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Abstract

Aquaculture is one of the fastest growing food producing sectors in the world, and its economic importance is increasing. Due to the increased demand for food, market pressure and growing concern about environmental and food quality issues, special techniques have been developed and applied to increase food production and improve product quality. Scientific advances in recent years in this sector have been facilitated largely by the application of science and the introduction of new technologies^[1]. Emerging technologies in areas of sensor network, network computing and ubiquitous computing are enabling the development of practical and innovative solutions, improving monitoring and decision-making capabilities^[2]. Innovations in water quality monitoring, fish feeding, biomass estimation, fish behavior monitoring, disease diagnosis and food waste management can not only improve the degree of automation of aquaculture and the level of scientific management, but also reduce the cost of production, improve environmental control and increase product quality^[3]. Despite the great progress of science and technology, the optimization and management of production processes of aquaculture systems is facing great challenges^[4]. The objectives of the present work are to review and analyze the currently scientific advances in technology applied in aquaculture systems, exploring the processes, architectures, the automation level and the role of sensors and new information technologies in this sector of activity.

References: ^[1]Bostock, John. 2011. The Application of Science and Technology Development in Shaping Current and Future Aquaculture Production Systems. *J. AGR. SC.* 149(S1):133-41; ^[2]Aqeel-Ur-Rehman, Abu Abbasi, Noman Islam, Zubair Shaikh. 2014. A Review of Wireless Sensors and Networks' Applications in Agriculture. *Computer Standards and Interfaces* 36(2):263-70; ^[3]Simbeye, Daudi S., Shi Yang. 2014. Water Quality Monitoring and Control for Aquaculture Based on Wireless Sensor Networks. *Journal of Networks* 9(4):840-49; ^[4]Berggren, Alexandra. 2007. Thesis: "Aquaculture in Sweden: Towards a Sustainable Future." Stockholm University

Acknowledgements

Research is supported by Portugal 2020 AQUATROPOLIS project. The "AQUATROPOLIS - Intelligent Management System for Sustainable Aquaculture" is an Incentive System for Research and Technological Development (SI I&DT) project in cooperation with the following entities: Compta - Emerging Business, S.A.; AlgaPlus - Production and Commercialization of Algae and its Derivatives Lda; Domatica - Global Solutions, S.A.; Polytechnic Institute of Leiria (IPL); Polytechnic Institute of Tomar (IPT) and Tagusvalley - Association for the Promotion and Development of the Tecnopolo Valley of the Tagus Valley. The main objective of the "Aquatropolis" project - Intelligent Management System for Sustainable Aquaculture - is to develop a disruptive solution for an intelligent, optimized and automated management of aquaculture operations, in order to promote the sustainable development of the Aquaculture industry in the countries of the Atlantic region.