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Module Code: 6CS007/CN4

Module Name: Project and Professionalism

Project Title: IoT based Pet Fish Farming Management System

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Submission Date: 08 th August 2021
(The date you handed in the assessment)

Award Title**:** Computer Networks
(Award Title for your project, if in doubt refer to your course/Module Registration)

Declaration Sheet

Presented in partial fulfilment of the assessment requirements for the above award.

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Student Name (Print): M. Vihanga Deshan Peiris

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Date: 08th August 2021
(Must include the unedited statement above. Sign and date)

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SECTION 2: STATEMENT OF PROJECT DETAILS

2.1 Project Title

IoT based Pet Fish Farming Management System

2.2 Academic Question

- How to measure the PH level of the water is good for fish?
- How to remove drainage and refill the tank with fresh water?
- How can feed to the fish according to the pre-planned time?
- How to inform the farmer via SMS if the environmental conditions in the tank change adversely?
- How to calculate the fish population in the tank and maintain the tank under proper conditions?

2.3 Aims

- Fish farmers always doing their work manually.
- They waste lots of time for it and otherwise occurs disadvantages to their tanks.
- When using this system, they can do the work very easily without risk and saving time.

2.4 Objectives

- When the PH Level get high automatically wastewater drainage and new water adjustment.
- Automatically food feeding preschedule time.
- Inform the farmer via SMS if the environmental conditions in the tank

2.5 Artefact (proposed) to be developed

In this system I used microcontroller-based fish farming pond maintained using the sensors. The PH sensor used for measuring the water quality of fish tank. Also, water level sensor used for identifying the water level of fish tank. Furthermore, I used automated food feeding system for this, then farmer no need to warry about feeding the fish. There is automated food feeding system already in the market, but that small device may be not appropriate the outdoor fish farming tanks. When it comes to fish farming, a lot of fish are in one tank, but only a limited number of fish can be caught in one tank. The temperature sensor monitors the temperature in the tank and controls the temperature in the tank with a heater. We also used a turbulence sensor to measure Turbulence rate or opacity, Arduino gravitational perturbation the sensor senses the quality of the water. The system also adds an image processing-based population management feature as the farmer loses time for his other work while visiting each tank. The images were taken by attaching a camera to the selected locations. Another problem for farmers is the removal of water from these tanks and refilling. It is now done by manually. This includes a feature that automatically removes stale water and fills it with fresh water if the pH of the water changes adversely. It is also expected to be refilled not only when the pH changes, we can schedule this process as what farmer wants. E.g. farmer wants to change water every two days. The microcontroller is used to control the entire circuit of the system.

SECTION 3: PROJECT PROPOSAL

3.1 Introduction

Today there are many small-scale fish farmers in Sri Lanka. Most of them are engaged in such activities while doing other work and this system is very useful for such people to save their time. This system makes it very easy for them to manage the water in the tanks. And they can look at a web dashboard from anywhere to see if system have managed the water properly. Other important factors in fish farming are temperature, pH, and the water level in the tank, which can be observed from anywhere. Other important factors in fish farming are temperature, pH, and the water level in the tank, which can be observed from anywhere. If these fish tanks are not properly monitored, it can affect every fish in them. Here the pH is monitored from time to time so that we can know if there is any change in the water that is harmful to the fish. Similarly, the temperature of the tank is monitored from time to time so that we can determine if it fits the type of fish in the tank. If there is any change in temperature, the heater will automatically activate and control it.

Normal pH changes do not always occur. It changes when any of our contaminants are added to the tanks or the water becomes stale. This system is designed to facilitate the day-to-day work of fish farmers so here we can also change the water according to a pre-planned schedule. So, farmers can save a lot of time.

Another factor when considering pet fish farming is the fish population in each tank. Because the bags carry a lot of fry at one time, the tank does not have enough space as the fry get bigger. The solution is to calculate the population and determine how many fish are in one tank. If the number of fish in the tank is exceeded, the farmer can know about it. This is done by image processing multiple pictures. Here it takes a few pictures from several places and calculates the average from it and makes a prediction of how many fish there are.

3.2 Initial Research into sources of information

Fowler et.al. [1] proposed the concept of recirculating Aquaculture Systems. In this paper, “they used temperature, DO, and pH scale be monitored directly on a continuous basis since they have an inclination to alter quickly and have a big adverse result on the system if allowed to work out-of-range”. Therefore, these three parameters are chosen to be monitored in this system.

