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# Aqua Fishing Monitoring System Using IoT Devices

**Md. Monirul Islam[1], Mohammod Abul Kashem[2] , Farzana Islam Jui[3]**

[1] Computer Science and Engineering department, Dhaka University of Engineering and Technology,Gazipur-1700, Bangladesh
monir.duet.cse@gmail.com[1]

[2] Computer Science and Engineering department, Dhaka University of Engineering and Technology,Gazipur-1700, Bangladesh
drkashemll@yahoo.com[2]

[3] Computer Science and Engineering department, Dhaka University of Engineering and Technology,Gazipur-1700, Bangladesh
farzanaju1994@gmail.com[3]

**Abstract**

In this age of world, everything is going to fourth revolution of industries. According to this, Bangladesh is going to be prompt in every sector. In this paper, we have proposed a system of cultivating fish farming using IoT devices. After simulating design, we implement it by hardware. Here we use water temperature, turbidity, PH, Water Level, CO3 gas. The objective of this research is to design and develop a real-time smart-based water temperature, PH and turbidity monitoring system. The system implementation resulted in a monitoring system that collects the current water temperature, PH, turbidity from the core-controller in real-time. Also, the system provides and displays information that includes normal range, maximum, minimum, average and findings of the collected data which figured by thing speak IoT analytics platform. It provides decision support to assist and guide fisher folks in avoiding distress to grow fish and obtaining the optimum water monitoring data such as temperature, ph and turbidity range.

***Keywords:*** *Water ph-temperature-turbidity monitoring, Thing speak cloud computing, IoT.*

## 1. Introduction

IOT has really become a reality on a massive scale. The IOT is no longer just about a handful of high-end Internet-connected appliances. Now, it's common for all types of devices, from TVs to thermostats to cars, to connect to the Internet. The Internet of Things (IOT) is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. A thing, in the Internet of Things, can be a person with a heart monitor implant, a farm animal with a biochip transponder, an auto mobile that has built-in sensors to alert the driver when tire pressure is low -- or any other natural or man-made object that can be assigned an IP address and provided with the ability to transfer data over a network. IoT has evolved from the convergence of wireless technologies, micro- electromechanical systems (MEMS), micro services and the internet. The convergence has helped tear down the silo walls between Operational Technology (OT) and information technology (IT), allowing unstructured machine-generated data to be analyzed for insights that will drive improvements. So we can help fish farmer with the help of IOT as modern technology and solve all kind fish related problem and which water is suitable for fishes. They can detect with the help of IOT technology. Farmers can also gain fish related information by visiting this website. Research in aquaculture is an input to increase stabilized production. In last decade various scientists have made sustained efforts that resulted in development of modern production technologies that have revolutionized farm production. The main aim of the paper is to remote monitoring of the fish farming system by using the various sensors to reduce the risks. In this processes we use sensors like pH value, temperature and level sensors. By using these sensors all the work is automated and it will also be easy to monitor the fish farming remotely from other location. We are going to propose a IoT system, where we deal with real time data from sensor values. We also propose a generalized web from work. Here we collect the amount of component in the water which is suitable for fish farming through various kinds of sensor. Then we send those data to iot platform. That means our data is passing from sensor to IoT platform using internet

## 2. Working procedure

We do the work by following steps (shown in figure 1)

- Firstly, we connect Arduino with pc
- Then connect those component with IOT server
- Connect all sensor with Arduino and Ethernet shild
- Then connect Ethernet shild with Arduino
- Then connect those component with IOT server
- Then make a website and android app and connect IOT server with app and website by Rest-Api.
- Analyze those data and classify by a given algorithm
- Analysis and compare previous and continuous data and take decision.

