

Smart Water Tank Web-based

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Abstract

In this modern era, automatic equipment dominates human life because it can ease the burden of human work. A variety of practical and flexible electronic devices have been created to help people more easily meet their needs. This research designed an automated water tank monitoring system using microcontrollers and utilizing the internet and websites as visualization of monitoring data. This smart water tank consists of pH sensors, turbidity sensors, and TDS sensors. In addition, there is a water level sensor to detect the water level in the reservoir, a solenoid valve as an automatic faucet, and water flow meter to calculate the discharge of water that fills the reservoir. When tds sensors and turbidity sensors detect water in a bad state it will automatically drain the Tandon. After the water drain is drained, the water level will be detected and then the water pump will automatically turn on. The purpose of this smart water tank is to make it easier for users to monitor the water tank in real time and accurately. The results of the test were carried out that every time the water detects turbidity levels above 25 NTu and Tds above 1000 mg / l then the water will be automatically wasted even though the reservoir is in full condition. The test results also proved the system is able to work by sending water data and displaying it on the web www.tandonair.online.

Keywords — Water Reservoir, Website, pH Sensor, TDS Sensor, Turbidity Sensor, and Solenoid Valve

1. INTRODUCTION

In this modern era, automatic equipment dominates human life because it can help make human work easier. More and more people are abandoning various devices that operate their operating systems manually, and are now switching to fully automated devices so that automatic devices dominate human life (Haidir, 2017).

Water plays an important role in supporting human survival. Water can be obtained from wells or other sources (Ikhsan, Yahya, & Fiolana, 2018). Treating water as a basic need allows water to reach the highest levels of demand. Of course, the water needed is clean and healthy water, which has been designated as drinking water according to regulatory standards issued by the Ministry of Health. Water must meet the requirements of being clear or not cloudy. Turbidity in water is usually caused by very fine soil particles. Colored water means it contains substances that are harmful to health (Ardiyansah, 2016).

To accommodate water so that it is more easily accessible, a large tub is used as a water reservoir, or what is now called a water reservoir. However, to find out firsthand the quality of the water in the reservoir, it is necessary to climb to the tower to see the state of the water in the reservoir. This is of course inconvenient because besides requiring a long time, it also requires extra energy to check whether the water conditions in the reservoir are in good condition (Ikhsan et al., 2018).

Starting from the existing problems, a new breakthrough emerged, namely "WEB-BASED SMART WATER TANDON", which is expected to be a real-time monitoring solution for monitoring water conditions in reservoirs in accordance with Ministry of Health Regulations.

2. RESEARCH METHODS

2.1 Object Study

Object study This is a water reservoir prototype that is at home the author is located at Prenggan RT.03 Palbapang, Bantul. order research in accordance with the desired, then the writer limit room scope research. Studies make Smart Water Reservoir Web-based aims for monitoring can be done digitally and in real time.

2.2 Research Tools

Component system security House based iot uses microcontroller and telegram as notification is *Laptop, NodeMCU ESP8266 v0.9, Arduino Uno, Turbidity Sensor, Analog PH sensor kit, Water Flow Sensor DC 5V ½", TDS 5V DC Sensor, Solenoid Valve DC 12V, ½", Water Pump SP-1200, Relay 12V 10A Songle SRD-12VDC-SL-C 5pin DC 5 feet, 7.7 inch Male to male Jumper Cable, Wire Aluminum, Transistor SM 548 2N2222, Resistor 2.2K ¼ W, Resistor 22K ¼ W, Multifunction Box, 30 Liter Box size 485 x 310 x 272 mm made from plastic, Box 52 Liter size 55 x 38 x 34.5 cm made from plastic, ¼ inch PVC pipe, ¼ inch connection pipe, ½ inch water faucet, T pipe connection. Software used _ are Sublime Text, Arduino IDE, XAMPP, and Google Chrome.*

2.3 Design System

2.3.1 Method Data Collection

Which method will take in finish the task end This includes:

- a) Studies Literature
Search and collect related literature and studies _ with the problem with the task end this, fine form articles, books references, *data from the internet, and other* related *sources* with *the problem* task end.
- b) Observation
one _ method of data collection carried out is observation, that is getting information with the method observe in a manner direct conditions that exist in the environment.

2.3.2 Internet Browsing

Do observation to various kinds of websites on the internet that provides relevant information _ with problem design and get up monitoring water quality and automation water tank or water reservoir.

