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Research paper

Intelligent Monitoring System for Freshwater Lobster Aquaculture based on Wireless Sensor Network

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Abstract

At this time the need for the nourishment of the people becomes important. Nutrition is supported by providing logistic constraint. A lot of things related to efforts to provide food that have good nutritional value. People's purchasing power is also an important factor that must be considered. Nutrition is also composed of vegetable or animal protein. Acquisition of animal protein, especially of marine animals are inaccessible to the public because the price is expensive. Lobster is just one example of marine animal that has high protein content. Therefore people pursue cultivation of freshwater lobster. Lobster watchcare is not easy because this animal is sensitive to environmental changes. Therefore this cultivation needs intensive monitoring which is difficult to do manually. As a solution proposed a monitoring system that works automatically. In the making of this monitoring system using prototyping method. By using this monitoring system , the consequences of vulnerability lobster habitat is anticipated. Then in turn will increase productivity levels cultivation of freshwater lobster. The monitoring system uses sensor and microcontroller, the result will sent by wireless communication system

Keywords: *lobster, monitoring system , sensor*

1. Introduction

Freshwater lobster also known as the Crayfish. Freshwater lobster price is also very expensive. Lobster is high nutrition food but low in fat. Freshwater lobster can be cultivated in a plastic tub, cement or soil. Currently lobster aquaculture is developing because of the high market demand.

In the cultivation of lobster, freshwater source of water is a very important thing. Certain conditions of the fresh water is a prerequisite for maintaining freshwater lobster. Water under appropriate conditions will make lobster growth becomes faster. Some important factors can affect the quality of water . They are temperature, ammonia and oxygen content ,degree of turbidity,and also acidity (pH). Value freshwater boundary conditions a.l temperature of 24-31 ° C. Ammonia content of 1.2 ppm, acidity (pH) range 6-8 (Setiawan, 2006).

Water conditions lobster habitat that has these thresholds must be maintained stability. If it done manually definitely not efficient . This paper proposed monitoring automatically as a solution perhaps the performance of actors lobster farming is to be effective and efficient. The observations were made using variety of sensor devices that are capable of retrieving data in realtime then transmitted over a wireless transmission medium (LAN) to a central computer. If the sensor is used quite a lot will form a network of sensor-based wireless (wireless sensor network).

2. Method

A method used in making the automatic monitoring system is modeling. Prototype monitoring system will be created with the same functionality as the actual equipment. The part of the main parts will be explained i.e sensors, data communication device, and also microcontroller as a data processor

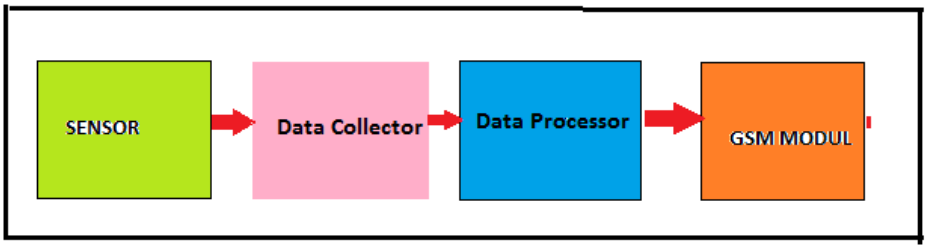

Fig.1: Scheme Framework Lobster Aquaculture System Monitor based Wireless Sensor Networks

Sensor is referred to this chart is a tool to change the physical parameters into electrical parameters in this case may be a temperature sensor; acidity sensor; Oxygen solubility sensor.The raw data is sent from this part towards collecting the data via wireless transmission media with a certain radio frequency waves. Data collectors in this case is called sink node this raw data is collected in the database and then processed. The process of data to the analysis performed by a processor such as a microcontroller. A limit value (threshold) ideal first entered later compared with realtime data. If it turns out there are conditions outside the allowable tolerance then the information will be sent to a mobile device via GSM communication breeder.

If the pond is are relatively much, or the use of sensors is quite a lot of it will form a wireless sensor network topology with scale and coverage. These conditions will require a specific strategy, as it will require the support of a resource are relatively large.

There should be arrangements for scheduling operation mote in the delivery of the data so there is no data collision , then which will result in not arriving data.In addition to the path through the which the data is is also pursued through the shortest path in order to arrive at the collecting of data accuracy corresponding to the value of the information that they update. It can happen if the selection algorithm fixed route selection and scheduling.