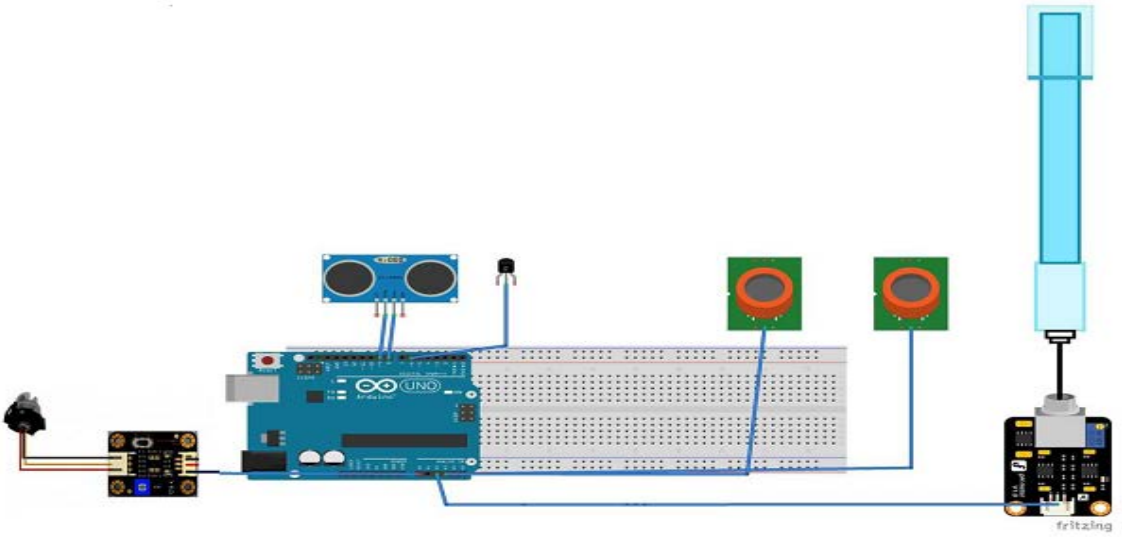
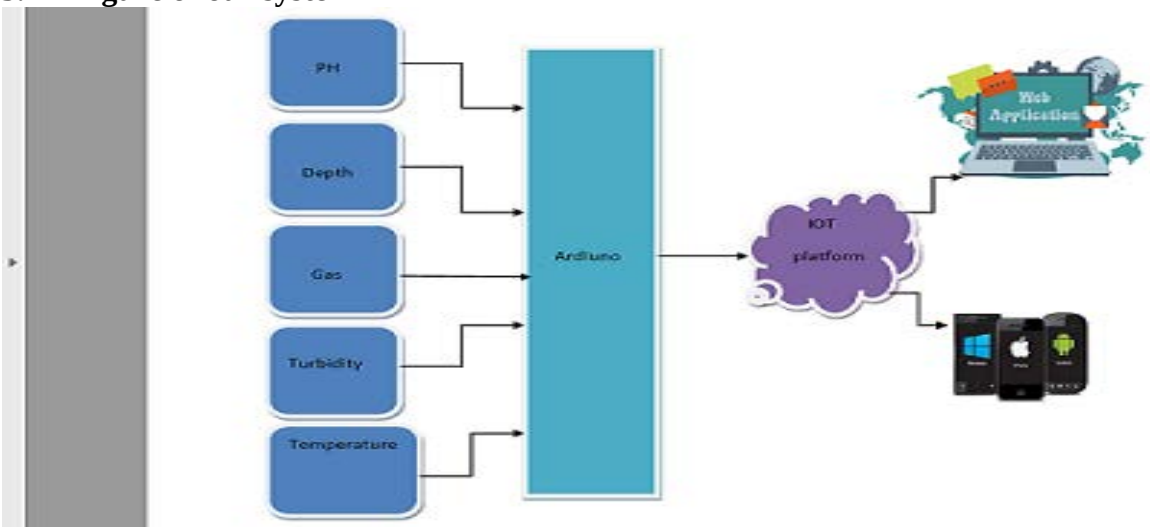