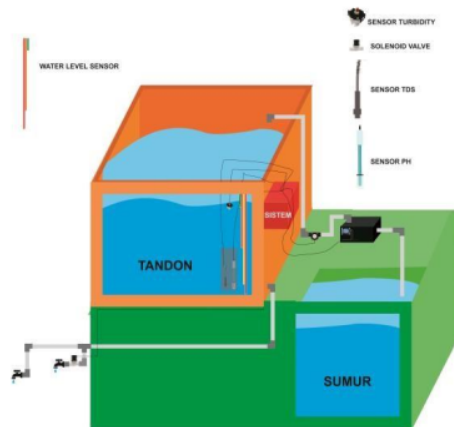


Figure 1. Design a Smart Water Reservoir prototype

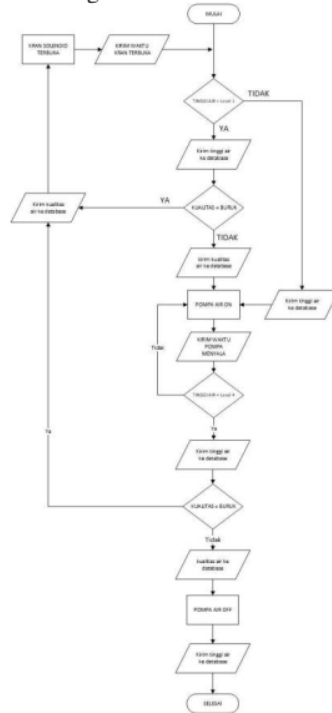


Figure 2. Flowchart System

2.4 Hardware and Software Design

2.4.1 Draft Hardware Series

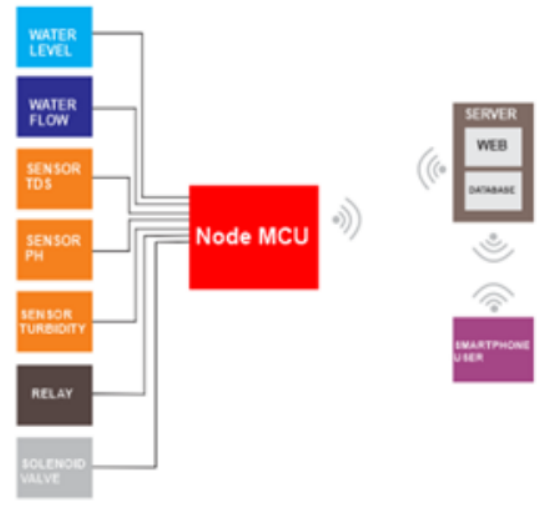


Figure 3. Design hardware chain

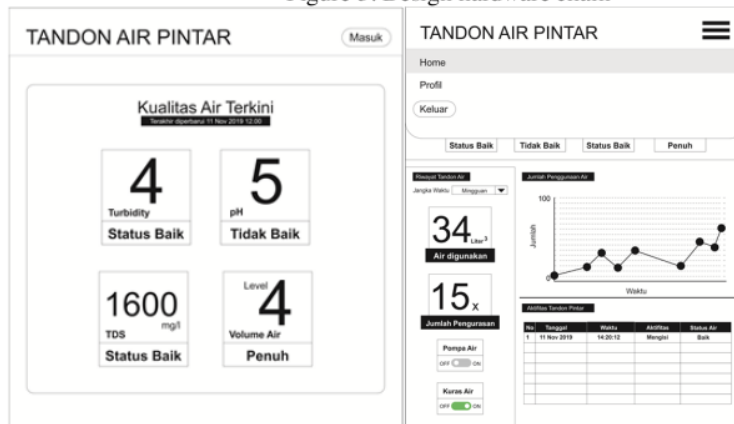


Figure 4. Design Web interface

3. RESULTS AND DISCUSSION

3.1 Implementation

Implementation This will explain details about the Smart Water Reservoir Web-based. Device-built software _ is customized with procedures and processes that exist in the existing system designed so that the application expected can be useful For inside water monitoring reservoir.

Suite Component System

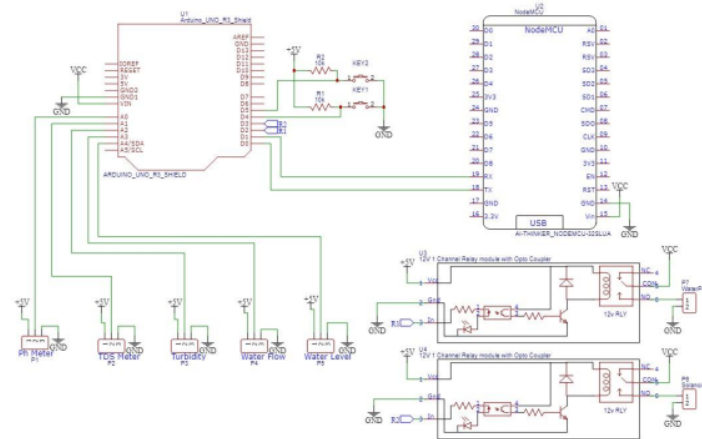


Figure 5. Circuit schematic component system

3.1.1 Implementation Device Hard

After creating the network and mapping hardware position, the whole required device _ can install in accordance specified sequence and position. _ Final result plans and sequences that have been applied can be seen in Figure 6 below.

