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# Blynk based aquaculture monitoring system using IOT

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## Abstract

Internet of Things (IOT) is one of the development trends technologies reduces the amount of human labor and creates an economy ethnic. Currently, IoT is applied in many fields such as medicine, agriculture, traffic system, training, monitoring, etc. It is the most important because aquaculture is an outdated field of applied science. As similar to In other areas such as agriculture, it is essential to identify problems that arise this field with the help of technology. The term Aquaculture mainly refers to Aquaculture such as fish and plants takes place in many forms aquatic environments, including lakes, rivers, ponds, oceans, and artificially closed areas terrestrial environmental systems. Aqua culture plays an important role in economic development and food production in our country. adopt fish can quickly and easily using monitoring systems. Water quality can be a fundamental problem and it depends on various parameters like pH, turbidity, Temperature, dissolved oxygen, Ammonia etc. Suggestion system continuous monitoring of water quality parameters by various sensors. The detected information is transmitted to the mobile phone of the aquarist via the web cloud waiter. It will also notify the aquarist about the data through the app. This system will activate automated farming system to make appropriate adjustments to the environment of the self-contained artificial pond. So the water quality parameters keeping a balance, culture is the root of health and development of living organisms. This system will monitor the water quality parameters and regularly access water quality parameters.

**Keywords:** Aquaculture; Web Cloud Waiter; Turbidity; Ammonia; IOT; Self-Contained Artificial Pond

## 1. Introduction

Recently, commercial aquaculture has faced many challenges due to different environmental conditions will alter the water quality parameters. Like currently, aqua culturists use manual verification strategies to find out the parameters of water may change longer and not exactly because of water quality parameters change over time. To avoid this problem, innovation should engage in aquaculture to enhance potency and limit losses due to continuous monitoring of water quality parameters. The goal of this project is to design and implement a distributed system for aquaculture water quality care through remote monitoring of pH, temperature and turbidity. This work will contribute to the framework of remote monitoring via IOT to filter the water quality in pond. The system is inexpensive, portable, modular and allows data sharing 3 through the cloud can be used for progress and improvement activities related to aquaculture.

## 2. Literature survey

The paper "[1]." Aquaculture monitoring and control system: An IoT based approach—The method implemented can facilitate the aqua culturist precise and reliable compliance with water parameters, in fact Manual testing will take more time and water quality parameters may vary additional IT time to take proactive measures before causing any damage. Despite the fact that the main cost is high, there will be no additional costs and maintenance after installation. Therefore, the proposed framework will achieve farmers to reduce damage from climate change and assert growth and aquatic

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health. This improves productivity, which improves foreign trade and increase the country's GDP. gather more information can be examined by big data analysis and necessary steps can performed before the water quality parameter crosses the limit value range. The automated hydro systems using IoT, reducing energy labour costs and consumption. "[2]." IOT for Aquaculture 4.0.— Water quality monitoring is not the only application of IoT for aquaculture. With data analytics and prediction, we can recommend some Artificial intelligence in farm management. For example, some oyster farms equipped with automatic machines to take the oysters out of the water (for the better evolution). One can easily imagine how artificial intelligence can be used to get smart decision to automatically lift the oysters out of the water in case of bad water quality status. "[3]." Water Monitoring IOT system for fish farming ponds— In this article, the IoT smart water monitoring system is presented to manage and improve fish production in fish ponds. The system currently being deployed includes the most important sensors that are needed to monitor water quality and notify on-site fishpond managers. We have updated this system by adding a hardware module that enables end users to monitor and in the future to control the most important parameters remote fish pond locations. Easy installation Wivity module and configured without high technical knowledge. In addition, if required by the end user, the Arduino platform can be remotely configured as a remote server or client easily, as well as hardware installation. The next module for mobile and web interfaces should be Developed for easier user interaction. In the future, we plan to expand IoT water monitoring system by adding many other types of sensors, like The sensor will measure the pH or dissolved oxygen that is important to the life cycle of the fish. .[4] Aquaculture monitoring and control system: An IoT based approached approach—The method implemented can be advantageous to the aqua culturist for Accurate and reliable compliance with water parameters, in fact the instructions for use testing will take longer and water quality parameters may change over time. in addition to taking proactive measures before any damage occurs. In spite of 7 the fact that the main cost is high, there will be no additional costs and maintenance after installation. Therefore, the proposed framework will achieve farmers to reduce damage from climate change and assert growth and aquatic health. This improves productivity, which improves foreign trade and increase the country's GDP. gather more information can be examined by big data analysis and necessary steps can performed before the water quality parameter crosses the limit value range. The Automated aquatic systems using IoT, reducing energy and labour costs consumption. [5] Construction of Internet of Things System in Coastal Aquaculture Environment. This study proposes an IoT smart coastal fish farm System can effectively increase fish production. System allows fish farmers to monitor environmental factors on their farm from far away. Proposed scheme to allow monitoring of water in ponds quality and use solar energy to generate electricity to reduce the cost of agriculture. Our recommendation system is not only workable in the future, but also have also undergone deployment tests in actual fish farms. Question system financially affordable equipment, can facilitate it extension and help farmers reduce establishment costs.

