

(54) Title of the invention : FISH GROWTH TRAJECTORY TRACKING USING MACHINE LEARNING IN PRECISIONAQUACULTURE

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## (57) Abstract :

ABSTRACT Fish growth trajectory tracking using Machine learning in precision aquaculture The present disclosure relates to fish growth trajectory tracking using Q-learning module under a representative Nile tilapia bioenergetic growth model (*Oreochromis niloticus*). Fish growth rate is difficult to estimate at it constantly changes due to complex environmental conditions. Classic model-based control approaches are error prone nonlinear couplings and interactions between various factors like temperature, dissolved oxygen making the model uncertain for the fish growth system. To solve this problem reinforcement learning control module that is the so-called Q-learning module is introduced that do not require the growth model's knowledge and the complex aquaculture condition and extrinsic factors not restrained by the Q-learning module. Q-learning algorithm is directed using the growth trajectories data to adequately replicate the real aquaculture environment and perform the growth trajectory tracking. Herein, we consider two aquaculture environments such as re-circulating aquaculture systems and open-water cage cultures to identify the control policies that optimize biomass production in these two types of industrial setups.

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