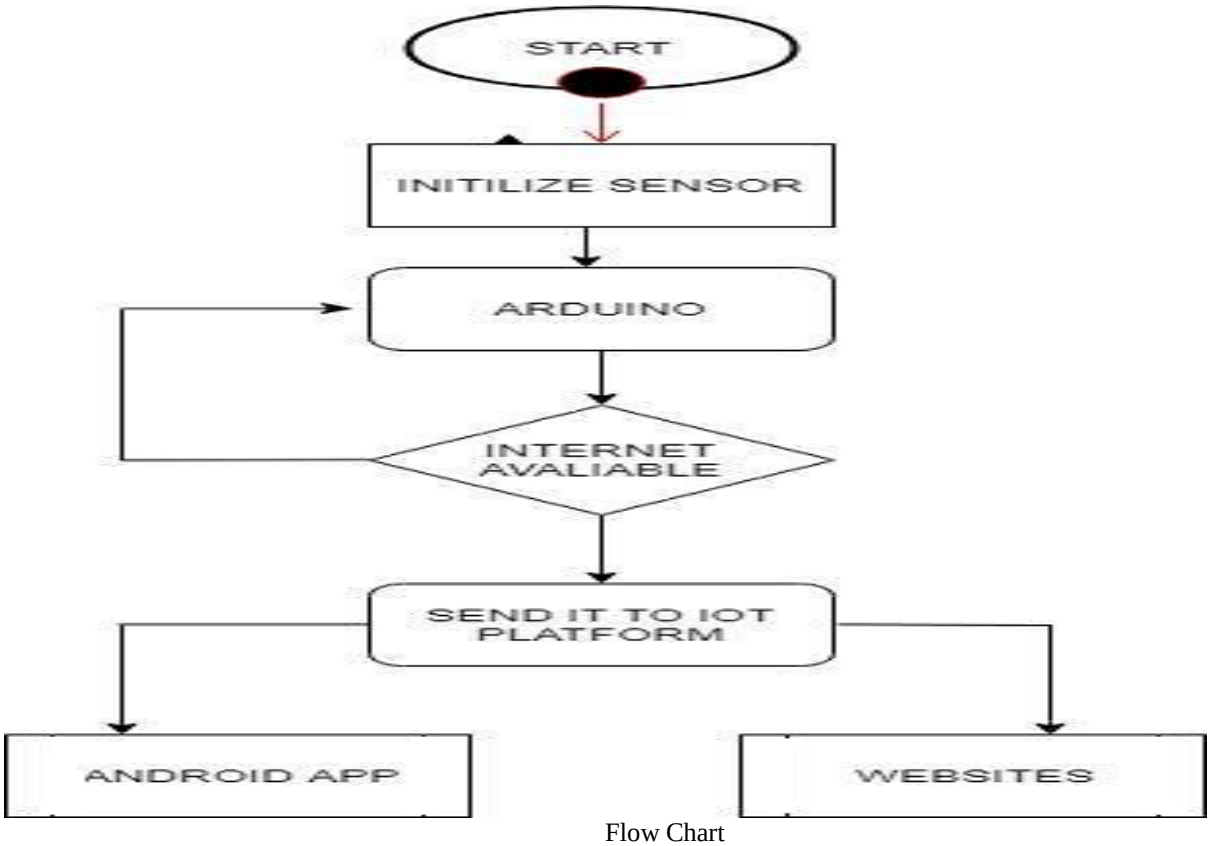


