

# IS ARTIFICIAL INTELLIGENCE THE NEW FISH FARMER?

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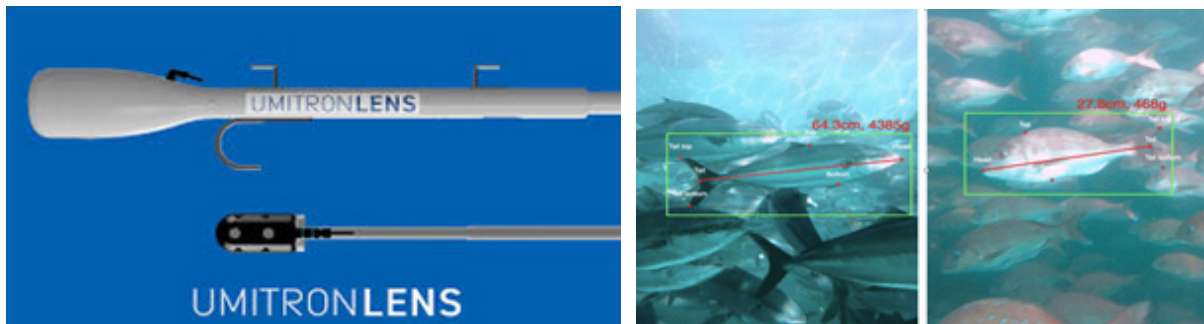
# INTRODUCTION

Artificial Intelligence is also termed as AI, which seemed an awestruck technology that could only be seen in Sci-Fi movies and shows is slowly becoming a reality. From Google to Apple all big shots are using AI to enhance the user hands on experience by simulating the human psychology inside a machine.

**Larry Page, Google Co-founder once said “One of our big goals in search is to make search that really understands exactly what you want, understands everything in the world. As individuals in the field of computer science, we designate the concept as artificial intelligence.”**

AI that is already dominating the technology world has made its way to the fish business as well. Of course, it had to happen since the need for smart farm management is increasing as the need to cope up with the speed of technological advancements is increasing and to reduce the extra manpower. Since the introduction of AI in the past decades, it has made quite a few contributions in the aquaculture sector as well like the introduction of automatic feeders to robofish and other interpretation devices such as UMITRON FAI (Fish Appetite Index) and UMITRON PULSE etc.

The Japanese firm UMITRON K.K. which was established in 2016 by Ken Fujiwara, Masahiko Yamada and Takuma Okamoto has been actively participating in making the aquaculture more precise by their AI technologies and IoT (Internet of Things). Some of the notable devices or services created by them are the UMITRON PULSE, UMITRON FAI (Fish Appetite Index), UMITRON CELL and the newly added UMITRON LENS.



## AI TECHNOLOGIES FOR NEED BASED AQUACULTURE:

As aquaculture has always been majorly dependent on the intuition and experience of the farmer, so if a farmer is able to track the growth cycle of the farmed stock it would be a dream come true for them. The conventional practice for measuring the growth of the fish is measuring its total length as the judgemental parameter for factors such as weight, age, and maturity by sampling a random number of fish frequently. This method is labour intensive and causes stress

to the fish. To curb this problem UMITRON has launched UMITRON LENS. This device utilises small stereo cameras and artificial intelligence that automatically measures the fish size in cages and uploads the data in the cloud storage. To achieve higher accuracy the company has developed a unique algorithm to achieve a high fish body measurement accuracy level. Unique as it sounds the CELL and FAI are no way behind. The CELL is a smart feeder which can dispense 400 kg of fish feed and is mounted with solar power management system, onboard computer, weight sensors, dispensing motor and a camera for 24/7 monitoring of the fish. It is connected to a desktop or a mobile phone over the internet which can be used to remotely control the feeder and monitor the video. As the farmers have access to the live video or the saved video, they can easily adjust the feed timing and amount of feed to be dispensed as well as can analyse the previous data to monitor the feeding behaviour of the fish stock. Along with the Fish Appetite Index (FAI) which is a real-time ocean-based fish appetite detection system in which machine language (ML) algorithm is used to analyse the fish appetite collected from the video data directly acquired from the farm, has made a magnanimous impact on the farmers engaged in tuna farming. The MSD Animal Health line of aquaculture solutions now includes