P. Bartolome [2] in general fish farming the acidity and alkaline of the water should be maintained between 6 to 8. Too acidic or alkaline will cause adverse effects, acid erosion of the gill tissue, tissue coagulation necrosis, increased mucus secretion, abdominal congestion and inflammation. If the PH value is less than 4.5, the fish will die.

Jui-Ho Chen, Wen-Tsai Sung, Guo-Yan Lin designs an [3] Automated Monitoring System for the Fish Farm Aquaculture Environment This system allows a user with a mobile device to monitor the fish farm Environmental Data with Instant mastery and control over the various environmental data. Temperature, dissolved oxygen, PH value and water level sensing modules are incorporated in this monitoring system. MCU processing is used to capture the physical sensing signal. The ZigBee wireless sensor network brings the data to a central processing core. A WIFI

interface transfers the data to the user terminal device. The user can control the entire fish farm environment through the terminal device. Android software was used to design the terminal device user interface. A low power MSP430 series MCU is the core of each sensing terminal and the central terminal. The power supply can be battery-powered, standard electricity supply and/or solar battery powered

Iot-based intelligent monitoring system for fish farming project by [4] A. Ramya, R. Rohini, S. Ravi research by The aim of the current method is to create a safe and secure system that helps fish pond owners and growers waters in producing high quality fish while maintaining normal water levels in the fish tank. Low or high-water flow in the fishpond will solve the long-term problem of killing fish in a fish pond. Each water quality can only affect the animals' health. Water flow in fishponds discusses how every day should be monitored. This should ensure quality when dealing with pH, membrane, temperature, ammonia, etc. It is a symbol of good quality water quality standards and poor water quality pools and how it should be updated. It is recommended that it be a prerequisite for increasing production, ensuring sustainable fresh quality and, consequently, priority should be given priority. Therefore, water quality parameters maintain balanced positions, culture is the basis for the health and development of living organisms. It is recommended to monitor and evaluate water quality parameters regularly.

S. Usha Kiruthika , Dr.S. Kanaga Suba Raja done by IOT based Automation of Fish Farming (2017)In research The proposed [5] work is an embedded system for automatic control of fish farming. Aquaculture, also known as aquaculture, is the creation of aquatic organisms such as fish, crustaceans and crabs, using the various sensors to reduce risks. The proposed work supports remote monitoring of the Internet of Things (IOT) based fish farming system for real-time monitoring and control of a fish farming system. The aim of this manuscript is to provide an automatic fish farming monitoring system, saving the farmer's time, money and energy. IOT technologies revolutionized agricultural production in the country. In the fish farming process, we use various sensors such as pH value, temperature and level sensors. With the use of these sensors all work is automated and it will also be easy to monitor the fish farm remotely from another location.completely done by this project Monitoring Level Sensor Values Monitoring Temperature Sensor Values The development of commercial aquaculture includes a considerable number of commercial, biological, engineering, precision measurement and calculation areas. Technological development can produce more precise control and greater economic efficiency. This article discussed physical measurements such as temperature, level, PH value using A/D signal processing, via Wi-Fi wireless transfer to the terminal server. Data messages are processed analytically, sent to the server database and displayed on a computer terminal. The system also has a monitoring function. The control system is installed on the terminal equipment of the fish farm to allow administrators to monitor the status of the fish farm. A history of queries is designed in the transmission section to significantly reduce equipment, management and labor costs.

3.3 Artefact (proposed)

This system is very useful for fish farmers as it does the work of the farmers completely automatically. The main advantage here is that even though there are 5 or 6 tanks, the environmental conditions of all the tanks can be viewed from one place. Here, mainly fish farmers can access the web dashboard to see the current temperature of the tank, the pH of the water at that time, and the amount of water currently in the tank.

