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Water Turbidity Monitoring System, Water Temperature and Fish Feed Using Arduino Mega 2560 Web-Based

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ABSTRACT

In daily life, fish that are kept in an aquarium must be aware of water turbidity, water temperature and feeding so that these fish need tools that can be adjusted continuously. As for the background of this writing is checking water turbidity, water temperature and feeding fish are still done manually, causing problems when fish keepers are busy or have to leave the house for a long time. The formulation of the problem of this research are (i) how to design and implement a monitoring system for water turbidity, water temperature and fish feed using the WEB-based Arduino Mega 2560 which can be scheduled based on time and (ii) how are the results of the monitoring system testing water turbidity, water temperature fish feed using WEB-based Arduino Mega 2560. By conducting 4 stages of research (i) Analysis of System Work and Requirements Analysis (ii) Design of Hardware Design, Schematic Design, Database Design, WEB Design, Network Design (iii) Hardware Implementation and Software Implementation (iv) Testing. The results of this study are a monitoring system for water turbidity, water temperature and fish feed according to a predetermined schedule with a monitoring system using the web. Water turbidity, water temperature and feeding are adjusted as needed. The servo will be active if the time on the real time clock (RTC) is the same as the schedule data variable that has been set.

1. Introduction

Technological advances in the field of electronics today are developing very rapidly and are influential in the manufacture of sophisticated devices, namely tools that can work automatically and have high accuracy so that they can make the work done by humans more practical, economical and efficient. The development of this technology has encouraged human life to be automatic. Automation in all sectors can not be avoided, so that the use of which was originally manual shifted to automation. No exception to hobbies such as keeping fish in an aquarium which can use tools as a helper for ease of use [1].

In everyday life, both in cities and in rural areas, there are many fish keepers in aquariums, both large, medium and small. Raising fish is a people's hobby that has been very popular from the past until now, because of its ease of maintenance and care which makes most people want to raise fish. Fish that are kept in an aquarium must pay attention to water turbidity, water temperature and feeding time so that these fish need a regular and continuous feeding schedule. However, due to busyness or other activities and unexpectedly, 2 often become obstacles when feeding the fish in the aquarium. The problem is when someone has to travel far and takes a long time to days, they will definitely think about the condition of the fish that are kept and how to be able to feed the fish continuously or on a schedule without having to interfere with daily activities [1].

Changes in water temperature, water turbidity and feeding in fish aquariums will affect the speed of fish metabolism. Increasing temperature will cause oxygen demand to increase so that it will affect oxygen demand in water. Busyness or other activities and unexpectedly often become obstacles when feeding the fish in the aquarium. The problem is when a person has to travel far and it takes a long time to days, he will definitely think about the condition of the fish that are kept and how to be able to feed the fish continuously or on a scheduled basis without having to interfere with daily activities [1]. The formulation of the problems in this study are (1) How to design and implement a monitoring system for water turbidity, water temperature and fish feed using WEB-based Arduino Mega 2560 which can be scheduled based on time? (2) What are the results of testing monitoring systems for monitoring water turbidity, water temperature and fish feed using the web-based Arduino Mega 2560 displaying information to the user. Based on the formulation of the

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problem, the objectives of this study are (1) Can design and implement a monitoring system for water turbidity, water temperature and fish feed using a web-based Arduino Mega 2560 which can be scheduled based on time. (2) Obtaining a test result of water turbidity monitoring system, water temperature and fish feed using the web-based Arduino Mega 2560.

2. Research Method

This research method uses a framework. A framework of thought, namely a framework for carrying out an action, or a frame of mind for compiling an idea that is directed and related to goals and objectives. This research consists of four stages, namely analysis, design, implementation and testing as shown in Figure 1.