## 3. Proposed method and system architecture

This section comprises of two subsections which are the introduction of required hardware and software technologies and description of the functionality of the architecture.

### 3.1. Required hardware and software

#### *3.1.1. Sensors*

The Analog pH Sensor (shown in Figure no.1 a) is specially designed for Microcontrollers and has a built-in simple, convenient, and practical connection and features. It has an LED that works as the Power Indicator, a BNC connector, and a PH2.0 sensor interface. To use it, just connect the pH sensor with the BND connector, and plug the PH2.0 interface into the Analog input port of any Arduino controller. If pre-programmed, you will get the pH value easily

**Figure 1** pH Sensor

Turbidity Sensor (shown in Figure no.1 b) is specially designed to work with microcontrollers like Arduino, NodeMCU, Raspberry pi, and other microcontrollers. It is very efficient, it has ability to detect and verify the quality of the water, can measure the turbidity value of water. Theory of Operation: This sensor operates on the simple principle that when the light passed through a water, the quantity of light transmitted through the water id depended on the quantity of dust or impurities in the water. As quantity of impurities increases, the amount of transmitted light decreases.

**Figure 1 b** Turbidity Sensor

Waterproofed DS18B20 Arduino temperature sensor (shown in Figure no.1 c). It has ±0.5 °C accuracy from -10 °C to+85 °C. The upside of this sensor is just required one pin data communication for multiple sensors at once. One Wire Library for Arduino is used to measure temperature with this sensor. It is used to measure the temperature of liquids.

**Figure 1 c** DS18B20

Ultrasonic sensors (shown in Figure no.1 d) has two parts are transducers are transducers that convert ultrasound waves to electrical signals or vice versa. Those that both transmit and receive may also be called ultrasound transceivers; many ultrasound sensors besides being sensors are indeed transceivers because they can both sense and transmit. These devices work on a principle similar to that of transducers used in radar and sonar systems, which evaluate attributes of a target by interpreting the echoes from radio or sound waves, respectively. Active ultrasonic sensors generate high- frequency sound waves and evaluate the echo which is received back by the sensor, measuring the time interval between sending the signal and receiving the echo to determine the distance to an object. Passive ultrasonic sensors are basically microphones that detect ultrasonic noise that is present under certain conditions, convert it to an electrical signal, and report it to a microcontroller.

