

ShrimpWiz: More animal welfare in indoor shrimp farming through AI

Project conducted by AWI and Oceanloop aims to use specially developed computer vision software to improve farming environment and make it more economical.

Shrimp in European supermarkets is almost exclusively sourced from farms outside the EU - often without any proof that it has been farmed in a welfare-compliant way. In the ShrimpWiz project, a consortium led by the Alfred Wegener Institute in cooperation with the company Oceanloop is investigating how indoor shrimp farming can be established in Europe and around the world that guarantees animal welfare and is economically viable for companies. They are using computer vision to automatically examine and care for the animals.

In shrimp farming, operators must regularly remove the animals from the water to weigh them and check their condition. However, this causes stress and reduces animal welfare. It is also almost impossible to detect symptoms of stress or disease, as turbidity, even under optimal light conditions, often limits in-situ observation. This is where the ShrimpWiz project comes in: Led by the Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research (AWI), a team of scientists and engineers in collaboration with Oceanloop, a pioneer in European indoor shrimp farming, has developed a system that can count shrimp in images using AI-based computer vision software. Under realistic farming conditions and in real time, the system can also determine the length of the animals with 95% accuracy.

Creating more awareness for sustainable and welfare compliant shrimp farming with AI

The first prototype has been tested at Oceanloop's research and development farm in Kiel, Germany. An advanced smartphone installed above the water surface automatically photographs the shrimp once a minute and transmits the data to a local server. Here, computer vision algorithms count individual shrimp in each image and measure their length. By improving the image quality and using the latest generation of AI-based image processing models, the team was even able to detect visual signs of stress in the animals.

Unlike pond farming, Oceanloop's systems use clear water for farming. These systems are therefore ideal for computer vision, as the consortium demonstrated in the previous MonitorShrimp project. Due to the high turbidity of the water in traditional pond systems, it is virtually impossible to visually monitor the welfare of the animals, either with the naked eye or with computer vision. Dr Stephan Ende, coordinator of the project at the AWI, is convinced that clear water technology is the key to animal welfare in intensive aquaculture: "The use of computer vision software to measure shrimp enables accurate and non-invasive monitoring of animal welfare and productivity in shrimp farming - 24 hours a day, 7 days a week. The clear water technology combined with our Early Welfare Alert software can be

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the starting point for more objective welfare labelling in the shrimp industry of tomorrow". The aim of ShrimpWiz" is to develop market-ready computer vision hardware and software for indoor shrimp farming that can capture all the necessary information in a single image, including biomass, stress and - at a later stage - possible diseases.

"Non-invasive, real-time monitoring of key farming parameters such as growth, feed conversion, survival and stress will make a crucial contribution to a better understanding of shrimp farming. To better understand the needs of our shrimp, we can use these economically important indicators to develop an artificial neural network that takes into account all available farm data, which can easily add up to more than a hundred," said Dr Bert Wecker, CTO of Oceanloop. Tomasz Kowalczyk, founder and CEO of NeuroSYS, which was involved in developing the algorithm for the project, explains: "Technological advances can transform companies and entire industries. We are ready to be part of this change and are working to bring the benefits of artificial intelligence and deep learning to the shrimp farming industry."

The consortium sees the development of AI-based software as an opportunity not only to improve animal welfare, but also to increase farming efficiency. The technology can help drive the digitalization of indoor shrimp farming, which is necessary to achieve today's retail price levels. "Proving the technical feasibility of alternative solutions is crucial to meet the growing awareness of customers and stakeholders for more sustainable and welfare compliant shrimp farming," concludes Stephan Ende.

The project is funded by the Federal Ministry of Food and Agriculture (BMEL) on the basis of a decision by the German Bundestag via the Federal Office for Agriculture and Food (BLE) as part of the innovation funding program.

About the consortium:

The Alfred Wegener Institute (www.awi.de), Helmholtz Center for Polar and Marine Research (AWI) conducts research in the Arctic, Antarctic and high and mid-latitude oceans. It coordinates polar research in Germany and provides the international scientific community with important infrastructure, such as the research icebreaker Polarstern and stations in the Arctic and Antarctic.

Oceanloop is a food tech company for recirculating aquaculture systems (RAS). The software-controlled, land-based artificial ecosystems are modulable, scalable and location-independent. Oceanloop sets new standards in terms of quality, sustainability and

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productivity, contributing to the growing demand for climate-friendly protein sources.
(www.oceanloop.com)

NeuroSYS (neurosys.com) is a team of experts in AI, machine learning and digitalization. Since 2010, NeuroSYS has completed over 100 complex AI and IT projects for clients around the world, optimizing operations in various industries. The company specializes in the application of cutting-edge technologies in sectors such as manufacturing, agriculture, healthcare and pharmaceuticals.

Further information:

[Project ShrimpWiz](#)

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