Figure 1: Proposed system

## 3. All figure of our system

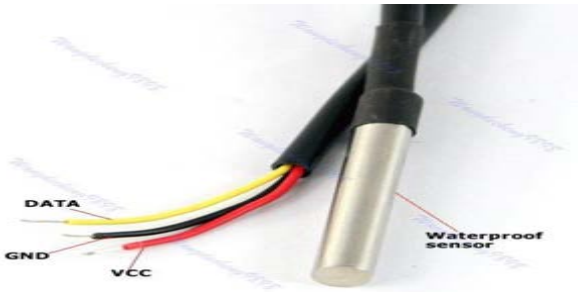



Block diagram

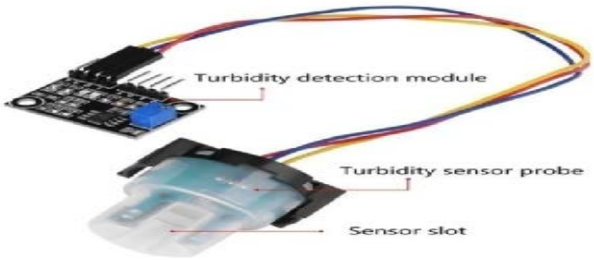



Flow Chart

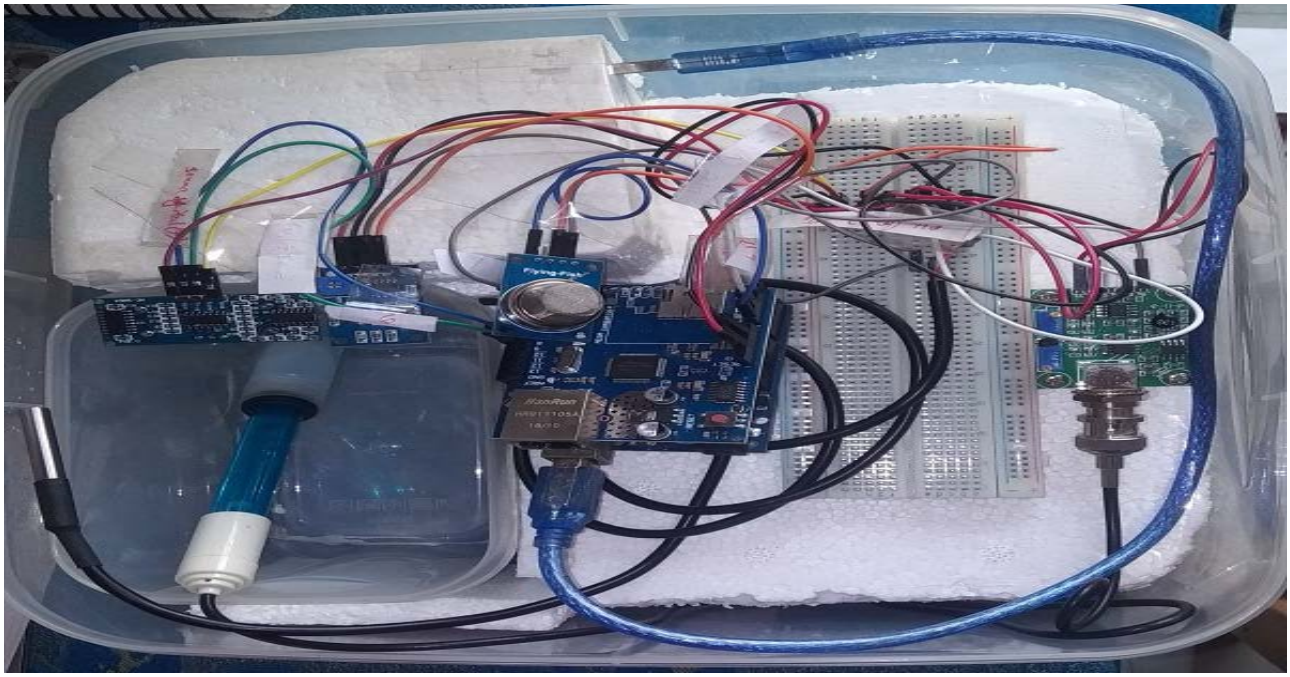
PH sensor




Temperature sensor




Turbidity sensor



Embedded System

## 4. Importance of water components for fish farming

Chemical Aspects of Water Quality [1]

- PH
- Alkalinity
- Hardness
- Dissolved gases: oxygen, carbon dioxide, nitrogen, ammonia
- Salinity
- Essential nutrients: N, P, K

## PH and Acidity

Pond water may be acidic, alkaline or neutral. Depending on this, water will react in different ways with substances dissolved in it. It will also affect in different ways the plants and animals living in the water. The measure of the alkalinity or acidity of water is expressed by its pH value. The pH value ranges from 0 to 14, with pH 7 indicating that the water is neutral. Values smaller than 7 indicate acidity and greater than 7, alkalinity. Fish production can be greatly affected by excessively low or high PH.

Pond water with pH un-favorable for fish production can be corrected by:

- If the pH is below 6.5 (at sunrise), use lime and alkaline fertilizers
- If the pH is above 8.5 at sunrise, you can use acid fertilizers

Ensuring that soil pH and acidity are within acceptable limits is a necessary part of managing the alkalinity, hardness, and pH of the water, which were discussed above. The key is to keep soil pH at 6.5 or above, which will usually maintain water pH, hardness, and alkalinity at desirable levels.