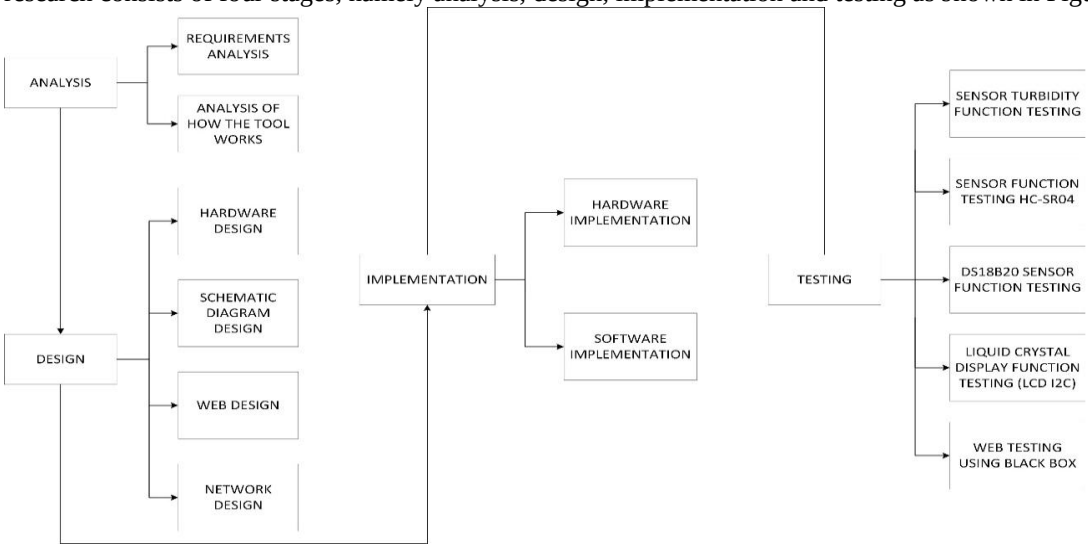

Fig 1. Research Method

3. Result

3.1 Analysis

In the process of analyzing how it works, it will explain how the system works in this study. The following image will explain the analysis of how it works on this system.

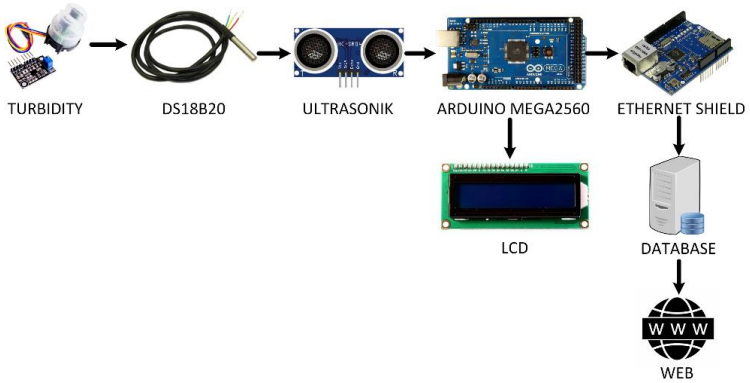

Fig 2. Analysis of how it works.

Figure 2 explains how the system works in this study, starting with a turbidity sensor detecting water turbidity in the aquarium, the DS18B20 sensor detects the temperature in the water, and ultrasonic detects the amount of feed in the container. Then the data from the sensor will be stored on the Arduino Mega 2560 which will be displayed on the I2C LCD. The Ethernet shield sends data to a database that has been created to display information via the website to users.

3.2 Design

a) Hardware Design.

The hardware design stage is carried out by restoring components that are in accordance with the function of the system requirements. The whole system consists of several parts which are illustrated by the block diagram below in Figure 3

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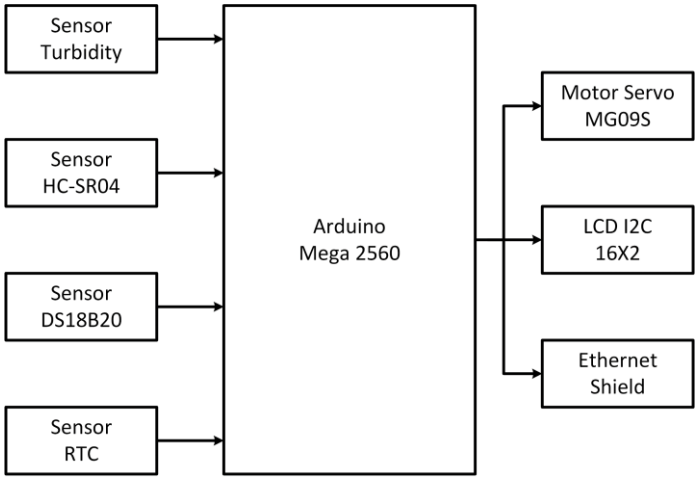

Fig 3. System Network Functional Block Diagram

Based on the block diagram found in figure 3 as a whole the system is divided into parts. Sensors as input, Arduino and ethernet shield, source code, which has been created and stored on the server with program instructions then the server will communicate with the web.

b) Schematic Diagram.

