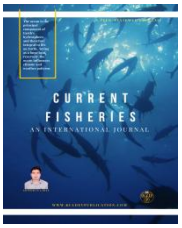
Current Fisheries: ISSN 0000-0000 (Online) 2023

List of contents available at KulDevWeb

Current Fisheries

Journal Homepage: www.current-fisheries.kuldevpublication.com



Review Article

A review of the system for monitoring and controlling fish farm aquaculture

*[1]Ramesh P. Khandare and [2]Akash R. Chaudhary

*[1,2]Department of Zoology, Shri Vasantrao Naik Mahavidyalaya, Dharni, Amravati-444702, Maharashtra, India

ARTICLE INFO

Article history:
Received 20 January 2024
Accepted 15 February 2024
Available online xxxx xxxx

Keywords:
Fish farming,
Aquaculture,
An IOT-system

ABSTRACT

The tiny aquarium and its ancillary equipment, which are used to nurture fish, have progressively evolved from functionalization to intellectualization with the advancement of information technology. The conventional ornamental fish culture of humans will alter significantly with the introduction of aquarium technology that can do remote autonomous monitoring. Fish are among the animals that need severe care in contrast to other aquatic pets like cats, rabbits, and hamsters. In most cases, fish have been left in dirty aquariums or fish breeding ponds due to neglect. A smart aquarium monitoring system that is based on the Internet of Things is one way to address the issues. In order to maintain fresh water in the aquarium for fish living habitats, this project proposes an Internet of Things-based Smart Aquarium Monitoring System. This device keeps an eye on the freshwater to provide a better environment for fish life. This device functions as a fish feeding system and is managed by a smartphone. The system is intended to employ controllers from NodeMCU and Arduino. The NodeMCU's Wi-Fi connectivity facilitates control of the operation between the controller and smartphone.

Selection and peer-review under responsibility of scientific committee of editorial board members of Current Fisheries and author (s) and suggested reviewer.

Introduction

The goal of this project is to create a fish monitoring system that enables users to see and manage an aquarium from a distance. For data collection and processing, the system makes use of a number of sensors, including temperature, turbidity, and ultrasonic sensors. It also uses an Arduino Uno microcontroller and a NodeMCU with server. Moreover, a servo motor and relay are used to regulate the water pump and other parts of the aquarium. For the local display of system information, an LCD screen is supplied. The system is also linked to the Adafruit IoT platform, enabling dashboard-based remote monitoring and control. Because of this, owners can keep an eye on and manage the aquarium from any location with an internet connection. The technology may find use in home aquariums, aquaculture, and research contexts that need remote control and monitoring of aquatic conditions. The overall goal of this project is to provide an economical and effective means of controlling and monitoring fish populations.

* Corresponding author.
E-mail address: rameshkhandare5@gmail.com (Ramesh P. Khandare)

https://doi.org/10

In this work, an outline for monitoring aquaculture water quality utilizing an Arduino, Raspberry Pi, and a variety of sensors, as well as an Android application and a smartphone camera, is employed. This article uses pH, color, temperature, and electrical conductivity as water quality metrics. The Raspberry Pi and Arduino are employed for data processing and server functions, respectively, for sensor collecting gadget. Using the camera on a smartphone, a Raspberry Pi is used to take photos in order to determine the color of the water. Any user may use an Android application to check the water quality from anywhere in the globe via the internet and Wi-Fi when it is within the Wi-Fi threshold range. Using these four characteristics, an analysis is conducted to verify the state of the water, and appropriate action may also be taken.

An Internet of Things (IoT)-based smart water quality monitoring system is put into place to assist with ongoing water condition monitoring based on four physical parameters: pH, turbidity, temperature, and electric conductivity. Four independent sensors are linked to an Arduino Uno to determine the water parameters. The collected information is sent to an application created on the NET platform, where it is compared to the WHO standard value (World Health Organization). To ascertain if the water sample is drinkable, the water parameters may be examined in light of the observed parameters.

Current System:

Conventional aquarium monitoring is routinely collecting physical samples of water quality measures and visually observing the health and behavior of the fish. Water samples are taken by aquarium owners, who then analyze them for elements including pH, ammonia, nitrite, and nitrate. As well as warmth. They visually examine the fish to look for indications of stress or disease. Usually, the information gathered by this method is manually entered into a spreadsheet or logbook. The relative affordability and ease of use of classic aquarium monitoring systems is one of its key benefits. Aquarium owners who do not have the funds for more sophisticated systems can use these systems. Additionally flexible is traditional monitoring. Because the frequency of sampling may be changed to suit certain requirements.