**Alkalinity and Hardness**

It is desirable to maintain both alkalinity and hardness at 40 - 70 mg Calcium carbonate per litre **[2].** This can be done by:

- Where water is 'soft' or acidic and soils are acid, apply lime (agricultural limestone) to the pond soil at recommended rates before to filling the pond.
- Lime may also be added after filling by spreading it uniformly over the water surface.
- In areas where soils are alkaline and hardness and alkalinity are high, application of lime is not required.
- Note that proper management of hardness and alkalinity will usually eliminate the need to worry about PH.

| Hardness description | Concentration of Calcium Carbonate (mg/L) (ppm) |
|---|---|
| Soft | 0-75 |
| Medium Hard | 75-150 |
| Hard | 150-300 |
| Very hard | 300-500 |
| Need treatment | 500-greater |

Table 1: Water can be classified by degree of hardness

## Dissolved oxygen in fish ponds

Dissolved oxygen (DO) **[3]** refers to oxygen gas that is dissolved in water. Fish "breathe" oxygen just as land animals do. However, fish are able to absorb oxygen directly from the water into their bloodstream using gills, whereas land animals use lungs to absorb oxygen from the atmosphere.

## 5. Reference value of some fishes

| Parameter | Range |
|---|---|
| Temperature | 25to32°C |
| pH | 6-9 |
| Dissolved Oxygen | 4-6 |
| Dissolved Ammonia | 0-1 ppm |
| Depth | 2 m |
| Terbidity | 4-4.15ppt |
| Gas(co) | 250-350ppm |

Table2: 1st level fish reference values, Example: Katla

| Parameter | Range |
|---|---|
| Temperature | 25to32°C |
| pH | 5.5-8.5 |
| Dissolved Oxygen | 4.5-6ppm |
| Dissolved Ammonia | 0-0.5 ppm |
| Depth | 1.2 m or 3-4 feet |
| Terbidity | 4-4.15ppt |
| Gas(co) | 250-350ppm |

Table3: 1st level fish reference values, Example: Koi

| Parameter | Range |
|---|---|
| Temperature | 25-36°C |
| pH | 7.7-9.5 |
| Salinity | 5ppt |
| Dissolved Ammonia | 5ppt |
| Depth | 0-1 ppm |
| Terbidity | 4-4.15ppt |
| Gas(co) | 250-350ppm |

Table4: 1st level fish reference values, Example: Rui Fish

## 6. IoT Platform

**ThingSpeak Server:**
ThingSpeak is an Internet of Things (IoT) platform that lets us analyze and visualize the data in MATLAB without buying a license from Mathworks. IT allows us to collect and store sensor data in the cloud and develop IoT applications. It works with Arduino, Particle Photon and Electron, ESP8266 Wifi Module, BeagleBone Black, Raspberry Pi, Mobile and web apps, Twitter, Twilio, and MATLAB to end the sensor data to ThingSpeak. The ThingSpeak is mostly focused on sensor logging, location tracking, triggers and alerts, and analysis.
We have got simulated value from thingspeak shown in figure 4.

