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SAVAGE OF AQUATIC LIFE THROUGH REAL TIME MONITORING (SOAL-RTM) SYSTEM USING ARDUINO BASED IOT

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Abstract : Agriculture is the backbone of Indian economy. There are many sectors like livestock, crop production,aqua culture etc. Now, our analysis is mainly focuses on aqua culture. The aqua culture depends on environmental parameters like temperature, pollutants in water. Water contains chemicals from industries that chemicals damage the health of aquatic animals and also those who eat them. Farmers then started aqua farming to reduce the effect of thesechemicalsinwater,theytooksomelandanddigapond and started cultivating the fishes. But this became a burden for them to go and check the water pollutants and the conditionoffishes.Inthiscontexttheremaybealossoffish. So, by taking this as a major issue, we thought this problem can be solved with an IOT device. We considered the environmental parameters of aqua life like temperature and pollutants in water. To control and monitor theseparameters we have sensors in IOT. In this project we use different sensors embedded with micro controller. So, this will help the farmer to continuously monitor the pond orAquarium.

Index Terms—Arduino, GSM, IOT, Sensors.

1. Introduction

Aquaculture involves the cultivation of fishes under controlled conditions. To maintain these conditions we are using IOT technology. In IOT we are using different sensors embedded with micro controller. The aimofourprojectisto increase the production of fishes. The fishes to be cultivated without facing any problems due to the swings in climate mainly temperature and pollutants in water. As fishes livein water so that environment should be under control. When fishes were healthy then the dependents may also gain good health.

Now a days farmers are facing huge loss due to manual monitoring,thiswouldreducetheproductionoffish.Butsea food can cure many diseases because they contain high quality protein, iodine ,various vitamins and minerals. Aqua farming is gaining popularity rapidly because of the increasingdemandsofproteinandhealthbenefitsoffish.so, by using IOT we are controlling the environment which is suitable for fishes which increase the economy and productivity offish.

2. Literature survey

Aqua culture mainly depends on the environment. To maintain that environment there should be manual monitoring. But manually it is impossible to maintain the environment. So, to control that environment different methodologies were used. According to Nocheski S and Naumoski A [2018], fishes are of different species require certain conditions. To maintain these they have used Wivity modem that communicates with IOT via Wi-Fi connection.

The methodology proposed by Kamuju Sai Divya,

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et al [2017] is Smart Aquaculture monitoring system using RaspberryPiAWSIOT.Inthiswaterqualityistested. Water quality is determined by variables like temperature, turbidity, water color, carbon dioxide, pH, alkalinity, hardness, ammonia, nitrite plankton population etc. using Raspberry pi.

Raghu Sita Rama Raju and G. Harish Kumar Varma [2017]performedaworkentitledas"Knowledgebase dReal Time monitoring System for aquaculture using IOT" which uses many sensors like Dissolved oxygen, Temperature, Ammonia, salt, nitrate, carbonates.

However maintaining various sensors is expensive and tedious. Thus a system is required which is not much expensive and can verify the quality of the water effectively. This is the purpose, which is the base of their analysis. After a lot of study, a realization is that each one parameters need not to be monitored.

As a result there are some parameters whose imbalances cause the imbalances of distinct parameters and from the quantity of some parameters we are able to assume the condition of others. For that the parameters are temperature and gases. The methodology used is use of cloud information to send message alerts through mobile app.

Pradeep Kumar, et al [2016] developed, "The Real Time monitoring of Water Quality in IOT Environment" that is used to monitor the water pollution by considering parameters like temperature, pH, turbidity, conductivity, dissolved oxygen (DO), chemical oxygen demand, nitrite, phosphate,etc.Themeasuredvaluesfromthesensors willbe processed by the micro controller. Finally, the sensed datais viewed oninternet.

Monitoring of Turbidity pH & Temperature of Water Based on GSM was proposed by Kiran Patil, et al [2015] which is an alert system to maintain the water pollution based on the datacollectedbythesensors.Thecollecteddataissent using GSMnetwork.

Jui-Ho Chen, Wen-Tsai Sung and Guo-Yan lin, [2015] developed an "Automated Monitoring System for the fish farm aquaculture Environment", this system permits user with a mobile device to observe the fish farm environmental data. ZigBee collects the information and a Wi-Fi interface transfer the information to the user terminal. This could support parameters like temperature, pH level, water level etc.

Prof.SachinS.Patil,etal[2014]proposedamethodolo gyof monitoring of turbidness, pH& Temperature of water which makes use of water detection sensors with distinctive advantage and existing GSM network. The system will monitor water quality automatically, and it's low in cost and doesn't need individuals on duty. So, the water quality testing is lightly to be more economical, convenient and quick. The system has good flexibility. solely by replacement of the corresponding sensors and changing the relevant software programs, this method may be used to monitor other water qualityparameters.

3. Factors causing unhealthiness in Aquatic life

Fishes mainly dependent on the environment. The factors which contaminate the environment are as follows:

1.Increase of Temperature, the reason for increasing of temperature in water is due to biological wastes due to that the microorganisms collide and increase the temperature.

If temperature increases the effects are:

- The reproduction of the fisheswillbereducedifthewatertemperatureishig has35c and above.
- The speed up of metabolism, which is harmful

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to take sufficient oxygen for their growth.

2.Pollution in water, the pollution in water is due to release of chemicals from industries, pesticides used in crop production, leakage of oil from boats, etc.