System Proposed:

The suggested fish monitor and control system is a complete solution that gathers information on aquarium water conditions using a variety of sensors. The temperature, turbidity, and ultrasonic sensors are some of these sensors. After analysis and feedback, the data is sent to a node MCU server, which manages the relay and modifies the water pump and servo motor to maintain water levels and feed the fish. The LCD panel shows real-time data for monitoring reasons. The remote control feature of the system offers simplicity and flexibility, allowing aquariums to be used from any location at any time. With this technology, maintaining ideal conditions and providing a healthy living environment for fish is easy and hassle-free, which is projected to increase production and fish well-being in aquariums.

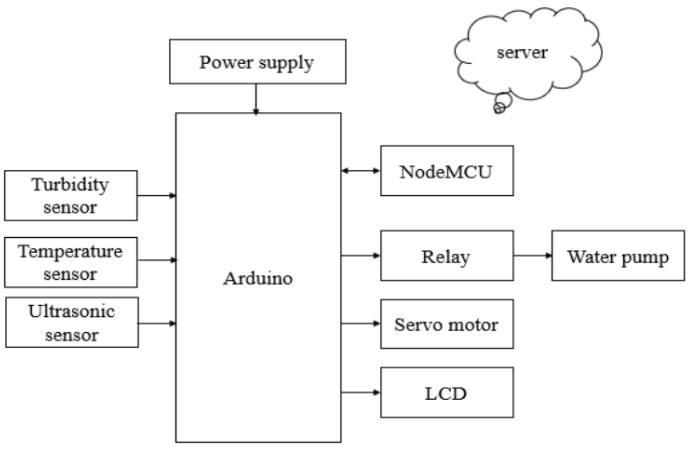


Figure-1) shows Block diagram

Description of hardware architecture module:

Arduino:

For the purpose of creating digital devices, Arduino is an open-source platform that creates and produces single-board microcontrollers and microcontroller kits. Different kinds of microprocessors and controllers are designed by Arduino boards. Digital and analog input/output pins that may be interfaced with bread boards and other circuits are included into the boards. The boards make use of a serial communications interface, some of them are equipped with a USB port. It may be coded in the C and C++ programming languages. The integrated development environment (IDE) is used for projects based on the processing language. It seeks to provide beginners an inexpensive and simple method.