The system of the prototype of "IoT based Fish Farming Management System"

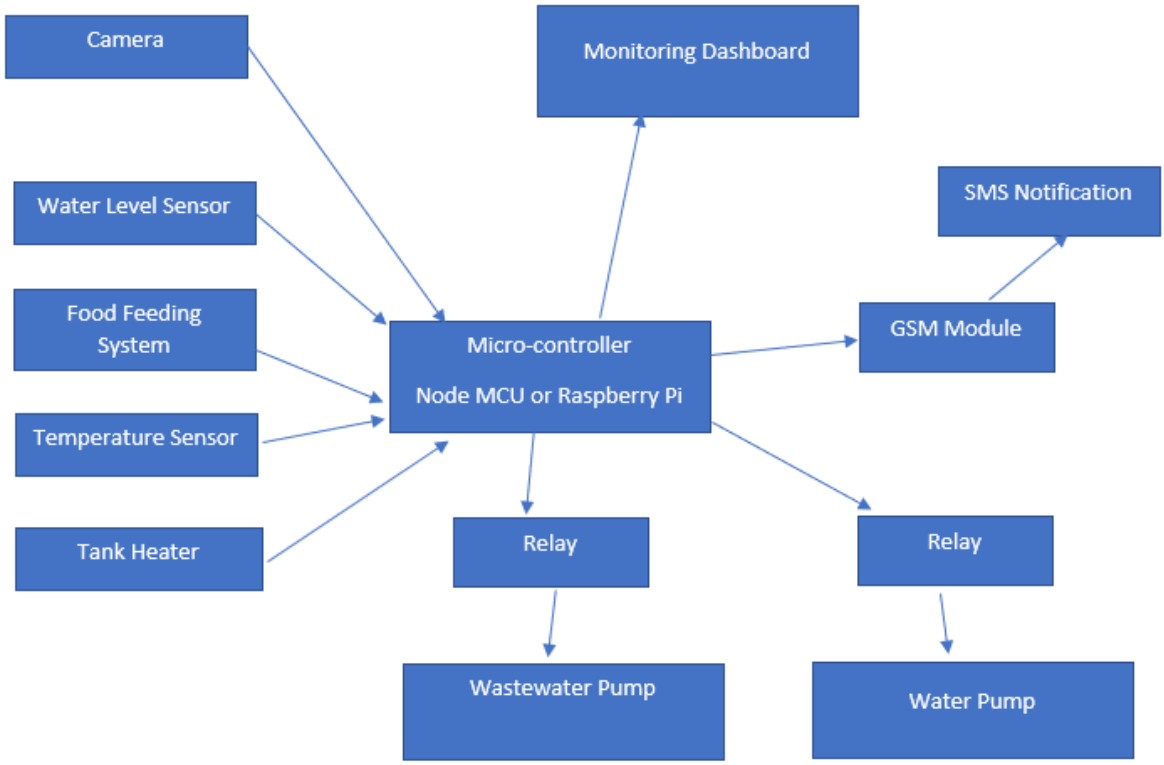

Figure 1 - Artefact Diagram

Due to the diversity and complexity of the underwater environment, underwater images are usually subjected to intense noise, which reduces the quality of the underwater images and affects the accuracy of image analysis. To make it easier to analyse the underwater image, we must provide appropriate pre-treatment to the underwater image. Below is how the system captures the population of fish in the tank,

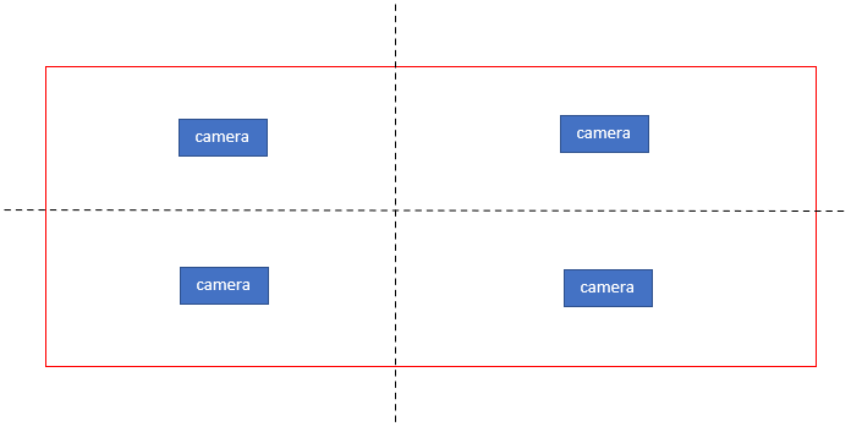

Figure 2 - Fish Tank

How the system captures the population of fish in the tank? We take photos from selected multiple locations in the tank (figure 2) to process the pictures and get the average from the fish count in those photos.