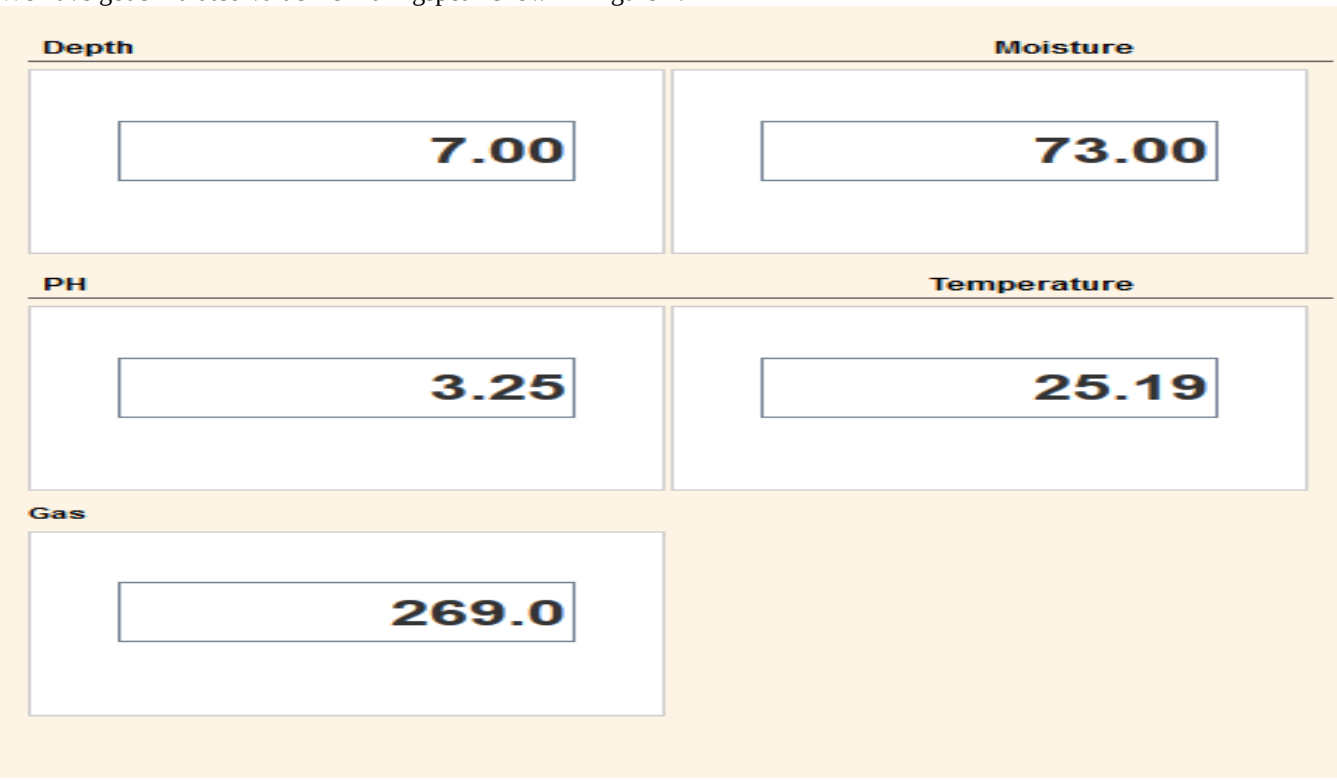



Figure 4: Simulated value

## 7. Conclusion

Commercial aquaculture development includes a considerable number of commercial, biological, engineering, precision measurement and calculation areas. Technological development can produce more accurate control and higher economic efficiency. This article discussed physical measures such as temperature, Water level, PH value, Co and turbidity using the A / D signal processing, via Ethernet shield transfer to the IOT server. The data messages are analytically processed, sent to the server database and displayed on a computer terminal. The system also has a monitoring function. System control is installed in fish farm terminal equipment to allow administrators to monitor the fish farm status. A query history is designed in the transmission section to greatly reduce the equipment, management and labor costs. And also increase productivity in fish farming. Careful monitoring of water quality parameters is important to understand the interactions between parameters and effects on fish and fish feeding, their growth and health. Each water parameter alone may not tell much, but several parameters together can reveal dynamic processes taking place in the pond. Water quality records will allow farmers to note changes and make decisions fast so that corrective actions can be taken quickly.
But we need to update many biological sensors to measure more accurate result for our project.
Example:

- Firstly, we do not have a big aquarium or pond to measure natural equipment perfectly.
- We need Dissolved Oxygen meter for measuring oxygen. But it is expensive **[4]**
- We need phytoplankton Detecting Disk for measuring phytoplankton. It gives us approximate idea of available fish food. But it is very expensive. **[5]**
- We need Color Detecting Sensor (Brown and Green) in water. It's gives a idea if there is any shortage of fish-food or not. But it is also costly.
- Salinity Testing is very important for salty watered fish. But there is very little study of this resource.

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**Md. Monirul Islam** is now lecturer in CSE department at Atish Dipankar University of Science and Technology. He achieved M.Sc in CSE from Dhaka University of Engineering and Technology.

**Dr. Mohammod Abul Kashem** is one of the prominent professor of Computer Science engineering department of Dhaka University of Engineering and Technology now. Post Doctorate (Erusmus Mundas scholarship, European commission) from University Lumiera Lyon2,France, Ph. D from National University "Lviv Politechnic" Ukraine and M.Sc. Engg and B.Sc. Engg. from State University "Lvivska Polytechnica" Ukraine.

**Farzana Islam Jui** is an M.Sc thesis student supervised under Professor Dr. Mohammod Abul Kashem at DUET.