At this stage, several schematic diagrams related to research are carried out, starting from the whole system schematic diagram, ethernet shield schematic diagram, turbidity sensor schematic diagram, HC-SR04 schematic diagram, DS18B20 schematic diagram, RTC schematic diagram, servo motor schematic diagram and diagram. LCD schematic. The following are several stages of the schematic diagram in this study:

Table 1.
Overall System Schematic Diagram

No	Device	Function
1.	Mikrokontroler Arduino Mega 2560	As a processor of data received from sensors.
2.	*Ethernet Shield*	As a connector for Arduino to the network using an RJ-45 cable.
3.	Sensor *Turbidity*	As a water turbidity detector.
4.	Sensor HC-SR04	As measuring distance.
5.	Sensor Suhu DS18B20	As a room temperature detector.
6.	Motor *Servo* MG09S	As an activator for fish feed.
7.	*Real Time Clock* (RTC)	As a source of time data.
8.	LCD I2C	As the output display of the processed data.

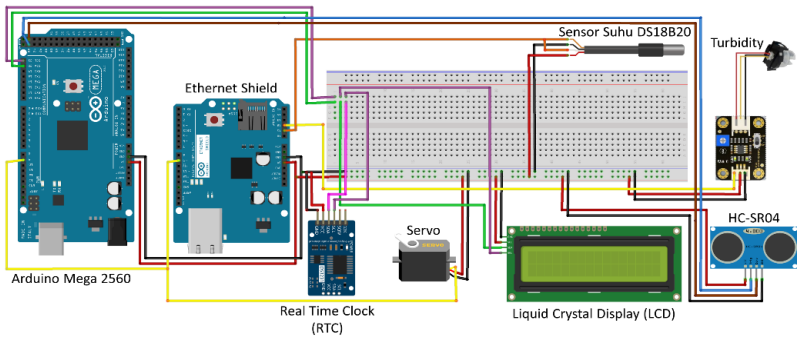

Fig 4. Whole System Schematic Diagram Network

In Figure 4 the network is divided into several stages, namely, the first stage of the ethernet shield schematic diagram network with arduino uno, the second stage of the arduino schematic network with turbidity sensor, the third level of the arduino schematic network with HC-SR04 sensor, the fourth stage of the arduino schematic network with DS18B20 sensor, fifth level arduino schematic network with real time clock (RTC), sixth level arduino network with servo motor, seventh level arduino network with LCD.

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3.3 Implementation

At the implementation stage, namely the installation of all the components previously carried out, which is implemented in the full system. Program implementation aims to ensure that the previously designed system runs well or not. This research is generally described using a flowchart as follows.