2.1. Implementation

The system consists of :

1. Power supply
2. Monitoring system
3. Aquarium

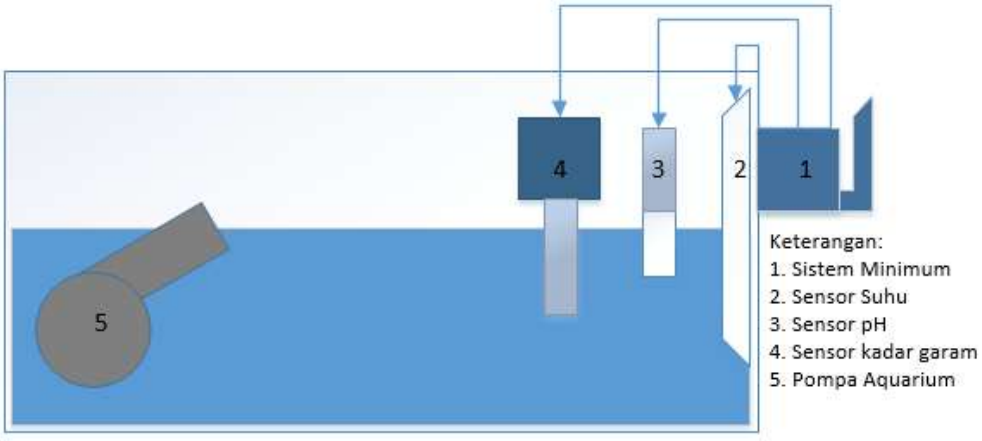

Fig2: Lobster Aquaculture System Monitor based Wireless Sensor Networks Design

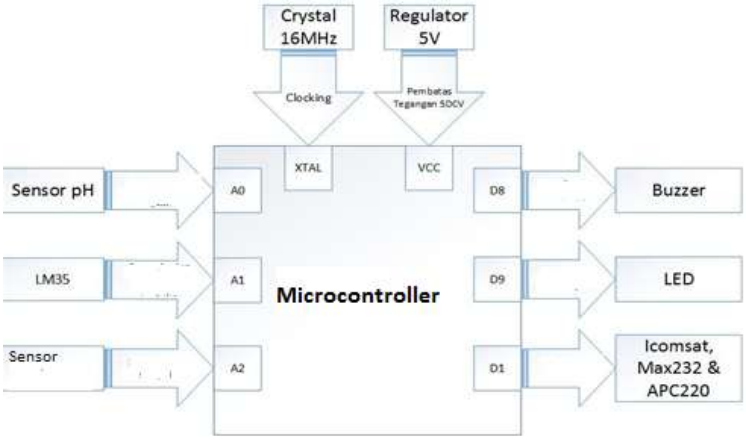

Fig 3: Minimum System Diagram

At the minimum system used for the automation monitor system freshwater lobster there are microcontroller, analog and digital ports. There are two kinds of sensors that have been used and can operate in accordance with the test scenarios, including:

1. Temperature Sensor

The temperature sensor detects the temperature of the water so that the water conditions in a temperature range suitable for freshwater lobster. If not so then lobster will easily stressed.

2 pH Sensor

PH sensor placed on the edge of the water reservoir with a sensor tip submerged. The purpose of the sensor portion is to measure the pH level in the water, lobster can survive the acidity level of the water between 6 to 8.

3. Result and Discussion

3.1. Data Communication System

The experiment has done by taking distance between receiver and transmitter . The maxiumum distance is 51,6 m.

Distance (meter)	Delay (second)	Connection
10	0	yes
20	0	yes
30	0	yes
40	1	yes
50	1	yes
52	-	no

This experiment provide the result that there is no delay for data communication between 10 m until 30 m. There is delay for distance between 40 until 50 meter , and there is no connection for distance up to 52 m

.**Tabel 2:** Temperature and pH level 04.00 – 04.50

Time	Suhu (◦C)	pH
04:10	21,82	6
04:20	21,84	6
04:30	21,82	6
04:40	21,82	6
04:50	21,83	6

Tabel 3: Temperature and pH level 07.10 -07.50

Waktu	Suhu (◦C)	pH
07:10	26,20	6
07:20	26,23	6
07:30	26,23	6
07:40	26,26	6
07:50	26,26	6

The analysis of the experiment result

1. The average of water thermal is at about 23,43OC this condition good enough for lobster.

2. The average of water ph Rata-rata is 6. This pH level is good enough for lobster

4. Conclusions and Recommendations

4.1. Conclusion

This study has been built an intelligent monitoring system of cultivation of freshwater lobster based on wireless sensor networks. The system is capable of functioning in accordance with what is desired.

In the construction and testing of the system is indeed found many obstacles. In the sensor system could arise obstacles such as pH sensors had not progressed much due to random errors that arise due to the nature of the chemical. In terms of data communication problems had also occurred where the data transmission was not running and the problem is that there is a pin that must in times of digital communication.

The results of the implementation of automatic monitoring devices Lobster

Automated Monitoring System Image On The Freshwater Aquarium This device is gaining input from the sensors and then microcontroller will process the data and provide the output GSM-based communication system

4.2. Suggestion:

Subsequent research can be developed using many nodes so that it can be optimized.

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