



BIOMASS DETECTION SYSTEM IN AQUACULTURE BASED ON OPTICAL SENSORS AND NEURAL NETWORKS

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ABSTRACT

In **aquaculture**, the food costs represent approximately 45% of the operating costs. 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. On the other hand, the **fish count** is especially indicated in the case of rivers where it is desired to have a control of the fish population. The present invention solves typical technical problems in estimating biomass (variable fish speed, low resolution or measurement errors in the calculation of the weight and height of the fish) through the use of new high-resolution optical systems, low-cost electronics and algorithms with neural networks.

This technology relates to a **novel biomass estimation system** in aquaculture based on optical sensors and neural networks comprising two identical optical barriers. Each of these barriers comprises a first emitter block of photoemitters in the infrared spectrum and a second receiving block of photoreceptors in the infrared spectrum, and also means for identifying the fish by radiofrequency, in such a way that a unique identification of each fish occurs when passing through the optical barriers. A subsequent classification of the fish identified will be done through neural networks.

INNOVATIVE ASPECTS

- ✓ Through 2D image processing, the system allows to identify the fish even when they pass in groups, and also to differentiate them from other objects.
- ✓ The system uses a high-resolution optical system, and due to current smaller and more powerful technology, the optical transmitters and receivers can be placed at a smaller distance from each other and thus obtain a more real fish profile.
- ✓ By incorporating radio frequency (RFID), it is possible to identify at every moment the fish that is going through the barriers. This novelty provides a substantial improvement in the estimation of biomass, since it allows knowing in real time the biomass present in the cage and, depending on it, managing online the automatic feeding system.
- ✓ Through the use of neural networks, the system allows the unambiguous identification of the object that passes through the barriers, discarding false positives.

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.
- ✓ **Integrated RFID system.** The radiofrequency identification system provides added value to the management of biomass in the cage.
- ✓ **Counting mechanism.** Installed in a salmon-scale farm, it would allow efficient management of the number of salmonids.

PATENTS

ES patent applied.
In time to seek international protection.

TYPE OF COLLABORATION

Licence agreement.