cage aquaculture. To address these challenges, the integration of Artificial Intelligence and the Internet of Things (AIoT) is rapidly transforming aquaculture into a highly automated, data-driven, and resilient production system. This keynote will explore the core technologies enabling smart aquaculture—including adaptive water-quality sensing, fish behavior analytics, intelligent feeding mechanisms, and edge-AI computing frameworks. By combining real-time sensing with AI-powered decision models, aquaculture operators can achieve predictive maintenance, precision feeding control, operational efficiency, and sustainable resource utilization. Practical deployments such as the Penghu Smart Aquaculture Demonstration Project and the AIoT Box ecosystem will be shared to highlight how AIoT can accelerate digital transformation and unlock scalable, energy-efficient, and commercially viable smart farming architectures. Finally, the talk will examine emerging challenges—including data governance, model robustness, cybersecurity, and industrial adoption—and propose a forward-looking roadmap toward building resilient next-generation marine farming systems.

## **Bio**

Dr. Liang-Bi Chen is an Associate Professor and Chair of the Department of Computer Science and Information Engineering at the National Penghu University of Science and Technology (NPU), Taiwan. He received his B.S. and M.S. degrees in Electronic Engineering from the National Kaohsiung University of Applied Sciences in 2001 and 2003, and earned his Ph.D. in Electronic Engineering from Southern Taiwan University of Science and Technology in 2019. Dr. Chen has held research positions at internationally recognized institutions, including the National University of Singapore, the University of California, Irvine (USA), and Waseda University (Japan). His industry experience includes engineering and executive roles at BXB Electronics Co., Ltd., where he contributed to R&D strategy and technology leadership. His research focuses on Internet of Things (IoT), Artificial Intelligence of Things (AIoT), low-power embedded system design, VLSI design, digital audio signal processing, system-level exploration, and engineering education. He has actively contributed to the IEEE community as an Associate Editor of IEEE Access, Section Editor Leader and Guest Editor-in-Chief for IEEE Technology and Engineering Education, and committee member of several international journals and conferences. Since 2022, he has served as Chair of the IoT Technical Committee within the

IEEE Consumer Technology Society. Dr. Chen is a senior member of IEEE and a member of IEICE and PMI. His work has been recognized internationally, receiving awards including the 2021 IEEE Chester Sall Award (Best Paper Award – IEEE Transactions on Consumer Electronics), the 2018 Publons Top 1% Reviewer Award, the IEEE Education Society Student Leadership Award, and several best paper and demo awards across IEEE conferences.