3.4 Plan/Schedule

Time Frame

No	TASK	START	END
	Step 1- Approach	**04/07/2021**	**25/07/2025**
1.	Define project title and supervisor allocation	04/07/2021	11/07/2021
2.	Research Papers Study	04/07/2021	24/07/2021
3.	Project proposal and Presentation	18/07/2021	25/07/2021
	Step 2 - Preparation	**26/07/2021**	**25/08/2021**
4.	Draw the System design	26/07/2021	30/07/2021
5.	Design the Project	30/07/2021	15/08/2021
6.	Choose and gather hardware component	16/08/2021	24/08/2021
	Step 3 - Implementation	**24/08/2021**	**30/12/2021**
7.	Develop the system	24/08/2021	28/11/2021
8.	Implement hardware structure	29/11/2021	25/12/2021
9.	Run and test for errors	25/12/2021	30/12/2021
	Step 4- Completion and submission	**31/12/2021**	**13/02/2022**
10.	Project report preparation	31/12/2021	25/01/2022
11.	Final prototype and design testing	26/01/2022	30/01/2022
12.	Conclusion and evaluation	31/01/2021	12/02/2022
13.	Delivery of the project	13/02/2022	13/02/2022

Figure 3 – Time Frame

Gannt Chart

Task Name	Duration	Start Date	End Date
Step 1 - Approach		**7/4/2021**	**7/25/2021**
Define project title and supervisor allocation	1 week	7/4/2021	7/11/2021
Research Papers Study	5 days	7/4/2021	7/24/2021
Project proposal and Presentation	1 week	7/18/2021	7/25/2021
Step 2 - Preparation		**7/26/2021**	**8/25/2021**
Study the draw design	2 days	7/26/2021	7/30/2021
Design the Project	1 week and 5 days	7/30/2021	8/15/2021
Choose and gathet hardware component	2 weeks	8/16/2021	8/24/2021
Step 3 - Implementation		**8/24/2021**	**12/30/2021**
Develop the program	13 weeks and 3 days	8/24/2021	11/28/2021
Implement hardware structure	2 weeks and 2 days	11/29/2021	12/25/2021
Run and test of errors	4 days	12/25/2021	12/30/2021
Step 4- Completion and Submission		**12/31/2021**	**2/13/2022**
Project report preparation	4 weeks and 4 days	12/31/2021	1/25/2022
Final prototype and design testing	1 week	1/26/2022	1/30/2022
Conclusion and evaluation	1 week and 5 days	1/31/2022	2/12/2022
Delivery of the project	1 day	2/13/2022	2/13/2022

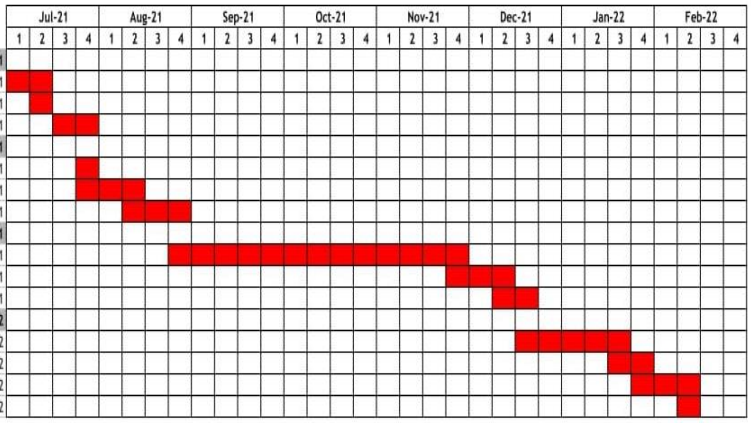

Figure 4 - Gannt Chart

3.5 References and Bibliography

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SECTION 4: ADDITIONAL SOURCES OF INFORMATION:

4.1 External Supervisor Form (Available on Canvas)

4.2 Resources:

These resources should be used to design and implement this system. Microcontroller (E.g – Raspberry-pi, Node MCU), Water level sensor, PH sensor, Fish tank Heater, water pump, relay, GSM Module, PHP, MySQL, Html, Node JS, Python, Open CV

4.3 Client:

Medium size and Small size fish farmers