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AUTOMATED FISH FARM AQUACULTURE MONITORING SYSTEM USING IoT

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Abstract:

IoT field has been proving its importance in areas like agriculture, medical, transportation, etc. As aquaculture has been a backward region of applied science, IoT can be successfully used in this field. Water quality is the major issue in aquaculture that includes turbidity[2], water level[2], temperature[1], pH[6] etc

Key words: turbidity[2], water level[2], temperature, pH[6].

I. INTRODUCTION

The proposed system continuously watches the water quality parameter using sensors. Aquafarmers in India spend about 5lakh rupees in a period of 3-4 months on aquafarms. If there is any slight change in turbidity, pH, water level and temperature may cause the death of fish or shrimp in bulk. This would be a huge loss to the farmer. So IoT based approach to aquaculture would prevent any losses to the farmer.The observing of physical and substance factors like pH, oxygen, and temperature in water is crucial to keep up sufficient conditions and avoid unfortunate circumstances that cause the failure of aquaculture. Aquaculture, known as aquafarming, is the farming of aquatic animals, for example, scavengers, fish, and crabs. The proposed work supports remote observing of the fish farming dependent on Internet of Things (IoT) for ongoing checking, control of a fish farming and the serious issue like wastage of water in aquaculture are controlled with aquaponics, also called the coordination of hydroponics with aquaculture, has developed to be a fruitful model of feasible natural and organic food production. The harmonious connection between fish, plants, and microscopic organisms, in a controlled domain, relies on ideal water quality conditions. This requires a need to create consistent water quality checking procedures that depend on keen information securing, communication, and handling. This work centers around utilizing the Internet of Things (IoT) technology to screen and control of water quality parameters utilizing sensors that give remote, persistent, and continuous data of pointers related to water quality thus helping in prevention of death of fish in Aquaculture [2].

II. METHODOLOGY & EXPERIMENTATION

In this project, a similar food quality monitoring device will be designed that will keep watch of environmental factors like temperature, humidity, alcohol content and exposure to light. The device is built on Arduino UNO which is a popular prototyping board [3]. The Arduino board is interfaced with various sensors like DHT-11 to monitor temperature and humidity, MQ6 to detect alcohol content and LDR to measure exposure to light. This is an IoT device and sends the measured sensor data to an IoT platform. The ESP8266 Wi-Fi Modem is interfaced with the Arduino to connect it to the internet via Wi-Fi router. The sensor data is also displayed on a character LCD interfaced with the Arduino UNO. The IoT platform used for logging and monitoring of sensor data i http://embeddedspot.top/iot/. With the power of Internet of Things, the environmental factors affecting the food storage can be monitored from anywhere, anytime and from any device.

This Arduino based IoT device should be installed in a food store. Once it is properly installed and powered on, it connects with the internet via Wi-Fi modem and start reading data from the interfaced sensors – DHT-11 temperature and humidity sensor, MQ6 Sensor and the LDR sensor [5].

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DHT11 Temperature and Humidity Sensor is a digital sensor with inbuilt capacitive humidity sensor and Thermistor. It relays a real-time temperature [3] and humidity reading every 2 seconds. The sensor operates on 3.5 to 5.5 V supply and can read temperature between 0° C and 50° C and relative humidity between 20% and 95% [4].

The sensor cannot be directly interfaced to a digital pin of the board as it operates on 1-wire protocol which must be implemented only on the firmware [5]. First the data pin is configured to input and a start signal is sent to it. The start signal comprises of a LOW for 18 milliseconds followed by a HIGH for 20 to 40 microseconds followed by a LOW again for 80 microseconds and a HIGH for 80 microseconds. After sending the start signal, the pin is configured to digital output and 40-bit data comprising of the temperature and humidity reading is latched out. Of the 5-byte data, the first two bytes are integer and decimal part of reading for relative humidity respectively, third and fourth bytes are integer and decimal part of reading for temperature and last one is checksum byte.

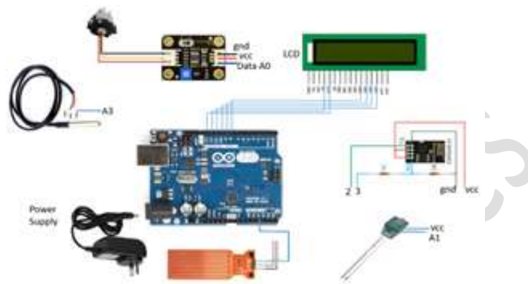
For Arduino, standard library for DHT-11 sensor is already available. The data from the sensor can be easily ready by calling read11() method of the DHT class [3].

The LDR sensor is connected in a potential divider circuit and inputs a voltage at the analog input pin of the controller. The voltage is read and digitized using in-built ADC channel.

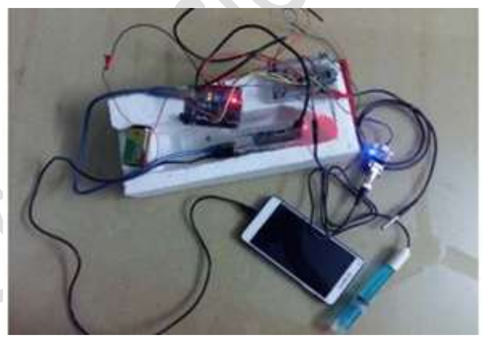
The MQ6 sensor detects the emission of ethanol type of gases. If the food/fruits get spoiled, they emit the ethanol type of gases. The MQ6 sensor detects the concentration of such gases and output an analog voltage proportional to the concentration of the gas. The analog output is passed to the analog pin of the Arduino which has inbuilt ADC that coverts the analog to digital value [3].

The Arduino collects data from all the sensors and convert the values to the strings. The sensor data wrapped as proper strings are passed to the character LCD for display. The ESP8266 Wi-Fi module connected to the Arduino uploads the data to embeddedspot Server [1].

III. SCHEMATIC DIAGRAM



IV. RESULT & DISCUSSIONS



Our proposed framework was executed in our beforehand chosen (as standard for shading) lake for certain hours.

Acquired qualities are

Time	Temperature (°C)	pH	EC (µS/cm)
08:00 am	23.4	8.4	52.0
09:00 am	23.9	8.2	52.3
10:00 am	24.3	8.5	52.7
11:00 am	24.7	8.3	53.2
12:00 am	25.3	8.7	53.9
01:00 pm	25.7	8.8	54.3
02:00 pm	26.3	8.9	54.8
03:00 pm	26.1	8.9	54.2
04:00 pm	25.9	9.0	53.9
05:00 pm	25.6	9.1	53.4

V. CONCLUSION

The strategy executed can encourage the water ranchers for the exact and dependable recognition of water parameters, the established truth that manual testing will take longer and water quality parameters could change with time It also takes genius dynamic measures before any mischief was finished. In spite of the way that the essential expense is high, there will be no additional cost and upkeep once it is introduced. In this way, the system actualized will arrive at the ranchers for lessening the mischief from climatic changes and affirms development and wellbeing for oceanic life. This improves efficiency, helps in improving outside exchange and expands the GDP of the nation.

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