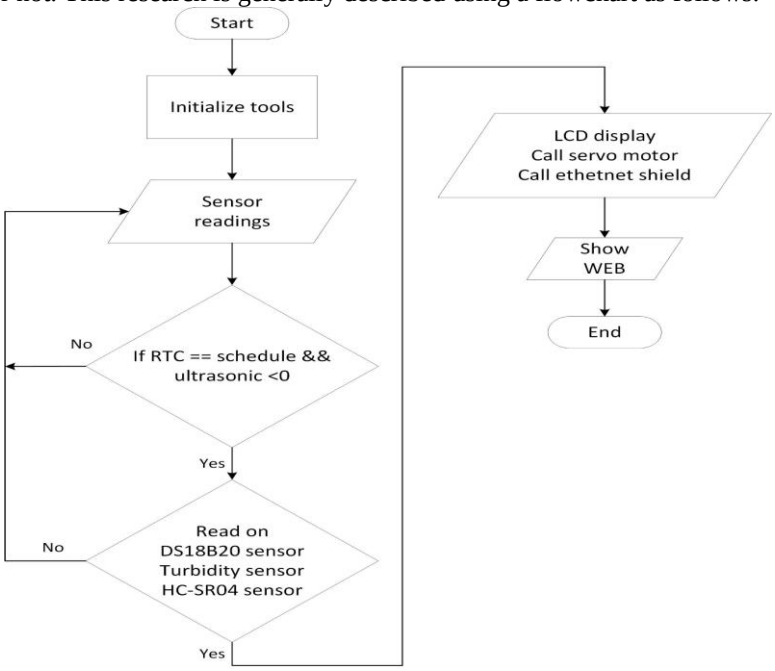

Fig 5. Flowchart Function

In Figure 5, the first step is explained, namely initializing the data and sensor pins. After that the sensor input is such as an ultrasonic sensor, ds18b20 temperature, turbidity, real time clock (RTC). Next is displaying sensor data on the LCD, giving commands to the servo motor and sending data through the ethernet shield. After the data is sent, the data will be entered into the database and then displayed on the web.

3.4 Testing

This stage is conducting Web testing using a black box. Black box testing is carried out on Web pages so that the resulting Web matches expectations and the results are valid. The following is the black box testing with Equivalence Partitioning that will be carried out, which will get results in the form of a Web that matches expectations and is valid.

Table 2.
Black Box Testing

No	Test Name.	Expected results	Results obtained	Information.
1	Displays time data on web page	Time data appears on the page web in real time	As expected	Valid
2	Displays temperature data on web page	Temperature data is displayed on the page the web	As expected	Valid
3	Showing murky data on web page	Cloudy data appears on the page the web	As expected	Valid
4	Displays feed data on web page	The feed data appears on the page the web	As expected	Valid

In table 2 is a black box testing table on the main page. From these tests, the results obtained are the main page as expected and successful. The following is the test on the main page of some of the simulations from table 2

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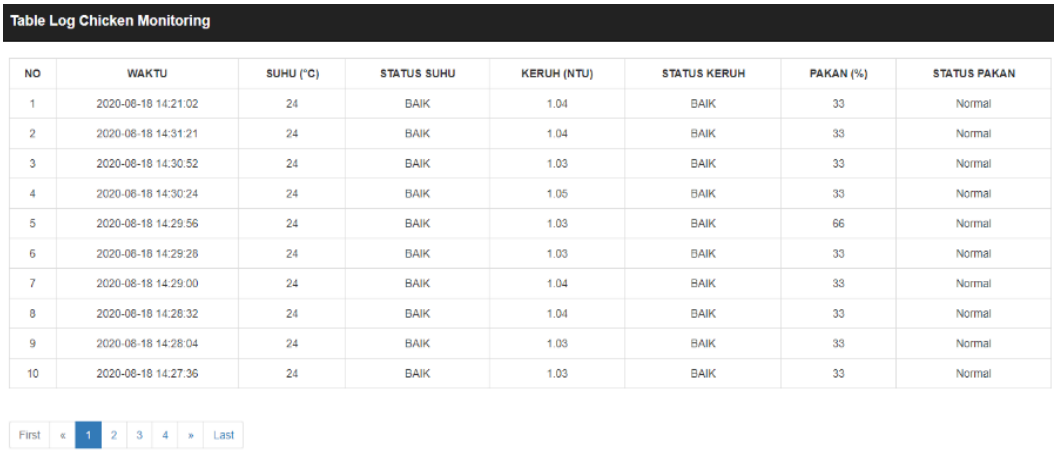

Table Log Chicken Monitoring

NO	WAKTU	SUHU (°C)	STATUS SUHU	KERUH (NTU)	STATUS KERUH	PAKAN (%)	STATUS PAKAN
1	2020-06-18 14:21:02	24	BAIK	1.04	BAIK	33	Normal
2	2020-06-18 14:31:21	24	BAIK	1.04	BAIK	33	Normal
3	2020-06-18 14:30:52	24	BAIK	1.03	BAIK	33	Normal
4	2020-06-18 14:30:24	24	BAIK	1.05	BAIK	33	Normal
5	2020-06-18 14:29:56	24	BAIK	1.03	BAIK	66	Normal
6	2020-06-18 14:29:28	24	BAIK	1.03	BAIK	33	Normal
7	2020-06-18 14:29:00	24	BAIK	1.04	BAIK	33	Normal
8	2020-06-18 14:28:32	24	BAIK	1.04	BAIK	33	Normal
9	2020-06-18 14:28:04	24	BAIK	1.03	BAIK	33	Normal
10	2020-06-18 14:27:36	24	BAIK	1.03	BAIK	33	Normal

