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A REVIEW ON FISH FARM AQUACULTURE MONITORING & CONTROLLING SYSTEM

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Abstract: With the progress of information technology, the small aquarium and its auxiliary equipment, which are used to raise fish, have gradually developed from functionalization to intellectualization. The aquarium equipment which can realize remote automatic monitoring will change people's traditional ornamental fish culture to a large extent. Fish is one of the pets that need intensive care compared to others pet like cat, rabbit and hamster since they live in the water. Usually, fish had been abandoned with lack of care such as unclean water in the aquarium or fish breeding ponds. An IoT-based smart aquarium monitoring system is one of the solutions to cater the problems. This project presents an IoT-based Smart Aquarium Monitoring System to keep a fresh water in the aquarium for fish life habitats. This system functions to monitor the fresh water for healthier fish life habitat. This system operates as fish feedings system and controlled by a smartphone in its operation. Arduino and NodeMCU controllers are used in the designed system. Wi-Fi communication on the NodeMCU is used between the smartphone and the controller to control the operation.

I. INTRODUCTION

This project involves the development of a fish monitoring system that allows users to remotely monitor and control an aquarium. The system utilizes various sensors such as a turbidity sensor, ultrasonic sensor, and temperature sensor, along with an Arduino uno microcontroller and a NodeMCU with server for data acquisition and processing. A relay and servo motor are also used to control the water pump and other aquarium components. An LCD screen is included for local display of system information.

Additionally, the system is connected to the Adafruit IoT platform for remote monitoring and control via a dashboard. This allows users to monitor and control the aquarium from anywhere with an internet connection. The system has potential applications in aquaculture, home aquariums, and research settings where remote monitoring and control of aquatic environments is needed. Overall, this project aims to provide a cost-effective and efficient solution for fish monitoring and control.

II. LITERATURE SURVEY

This paper an outline for monitoring of water quality for aquaculture is used using Arduino, Raspberry pi and various sensors, android application and smartphone camera. The parameters for water quality used in this paper are pH, colour, temperature and electrical conductivity. The sensor acquisition is performed by Raspberry pi and Arduino which is used as server and data processing device. To detect the colour of the water photo acquisition is conducted using Raspberry pi with the help of smartphone camera. Any user can check the water condition using an android application through Wi-Fi within Wi-Fi threshold range and internet from anywhere in the world. To check the water condition some analysis is performed with these four parameters and necessary action can also be taken.

An IoT based smart water quality monitoring system is implemented that helps in continuous water condition monitoring based on four physical parameters: temperature, turbidity, electric conductivity & pH properties. Arduino uno is connected with four sensors separately to find the water parameters. The acquired data is transmitted to a application developed using. NET platform and it is compared with the standard value of WHO (World Health Organization). The water parameters can be analyzed based on the measured parameters to determine if the water sample is drinking.

III. EXISTING SYSTEM

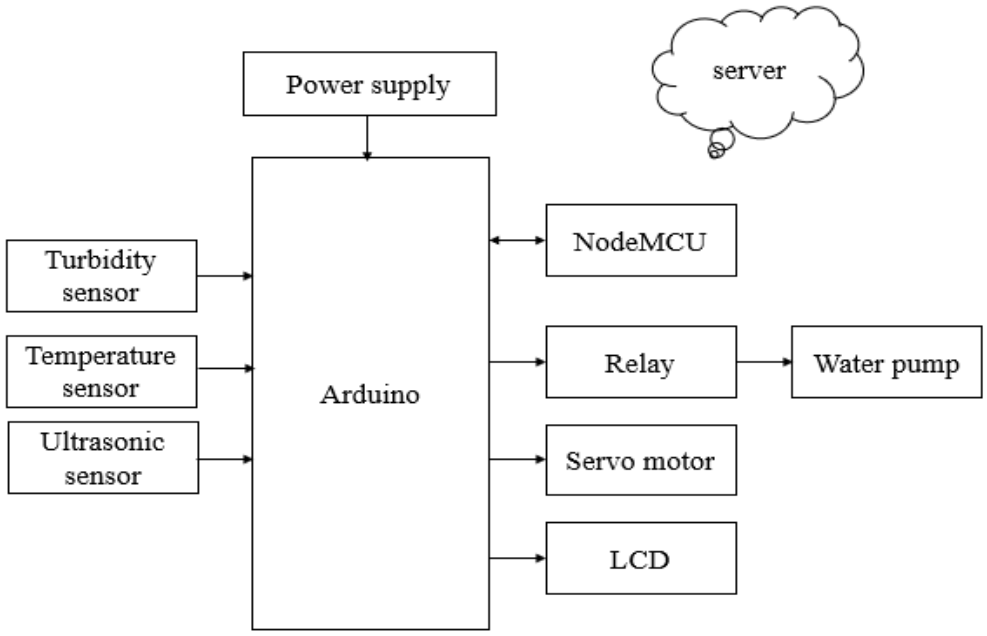
Traditional aquarium monitoring involves periodic manual sampling of water quality parameters and visual observation of fish behavior and health. Aquarium owners collect water samples and test them for parameters such as pH, ammonia, nitrite, nitrate, and temperature. They also visually observe the fish for signs of stress or illness. The data collected through this process is typically recorded manually in a logbook or spreadsheet.