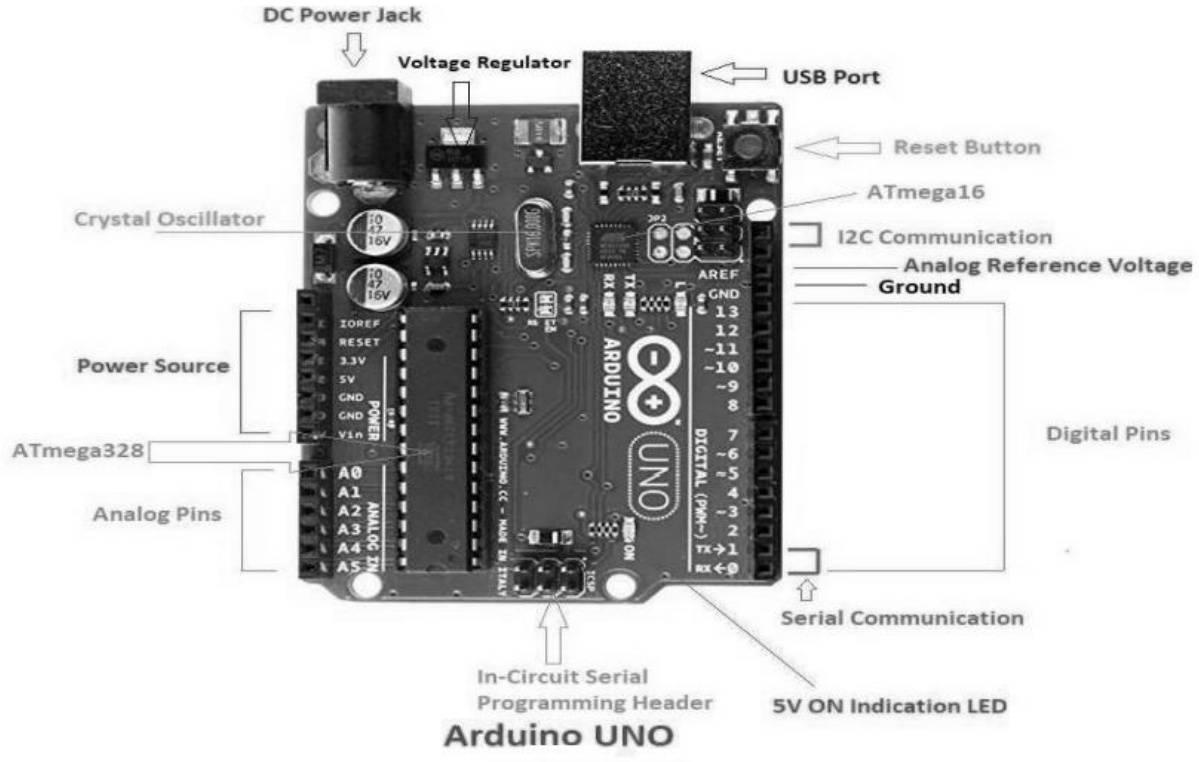


Figure- 2) Arduino UNO board

Temperature Sensor:

Determining the water's temperature is the most crucial physical analysis. It affects the water's chemical and biological composition as well as the amount of dissolved oxygen. One-wire interface makes it simple to interact with Arduino.

Procedure:

When it's wet, ensoris probe types are ideal for measuring water temperature. There is a temperature range of 55° to 125°C.

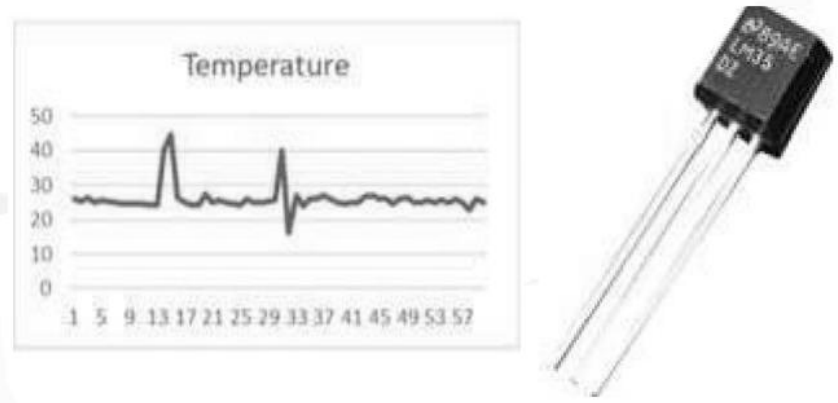


Figure- 3) Sensor of Temperature

Turbidity gauge:

The turbidity of water is determined by its total suspended solids (TSS) and clarity. It also shows the amount of germs and pathogens present. Water quality is continuously monitored to make sure that it stays within acceptable bounds. A turbidity sensor measures the amount of light dispersed by tiny particles called sold particles in water. The amount of turbidity in water increases as the amount of solid particles increases.

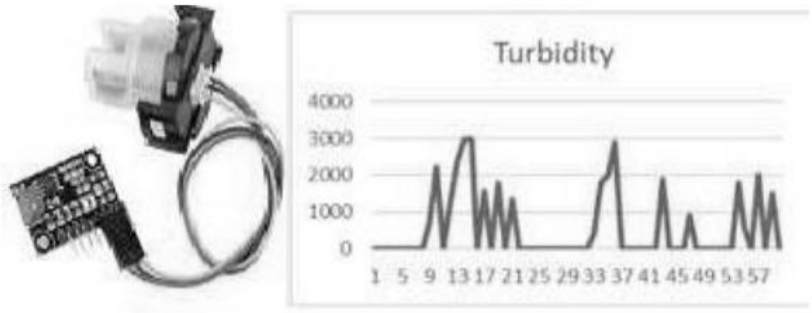


Fig: turbidity sensor

Results:

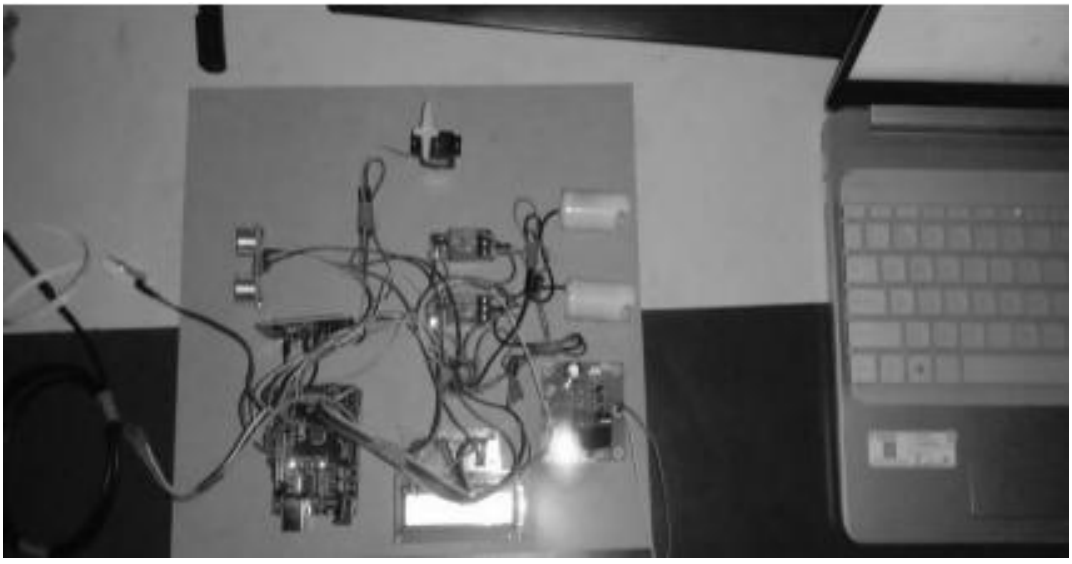


Figure- 5) shows proposed system

Summary:

Water quality must be preserved; contaminated water is unsafe for use and negatively impacts habitat. There are several approaches for carrying out the design and execution phase. For convenience, you may mix Wi-Fi and the Internet to get better results. For less money than any other method. Systems based on neural networks might be created for aquaculture species. It is possible to develop and deploy Raspberry Pi 3 systems, which allow for laboratory-scale monitoring. The temperature and dissolved oxygen data are obtained by dipping the temperature sensor into a shrimp farm. The temperature during the daytime is lower than the atmospheric temperature, and vice versa. Both automated and manual control mechanisms are available for feeding fish.

Future area:

With the use of IoT and WSN smart city projects, this system will be able to identify and analyze water's chemical characteristics in real time. It is possible to set up a base station to keep an eye on the quality across many locations. Fish counts may be conducted in conjunction with health assessments. It is possible to identify the physical and chemical factors that affect the water quality by adding more sensors. By creating an automated aquatic system, labor costs and energy usage may be decreased.

References

Hong-junzhu, "Global fisheries development status and future trend analysis", Taiwan economic research monthly,

James R. and K. Sampath, (2002): Effect of feed types on growth and fecundity in ornamental fish, Betta splendens (Regan). Indian J. Fish., 49:279-285.

Rodriguez, C. M. (1997): Phylogenetic analysis of the Contribution to vital statistics of a guppy Poecilia reticulata. Pan-American Journal of Aquatic Sciences (2008), 3(3): 335-339 339tribe Poeciliini (Cyprimodontiformes: Poeciliidae). Copeia, 4: 663-679.

Rojas, E., Gamboa, M., Villalobos, S. and F. Cruzado, (2004): Eficacia del control de larvas de vectores de la malaria con peces larvívoros nativos en San Martín, Perú. Revista Peruana de Medicina Experimental y Salud Pública, 21(1): 4 - 50.

Sajalsaha, Rakibul Hasan Rajib, SumaiyaKabir, "IoT Based Automated Fish Farm Aquaculture Monitoring system", Chittagong, Bangladesh

TAbinaya, J Ishwarya, M Maheshwari, "A Novel Methodology for monitoring and controlling of water quality in Aquaculture using internet of Things (IosssT)", International conference on computer communication and informatics, Coimbatore, INDIA