First « 1 2 3 4 » Last

Fig 6. WEB testing using Black Box

4. Conclusion

Based on the results and discussion, the following conclusions can be drawn: (1) In designing a monitoring system for water turbidity, water temperature, and fish feed using web-based Arduino Mega 2560 includes (i) Hardware Design, (ii) Diagram Design Schematic, (iii) WEB Design, (iv) Network Design. In implementing a monitoring system for water turbidity, water temperature, and fish feed using the web-based Arduino Mega 2560, including (i) Hardware Implementation, (ii) Software Implementation. (2) In the test results of the monitoring system for water turbidity, water temperature, and fish feed using the web-based Arduino Mega 2560, including (i) Testing the Turbidity Sensor Function, Testing the HC-SR04 Sensor Function, Testing the DS18B20 Sensor Function, Testing the WEB. Sensor and WEB testing are in accordance with their functions. The next test is to use a blackbox in the monitoring system for water turbidity, water temperature, and fish feed using the web-based Arduino Mega 2560. In this test it is in accordance with its function.

5. References

[1] Nulhakim, Lukman. 2014. Alat Pemberi Makan Ikan Di Akuarium Otomatis Berbasis Mikrokontroler Atmega16 Proyek Akhir. Universitas Negeri Yogyakarta. Yogyakarta.
[2] Wijaya, Zaenal Sekty. 2015. Penerapan Sistem Informasi Berbasis Komputer Pada Aplikasi Monitoring Keuangan Dan Aset (Terkait Penatausahaan Piutang Tuntutan Ganti Kerugian Negara). Universitas Sebelas Maret Surakarta. Surakarta.
[3] Nelly Indriani, Widiastuti. Susanto, Reni. 2014. Kajian Sistem Monitoring Dokumen Akreditasi Unikom. Universitas Komputer Indonesia. Bandung.
[4] Ismadi. 2019. Kiat Sukses Budidaya Ikan Hias. Desa Pustaka Indonesia. Temanggung.
[5] Indriani, Anizar. 2017. Sistem Kontrol Kekeruhan dan Temperatur Air Laut Menggunakan Microcontroller Arduino Mega. Universitas Bengkulu. Bengkulu.
[6] Rivai, Muhammad. 2010. Rancang Bangun Sistem Kontrol Otomatis Pada Kolam Ikan Kerapu Berdasarkan Parameter Suhu Berbasis Real Time: Institut Teknologi Sepuluh Nopember. Surabaya.
[7] Suryanto, Muhamad Juhan Dwi. 2019. Rancang Bangun Alat Pencatat Biaya Pemakaian Energi Listrik Pada Kamar Kos Menggunakan Modul Global System For Mobile Communications(Gsm) 800l Berbasis Arduino Uno: Jurnal Teknik Elektro. Volume 8 No. 1: 47-55. Surabaya.
[8] Ritzkal. 2020. "Tick Waste Application in Houses With Warning of Microcontroller Assistant Social Media.," Jurnal MANTIK Vol 3, hlm. 559-568.
[9] Ritzkal. 2018. "Manajemen jaringan untuk pemula.," Bogor: UIKA PRESS.
[10] M Subchan, Dedi Setiadi. 2020. "Information System For Sale Of Muslim Clothes Based On E-Commerce Technology.," Jurnal MANTIK Vol 4, hlm. 311-318.
[11] Ritzkal, Arief Goeritno, dan Eko Hadi P, (2017), "Pengukuran Kualitas Perangkat Lunak Sistem E-Learning Menggunakan Metric Function Oriented", Prosiding SNATIF Ke-4 Fakultas Teknik Universitas Muria, Kudus.
[12] Ritzkal, Moh Subchan, (2017), "Pengukuran Kualitas Perangkat Lunak Sistem Manajemen Pelaporan Kegiatan Berbasis Web Peringatan Berbasis Email",Prosiding Seminar Nasional Teknoka ke - 2 UHAMKA, Jakarta.