If there is a pollution in water the effectsare:

- Promote the growth of Algae, which lower the oxygen levels.
- The dissolved oxygen will be reduced due to toxic substance present inwater.

Thus, the population of the fishes will be reduced as it mainly depend on the dissolved oxygen.

4.The model development

The proposed method aims at continuously monitoring the harmful gases and relative humidity in a cost effective way by polling sensor at fixed interval of time. Arduino processes data and will be updated continuously on the system. The processed data will be displayed on liquid crystal display and later received by the GSM. If the conditions were not satisfied then associate alert message was sent to the farmer. With the evolution of miniaturized sensing elements coupled with wireless technologies it is possible to remotely monitor the parameters like harmful gases and humidity.

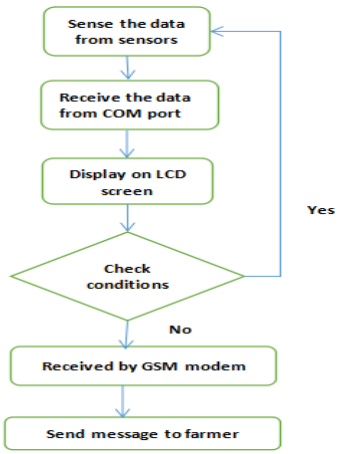

Fig 4.1: Overview of the system

Sensors:The sensors which we are using are LM35 to sense the temperature and MQ2 to sense the pollutants.

COM port:The port where we upload the code from the system to micro-controller and receive the data from the sensors

LCD screen:It is a 16x2 screen to display the data which is received by the micro-controller.

GSM Modem:To receive and transmit the messages.

5. Processing Steps

The following are the steps to develop the system:

- Step1:Fix the sensors of the environmental parameters to the Aquarium or pond.
- Step2:Connect these sensors with a micro-controller.
- Step3:Now the sensors data is received by the controller and the data is displayed on the LCD screen.
- Step4:The data which is displayed on LCD is verified with the base condition
- Step5:If the data received is beyond the base condition, Immediately a message is sent to the registered mobile number.
- Step6:After sending the message the remedial actions are formed accordingly before the person reaches the aquarium or pond.

Thus, the system monitor the parameters and control the environmental conditions.

6. Implementation

The main aim is to reduce the effect of the factorsabove.

To reducethe effect of temperature:

Most of the Aqua-life depend on the temperature of water. If the temperature is

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moderate fishes can survive, otherwise if temperature is above 35c the oxygen level will be reduced, hatching of eggs will be difficult for fishes and also effects on the reproduction of fishes.

In this system we follow a basic criteria that, to check the temperature continuously. To monitor continuously we fix a sensor to the aquarium to sense the temperature. If the temperature is beyond 35c we should intimate it to the aqua farmer. To send a message to the farmer we are using GSM module. After sending the message it might take some time for the farmer to reach the aquarium/pond. So, by using our system the remedial action which we are performing is to activate the coolant fan, that will reduce the effect of temperatureonfishes.Thebelowfigureillustratesth eabove condition.

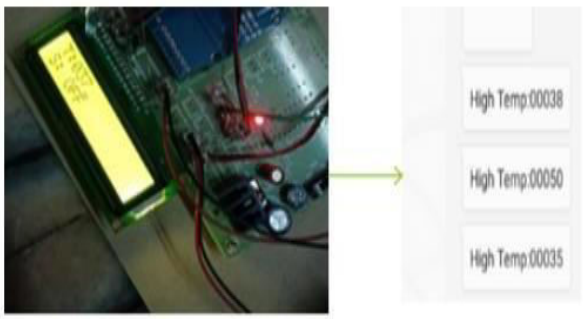

Fig 6.1: Activating the temperature sensor and send message to farmer

After activating the temperature sensor if exceed 35c then message should be sent to the registered number i.e. , “High Temp: value”. Before the farmer reached the pond/aquariumthecoolantfanwillberotated.Thus,s lightly we can reduce the effect oftemperature.

To reduce the effect of pollutants:

The Aqua life lives in water bodies. So, the pollutants in water bodies should be reduced because due to the toxic substances present in water the dissolved oxygen will be reduced. Due to this most of the aquatic life is feeling stressed and even death of fish.

So,toreducethestresslevelоffisheswefi xasensorto theaquarium/pondtosensethegasespresentinw ater.Ifany gas is present then the sensor will be activated and intimate to the farmer. The remedial action which we perform is, additionallysupplytheexcessoxygen.Sothepoll utantgases level will be reduced. The below figure illustrates the above condition.

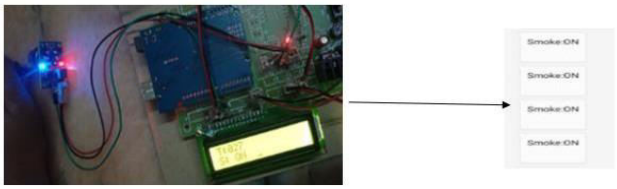

Fig 6.2: Activating the Gas sensor and sending messages

After activating the gas sensor then message should be sent to the registered number i.e., “Smoke ON”.

7. Conclusion

Theideabehindbuildingupthерealtime monitoringsystem is to lessen the manual fish farming which uses more work powers. There are sensors which measure water parameters and control those to keep aquarium clean and fisheshealthy. Farmers are given alert messages if the water parameters exceed and also remedial actions are performed before he reached to the Aquarium. This device is useful for fishes as well as other Aqua life also. By using this we can save the aqua life.

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