Vaki. The company offers a variety of tools, products, and technologies for measuring fish size and counting them from freshwater to saltwater rearing while gathering important information and analytics at each step of fish production. As smolts and fingerlings pass sensors at various phases of growth, Vaki's systems can count hundreds of thousands of them every hour. Vaki systems measure the fish's size each day while they swim freely inside the cages in addition to counting the fish when they are placed inside. Throughout the whole production cycle, infrared scanners and vision technology track the fish's average size, growth, and performance. This data gives salmon farmers the knowledge they need to optimise feeding and schedule harvesting. A web-based platform created by Canadian business XpertSea has the potential to revolutionise the aquaculture sector. The Growth Platform enables prawn and fish farmers to forecast animal growth, make necessary dietary adjustments, address production issues like illness or inadequate weight gain earlier in the process, and ultimately forecast harvest times more accurately than ever before. The combination of this technology and XperCount, a device that gauges organism growth and transmits that information to the Growth Platform, yields the most precise results. The Growth Platform leverages this information

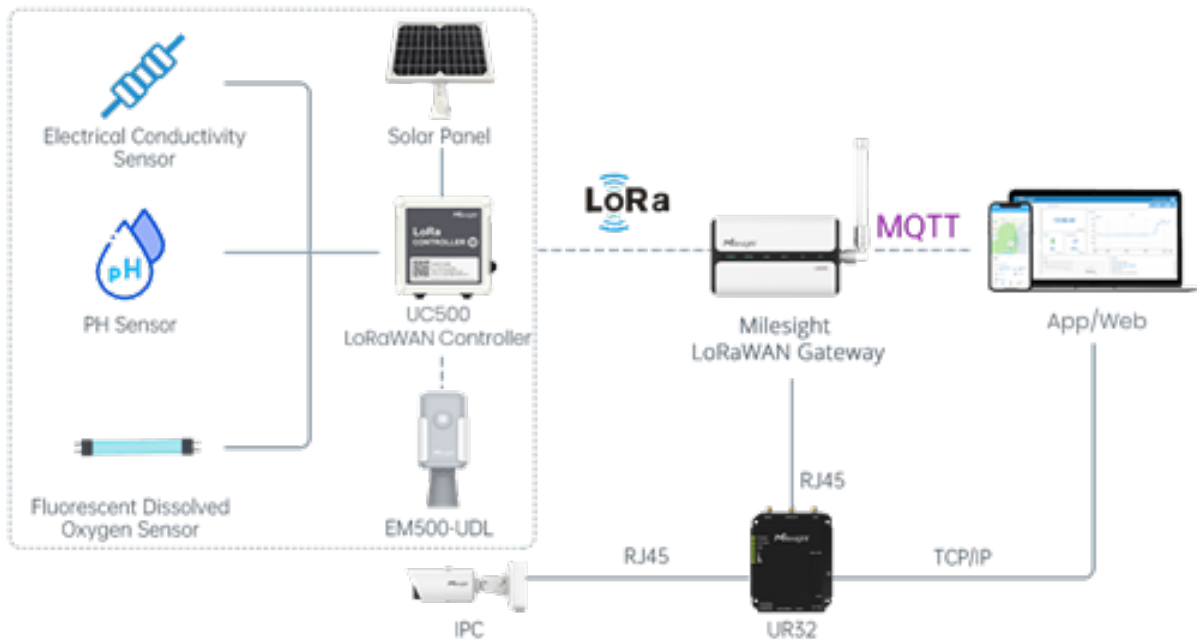


**XperCount<sub>2</sub>**  
 Count and Size Aquatic Organisms in Seconds  
 No More Hand Counts

[▶ WATCH OUR VIDEO](#)

- Total Count
- Average size
- Size distribution
- Detailed picture

to compute the daily growth rate, feed conversion ratio (FCR), stocking density, and survival rate by using artificial intelligence and computer vision to count, measure size, and weigh organisms.