One of the main advantages of traditional aquarium monitoring systems is their relative simplicity and low cost. These systems are accessible to aquarium owners who may not have the resources for more advanced systems. Traditional monitoring also provides some flexibility. As the sampling frequency can be adjusted based on specific needs.

IV. PROPOSED SYSTEM

The proposed fish monitor and control system is a comprehensive solution that utilizes multiple sensors to collect data on the water conditions of an aquarium. These sensors include the turbidity sensor, ultrasonic sensor, and temperature sensor. The data is then sent to a node MCU server for analysis and feedback, which control the relay to adjust the water pump and servo motor to regulate the water levels and feed the fish. Real-time data is displayed on the LCD screen for monitoring purposes. The system ability to be controlled remotely provides flexibility and convenience, enabling aquariums from anywhere, at any time. This system is expected to improve productivity and the well-being of fish in aquariums by offering a hassle-free and effective way to maintain optimal conditions, ensuring a healthy living environment for fish.

V. BLOCK DIAGRAM



VI. HARDWARE ARCHITECTURE MODULE DISCRIPTION

Arduino:

Arduino is a open source plat form which designs and manufactures single board microcontrollers and microcontroller kits for developing digital devices. Arduino board designs various types of controllers and microprocessors. The boards are integrated with digital and analog input or output pins that may be interfaced on bread boards and other circuits. The boards uses serial communications interface which includes universal serial bus (USB) on some models. It can be programmed using C and C++languages. Based on processing language project integrated development environment (IDE) is used. It aims to provide low cost and easy way for novices.