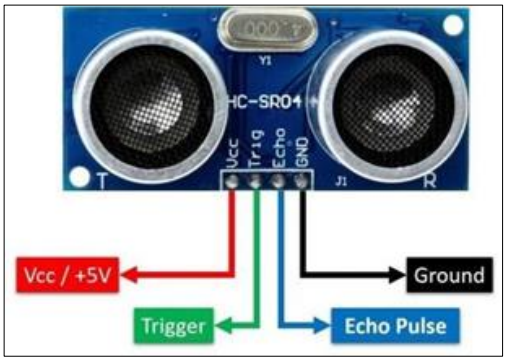


**Figure 1 d** Ultrasonic Sensor

### *3.1.2. Arduino*

As the sensors we use in this work are specially designed for Arduino, we use Arduino for sensor acquisition. Our Arduino version is Arduino UNO (shown in Figure no.2). Arduino Uno is a microcontroller board which is based on the ATmega328P. It has 6 analog input pins and 14 digital input/output pins. Its operating voltage is 5V and recommended input voltage range is 7-12V. Arduino IDE is required to program it. Arduino Uno should be connected to computer with USB cable to be programmed through USB to- serial converter. It can conduct data communication with computer via serial port

### *3.1.3. ESP8266*

Wi-Fi Module is a self-contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your Wi-Fi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. This module has a powerful enough on-board processing and storage capability that allows it to be integrated with the sensors and other application specific devices through its GPIOs with minimal development up- front and minimal loading during runtime.

### *3.1.4. Blynk*

Is a platform for the development of smart phone application that works with a wide range of microcontrollers like Arduinos and NodeMCUs. No need to program mobile interface and mainly it is an opensource platform. It mainly concentrates on the functionality. Each project can contain graphical widgets, like virtual LEDs, Buttons, value, Display, and even a terminal can interact with multiple devices. With the help of Blynk library in Arduino IDE, it is possible to control Arduino or NodeMCUs directly from your phone or Computer Wirelessly

## 3.2. System architecture

Now we will describe the architecture of our proposed monitoring system. Fig.2 shows the general scheme of our monitoring system.

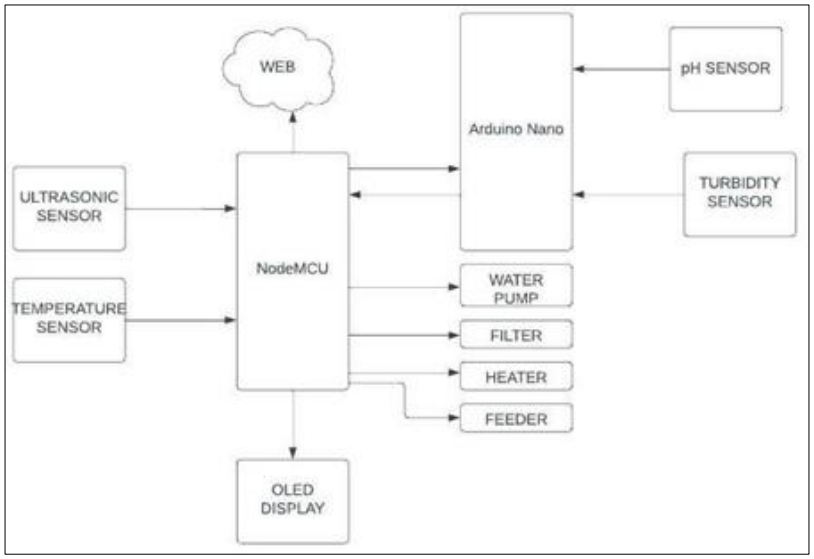


**Figure 2** General scheme

Input design is a user-oriented transition description of the item in the programmer-oriented specification. four different 13 The sensors are used to collect four different entrances of the aquaculture pond. This system uses a pH sensor to measure the pH of the water, an ultrasonic sensor to measure the water level in the pool, DS18B20 Temperature sensor for measure water temperature, turbidity sensor to measure the turbidity of water. pH sensor and turbidity sensor connected to Arduino nano as NodeMCU has only one analog pin, sensor input is collected as an integer and converted to a string, which is then converted to ButtonMCU (ESP8266). Ultrasonic sensor and DS18B20 sensor connected directly with NodeMCU which has 8 digital pins then data is transmitted to blynk server over Wi-Fi.