A high-tech company called Milesight focuses on Internet of Things (IoT) technology like Artificial Intelligence, which efficiently runs and monitors fish farming operations while solving the drawbacks of conventional monitoring techniques. Through the RS485 industrial interface, the Milesight UC501 LoRaWAN® IoT controller can communicate with a variety of conventional sensors, such as electrical conductivity, pH, and fluorescent dissolved oxygen sensors. The assessment of water quality is quick and effective thanks to this integration. The LoRaWAN® technology used by the EM500-UDL Ultrasonic Level Sensor enables immediate transmission of pond water level data to the gateway via LoRaWAN® communication. This effective technology guarantees real-time water level monitoring, improving aquaculture management and encouraging ideal water levels. The Milesight WTS506 IoT Meteorological Station is made to gather meteorological information in real-time, such

as temperature, humidity, wind speed, wind direction, barometric pressure, and rainfall. Farmers get useful information about weather conditions that have an immediate influence on their operations by incorporating weather monitoring into the aquaculture system. To enable remote real-time monitoring, capture regular snapshots, store videos, and support playback functionalities, the implementation of a video surveillance camera in the breeding area is recommended. This 24/7 surveillance system is deemed essential in ensuring safe production in the aquaculture area while significantly enhancing work efficiency and farmer management capabilities. By providing improved oversight and real-time insights, farmers can make informed decisions, thereby promoting a secure and productive environment for their aquaculture operations. The Milesight IoT Cloud presents an assortment of advanced functionalities, whereby remote management of gadgets is attainable via the UC501 LoRaWAN® IoT

Controller's relay output. Administrators have convenient access to current water quality data through a personal computer or mobile application. Additionally, the cloud infrastructure facilitates the establishment of alarms to expedite notifications when conditions deteriorate below thresholds predetermined by users, thus enabling timely responses to alterations.



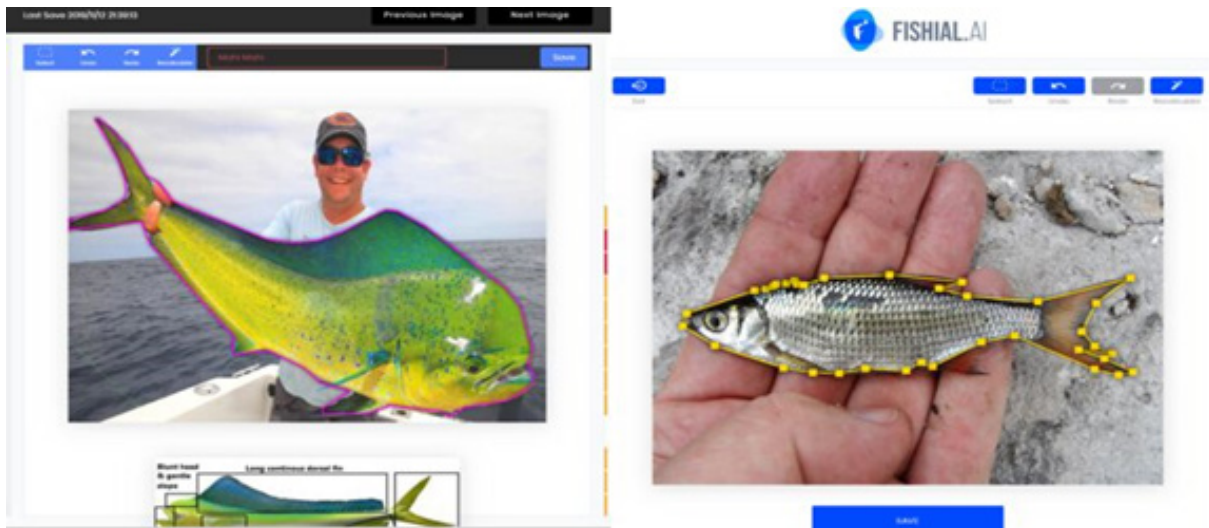
## AI FOR FISH CLASSIFICATION:

Fish species classification is an important task for biologists and marine ecologists to frequently estimate the relative abundance of fish species in their natural habitats and monitor changes in their populations. Fish Net is a species Classification and Size Estimation Application developed with a purpose of classifying fish species using CNNs and transfer learning and estimate their size using regression models. Mobile AI App for species Identification called CrabTech Crabifier app, which targets to improve efficiency and sustainability by allowing fishers to focus on their limited resource and to compare sources and grow out site for crablets, so farmers can be guided as to which crablet source is best for farms for minimising high risk. Integration of Data using Machine Learning, is a valuable application with numerous potential benefits for fisheries management and marine conservation for sorting juvenile fish to provide early life-history information for particular species. Another transformative advancement in the inculcation of AI in aquaculture sector is RIVER EYE App for biodiversity conservation. Rivers are the natural homes to aquatic organisms unfortunately threatened by Pollution, Climate change and other degrading agents. By harnessing the capabilities of AI, it allows for the continuous intelligent monitoring of River Ecosystems.



**FISHIAL.AI**  
ENABLING FISHIAL RECOGNITION™

The FISIAL.AI team presents a citizen science-based approach to aggregating worldwide images of fish species into a centralized open-sourced labelled dataset for machine learning known as FISHIAL.AI. It also provides free access to researchers and scientists to label their fish species images. The Catch ID Programme in FAO fisheries focuses on improving the accuracy and transparency of fish catch data. It encourages countries and vessels to report catch information, promotes traceability, enforces regulations, utilizes technology, fosters international collaboration, supports certification, and includes capacity-building efforts. This programme is a multifaceted approach aiming to combat illegal fishing and ensure sustainable fisheries management.



## FEED MANAGEMENT USING AI TECHNOLOGY:

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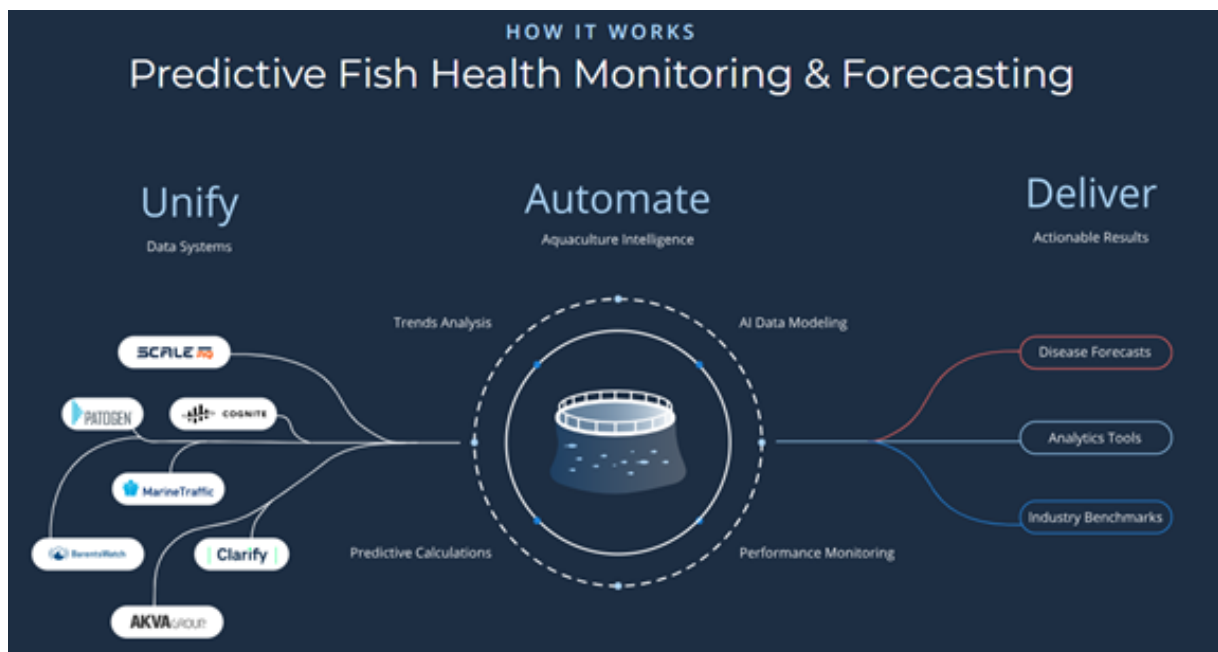


