**KNOWLEDGE BASED REAL TIME MONITORING SYSTEM FOR AQUACULTURE USING IOT**

**ABSTRACT:**

Internet of things is one of the rapidly growing fields for delivering social and economic benefits for emerging and developing economy. The field of IOT is expanding its wings in all the domains like medical, industrial, transportation, education, mining etc. Now-adays with the advancement in integrated on chip computers like Arduino, Raspberry pi the technology is reaching the ground level with its application in agriculture and aquaculture. Water quality is a critical factor while culturing aquatic organisms. It mainly depends on several parameters like dissolved oxygen, ammonia, pH, temperature, salt, nitrates, carbonates and water level etc. The quality of water is monitored continuously with the help of sensors to ensure growth and survival of aquatic life. The sensed data is transferred to the aqua farmer mobile through cloud. As a result preventive measures can be taken in time to minimize the losses and increase the productivity.

**INTRODUCTION:**

Aqua culture is one of the flourishing sectors in India as it contributes nearly 1.07% of the GDP. It is estimated that fish requirement of the country by 2025 would be order of 16 million tones but due to over fishing natural fisheries have been depleted as a result commercial aqua culture came into existence. But in recent years commercial aquaculture is facing many problems due to sudden climatic fluctuation which leads to changes in water quality parameters. At present aqua farmers are depending on manual testing for knowing the parameters of water. This will consume time and inaccurate because water quality parameters may alter with time. In order to overcome this problem, technology should be brought to aqua culture which increases the productivity and minimize the losses by constant monitoring of water quality parameters. This proposed work uses an integrated on chip computer Arduino with Wi Fi module which makes it unique. It is energized with the help of solar panel which is more reliable and wireless. Several sensors are mounted to sense the data and the data is transferred to the aqua farmer through IOT. .If the particular values of water quality crosses the threshold range the aqua farmer will get an alert with feasible solution shown in Recently IoT is reaching the ground level with its application to farmers. Several papers in literature survey focuses on how the aquatic life will effect due to change in water quality parameters and how IoT technology is used to overcome the problem.Some papers uses Arduino as micro controller for monitoring the aqua field, Arduino as it has inbuilt Wi-Fi module.Many of the papers concentrates on few type sensors like DO, pH, Turbidity etc and a solution to those problems. All these parameters are sensed using multiple sensors and a feasible solution was given to the aqua farmer.The sensed data will be sent directly to the aqua farmer. But storing the data in cloud database helps us for analyzing the data using data analytics which can help us to take pro-active measures before the change in water quality parameters. The overall system is energized with the help of municipal electricity back up with a battery. But aqua farmers are facing power cuts as a result solar energy can be used as a power module which is more reliable and can move anywhere in the pond without the use of wire. Most of the models concentrates on sending the sensor data to the farmer but our model mainly concentrates on providing the solution such as which medicine should be applied or necessary action to be taken in the form of an alert message when the water quality parameters changes.

**PROPOSED METHOD:**

The proposed model mainly focuses on constant monitoring of water quality parameters from time to time in order to take preventive measures before actual damage was done. The proposed architecture consists of four modules 1) power module 2) sensor module 3) microcontroller module 4) output module which was shown in Fig.1.

**1) Power module:**

The power module we opted is more eco-friendly. The power module comprises of solar panel, charge controller, battery,

**2) Sensor module:**

The sensor module comprises of several sensors such as pH, Salt,rust particles and an water level .These sensors are mounted on Arduino and are used for sensing the water quality parameters from time to time.

**3) Micro controller module:**

It is considered as heart of this architecture. Arduino UNO is used as computer in this paper .Arduino UNO. It has several advantages when compared to other micro-controllers such as inbuilt Wi-Fi module. The Program for collecting the sensor data is written in C++ language and sends that data to the cloud database. The server side program continuously monitors the sensor values whether they are within the threshold range .If the values deviates from the threshold range a feasible solution was send to the output module.

**4) Output module:**

Aqua farmer mobile is taken as an output module. An app has been loaded in the mobile which consists of two buttons 1) Get data 2) History. When we press getdata button current water quality parameters values has been displayed on the farmers mobile. Message alerts will be sending to the farmer if there is deviation from the threshold range with necessary action to be taken.

**BLOCK DIAGRAM:**

Blynk

PH meter

Conductivity

Turbidity

Water level

Mobile

or

PC

Water pump

Wifi module

Relay

Arduino

UNO

Solar panel

Power supply system

**COMPONENTS REQUIRED:**

**HARDWARE REQUIREMENTS:**

* Microcontroller
* Water level Sensor
* Turbidity sensor
* PH sensor
* PC
* Android phone
* Power Supply
* Solar panel

**SOFTWARE REQUIREMENTS:**

* Programming language: Embedded C
* Arduino IDE
* Blynk Android Application

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