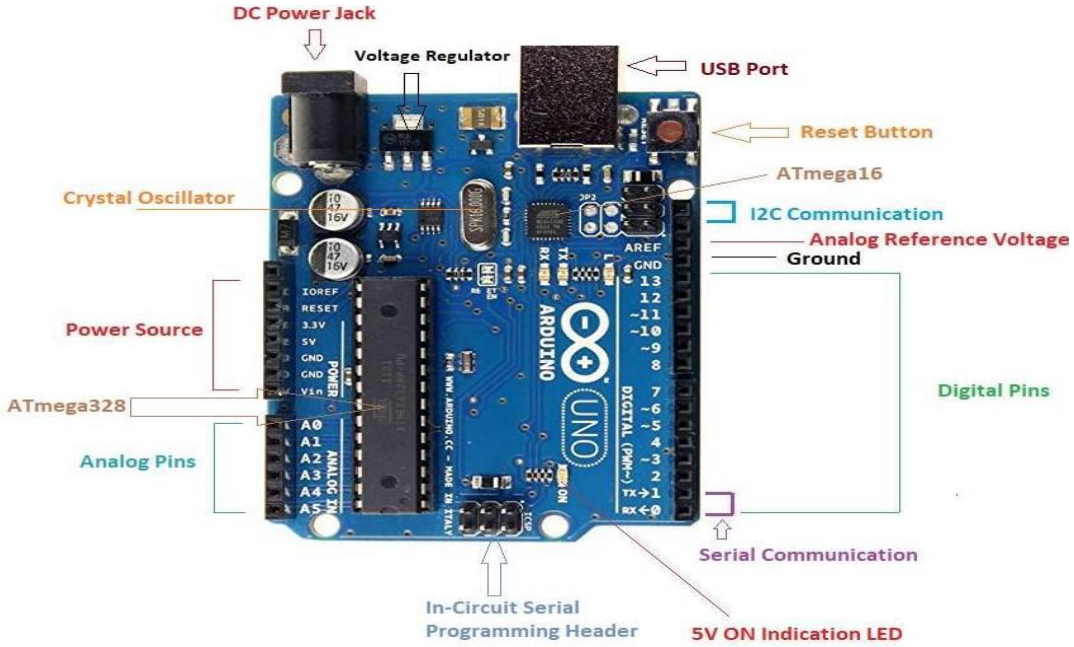


Fig: Arduino uno board

Temperature Sensor:

The most important physical analysis of water quality is measurement of temperature. It effects the quantity of oxygen dissolved in the water, the chemical and biological properties of water. It can be easily interfaced with Arduino using one-wire protocol. Probe types ensoris perfect for sensing temperature of water in wet conditions. The temperature range is in between-55° to125°C.

Fig: temperature sensor

Turbidity sensor:

A turbidity is the measure of quality of water which is based on total suspended solids (TSS) and clarity. It also indicates the presence of pathogens and bacteria levels. Monitoring of water quality is done constantly to ensure that it does not exceed safe levels. The light scattered by sold particles which are small in water is measured by turbidity sensor. With the increase in solid particles turbidity level of water is increased.

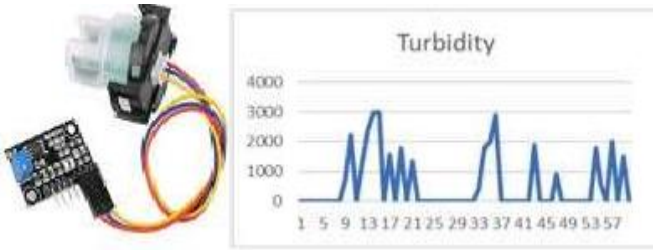


Fig: turbidity sensor

VII. RESULTS

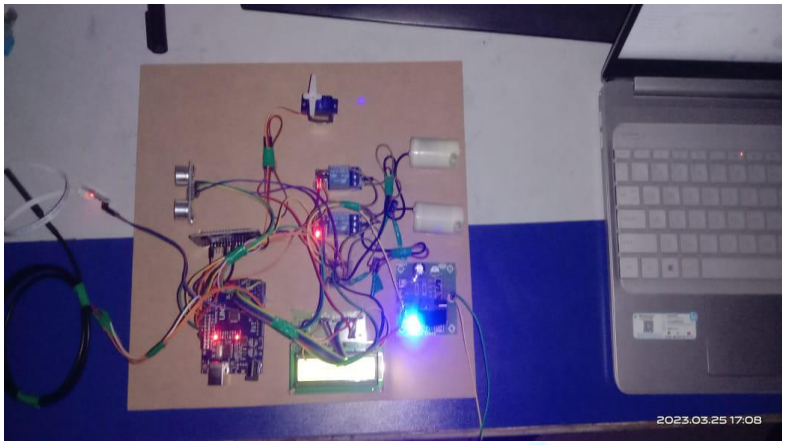


Fig: proposed system

VIII. CONCLUSIONS

Maintaining a sustained water quality is necessary, polluted water is unfit for usage and it directly affects habitat. The design and implementation part can be done using various methods. Internet and Wi-Fi can be combined for convenience to give a better result for low cost than any other system. Neural network based system can be developed for aquaculture organisms. Using Raspberry pi3 design and implementation can be carried out, in which monitoring can be done on a laboratory scale. The temperature sensor is dipped in a shrimp farm were the readings of temperature and dissolved oxygen is acquired. When compared with the atmospheric temperature, the temperature level during day time is decreased and vice versa. Fish feeding can be done through automate and manual control mechanism.

IX. FUTURE SCOPE

This system has the future scope of the chemical parameters of water can be detected and real time monitoring and controlling using IoT and WSN smart city project. A base station can be established in order to monitor the quality in multiple areas. The counting of fishes can be done along with its health monitoring. With addition of some more sensors the physical and chemical parameters can be determined, that effects the quality of water. The labor cost and energy consumption can be reduced by designing automatic aqua system.

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