For land-based aquaculture operations, the Canadian company ReelData AI has created two noteworthy products: ReelAppetite, it is an automated system that accurately determines the population's appetite in real time and modifies the amount of feed being fed in order to maximise biomass while minimising waste, and ReelBiomass is the only biomass estimation camera system created from the ground up for re-circulatory aquaculture system (RAS) and flow through systems. In spite of heavy stocking densities, murky settings, and stationary fish, it integrates cutting-edge technology and land-based datasets to deliver precise findings. Because of its series a fundraising round's \$8 million plus USD total, the company recently gained media attention.

## AI FOR DISEASE SURVEILLANCE:

The concern for disease outbreaks in aquaculture system has always been a primary concern for the farmers. The mighty AI is also able to cope up with that as well and is proving its worth. Norway's Seafood Innovation Cluster in 2017 launched a platform named AquaCloud, a cloud-based program which aims to aid fish-health managers and researchers deal with the sea lice, with goal of reducing dependency on expensive medical treatment thus minimising stock mortality by predicting or preventing lice development in sea cages. Aquaconnect,

an Indian aquaculture technology start-up, has developed an app FarmMOJO. It is an AI driven app that provides scientific advisory solutions to farmers. It has been helping the shrimp farmers boost their productivity by helping farmers predict diseases and monitor water quality parameters. Critical parameters such as pH, salinity, dissolved oxygen levels, turbidity, pollutants as well as heart rates of the stocks all can be measured by sensor equipped drones. Interestingly, it has become a reality by the innovation of robotic fishes introduced by SHOAL which detects and



collects data on underwater pollution sources in and around the farm vicinity. Fishency360 is a comprehensive hardware and software solution aimed at enhancing the welfare of fish by monitoring their health, lice infestations, and growth in the pen. Employing a 360° perspective, the entire surface of each fish is meticulously scanned and analysed. Another Company called Manolin Inc. (Manolinaqua) provide solutions for monitoring of health in fish farms. Instead of manually processing and assessing the risk, Manolin use their AI model to stop and overcome problems related to fish health before they occur. They make use of various data systems such as SCALE AQ, PATOGEN, MARINE TRAFFIC etc. to unify the data, then automate the data using predictive calculations, trends analysis, AI data modelling and performance monitoring to deliver actionable results such as Disease forecasts, Analytics tools and Industry benchmarks.

## CONCLUSION:

With the power of artificial intelligence farmers can remotely switch pumps, aerators, motors on and off. Demand and production can be adjusted and forecasted by altering the parameters of the program thereby giving the farmers credibility over improving farm efficiency and monitoring ability. Artificial Intelligence provides an enormous prospect of being “The Next Big Thing” in aquaculture vis-à-vis changing the whole way and building a repertoire about the aquaculture farming. But the question arises here, will AI totally replace the human effort? Of course not, without manpower nothing is possible, removing the misconception AI is only used to enhance the efficacy of the system and changing the hit and trial prospect to rigid scientific way of doing things. Fully embracing AI and automation can increase seafood production, reduce costs, and minimize the environmental impact of aquaculture operations. Well, wouldn't it be good that the farmer also gets to spend some time with his family? If you agree, then just use AI.