



BIOMASS ESTIMATION SYSTEM IN AQUACULTURE BASED ON 3D IMAGES

TECHNOLOGY OFFER



ABSTRACT

In **aquaculture**, the food costs represent approximately 45% of the operating costs in a fish farm. Thus, the **reduction of food costs** is essential to achieve the sustainability of such industry, existing great potential both in the reduction of food costs per unit and through the adoption of appropriate food management strategies. The present invention solves typical technical problems in this area (variable fish speed, low resolution or measurement errors in the calculation of the weight and height of the fish) through the reconstruction of 3D images.

The system comprises a frame that defines a cube whose interior is divided into two different zones: the first one is a passage for the fish and a second one is configured to prevent the access of fish to its interior and where several sensors for oxygen, pH, conductivity and turbidity are provided, as well as an RFID reader device connected with an RFID antenna arranged in a frame at the entrance of the fish passage zone. Unlike current systems, this technology works out the **biomass in real time** based on the volume of the fish and its density. It also uses a **discretization and tracking** algorithm and, with the use of all the obtained variables from the sensors and the use of neural networks, **predictions of the state and behaviour** of the fish can be performed.

INNOVATIVE ASPECTS

- ✓ This system makes accurate estimations based on the volume of the fish and its density by 3D image reconstruction with two cameras and stereographic technology.
- ✓ Unlike other systems, in which the selection of the fish is done manually by a technician, this technology uses a fish discretization and tracking algorithm, which can also help to follow the fish even when they overlap each other.
- ✓ The system has an antenna that, together with a reader, constitutes a radio frequency (RFID) system that allows real-time identification of the fish. This novelty provides a substantial improvement in the estimation of biomass as it allows the individual fish biomass to be monitored and compared with the global calculation.
- ✓ The system has a set of sensors that check the state of the medium at all times (oxygen, pH, conductivity and turbidity). Being a system that works continuously, with the use of all those inputs and the use of neural networks, **predictions of the state and behaviour of the fish** can be obtained.

COMPETITIVE ADVANTAGES

- ✓ **Reduction of operating costs.** The daily ration of food that fish receive in intensive aquaculture is about 4% of the biomass present in the cages. This system improves the accuracy of the biomass estimation and, therefore, contributes to great savings.
- ✓ **Low cost equipment.** New low-cost stereo cameras allow to calculate depth and enable devices to see, understand, interact with, and learn from their environment.
- ✓ **Improvement of the biomass management** through an integrated RFID system.
- ✓ **Real time estimation** of the biomass present in a cage.

PATENTS

ES patent applied.
In time to seek international protection.

TYPE OF COLLABORATION

Licence agreement.

Principal Researcher

Francisco J. Ferrero Martín

Department

Ingeniería Eléctrica, Electrónica, de Computadores y Sistemas
(Electrical, Electronic, Computers and Systems Engineering)

E.mail

otri@uniovi.es