## 4. Results and discussion

As discussed, fishery supervisors use traditional methods and engineering and also use predictive models to measure water quality. In our model we reduce internet consumption and also create a cost effective solution Modeling and using the cloud to view results on mobile devices. The main goal of this system is provide real-time monitoring system using NodeMCU and Android Application and monitoring of aquaculture ponds via website. Suggestions The system was applied in an aquarium and the test was taken from different sensors. Below are plots collected by water quality Fig.3(b) shows the values in chart style in our app. Our app gives current status of the parameters and water condition (shown in Fig.3(a)). It also gives suggestion about required action according to the water condition. We see that pH, Temperature, Turbidity and water level in the app. Fig.3(c) shows the hardware prototype of the project.


**Figure 3 a** Web page

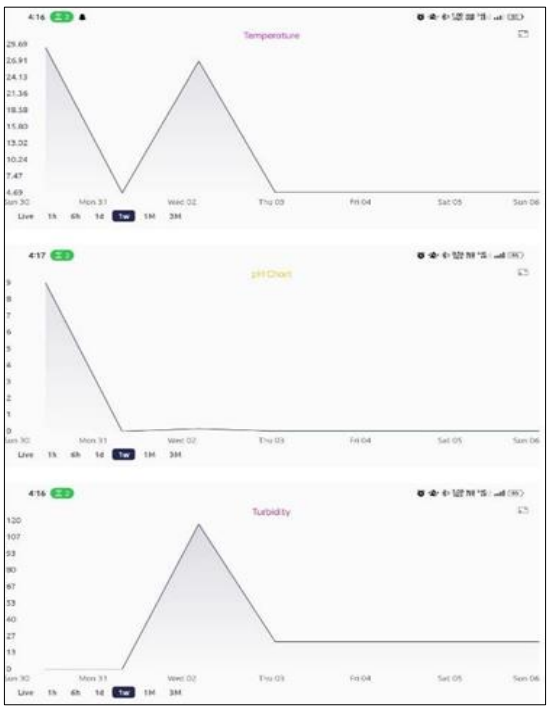


**Figure 3 b G**raphs

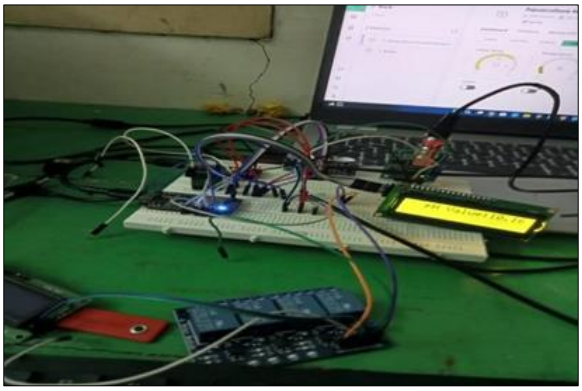

**Figure 3 c** Hardware prototype

## 5. Conclusion

In this article, we have introduced IOT . based aquaculture monitoring management system and improve fish production in fish ponds. The proposed system can assist aqua culturists with accuracy and reliability comply with the water parameters, the fact that manual tests will take longer and water quality parameters may change over time. He is more take proactive measures before damage is done. Thus, the frame implementation will reach farmers to reduce climate damage regulate and validate the growth and health of aquatic life. The sensors will Continuously monitor parameters and keep alert in case of changes and automatically change the fish's environment by turning on applications such as filtration, heating. The water level is also continuously monitored if water exceeds the setting of the water pump motor and vice versa but by reducing labor. The fish are also fed automatically every 6 hours. So the fish can get their food at the right time. It improves productivity, which improves foreign trade and increases GDP of nation. Automated aquatic system using IoT, reducing energy.

## Compliance with ethical standards

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*Disclosure of conflict of interest*

I truly do hereby declare that there is no conflict between us -the authors of this paper

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