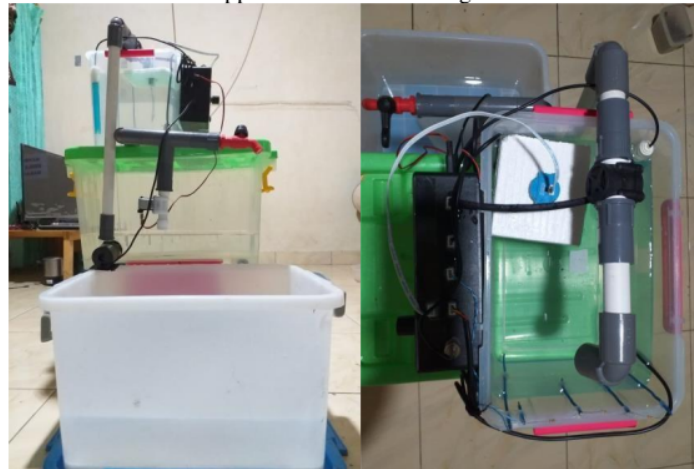


Figure 6. Smart Water Reservoir Prototype

3.1.2 Web Implementation

To view reservoir water quality data, access the web address tandon air online. Appearance First-moment address accessed like Figure 7 below.

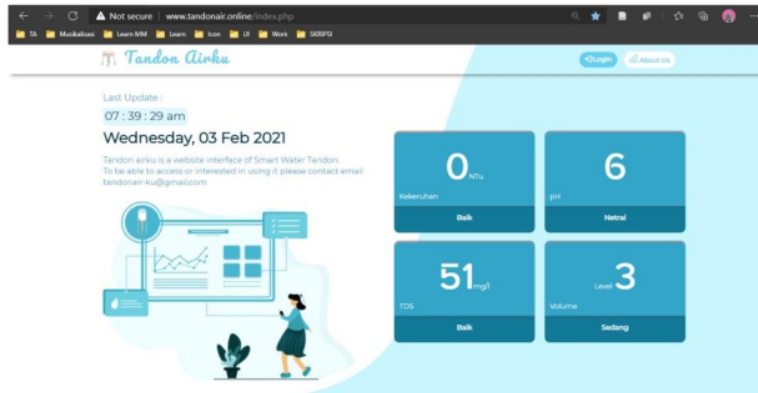


Figure 7. The first page of the web is accessed

Users must log in first formerly with the method make account username and password by admin. After being given a username and password, the user can log in and view water quality in detail along with the history activity smart water reservoir. Web view after login as shown in Figure 8 below.

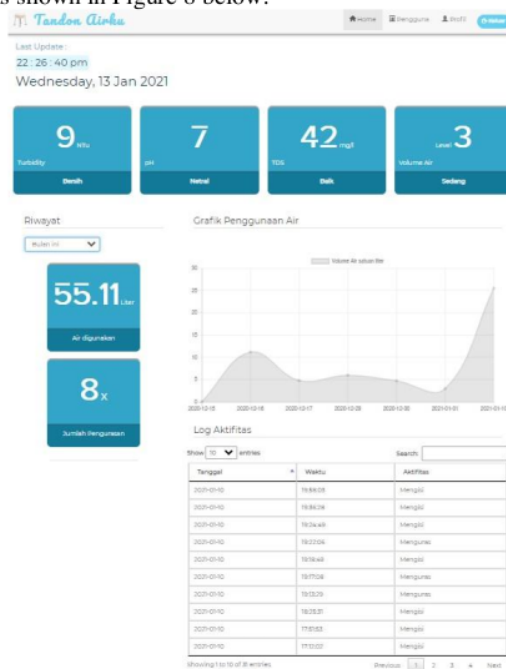


Figure 8 Menu After Login

Besides can view water quality data, users can also see the history of one water use Sunday final or seven-day last and one month final or thirty-day last form graph. Users can see the amount of deep water used in liters and the quantity of drain reservoir. Besides, there is the graph, on the page This user can view an activity log filled tank _ time and date, as well as activity fill-in or drain in the form table.

3.2 TOOL TRIAL RESULTS

3.2.1 Water pH Sensor Test Results

Test	Water Type	Which Expected	Observation	Results
1	Plain Water (Mineral water)	The tool can read water pH levels 6-8	pH value 7.0	Reads: Neutral
2	Mineral water added solution alkaline (water detergent)	The tool can read water pH levels 9 – 14	pH value 9.0	Reads: Basa
3	Mineral water added to solution sour (Lemon Water)	The tool can read water pH levels 0 – 5	pH value 4.0	Reads: Sour

Table 1. Table pH Sensor Testing

From testing on concluded that when the ph sensor value is between 6 with 8 then the ph of the water will read Neutral. When the ph of water reaches 9 with 14 will legible Basa, and the range from 0 to 5 will read Sour. Value and status then will appear on the web.

3.2.2 Turbidity Sensor Test Results

Test to -	Water Type	Expected _	Observation	Results
1	Plain Water (Mineral water)	The tool can read water NTU value 0 – 24	NTU value of 9	Reads: Clean
2	Mineral water added solution sour (Mixed Water land)	The tool can read the NTU value of water is above 25 NTU	NTU value of 27	Reads: cloudy

Table 2. Table Turbidity Sensor Testing

From testing on concluded that when the Turbidity sensor value is between 0 by 2 then will read clear. When the turbidity value is between 8 with 10 then will read cloudy.

3.2.3 Tds Sensor Test Results

Test to	Water Type	Expected _	Observation	Results
1	Plain Water (Mineral water)	The tool can read mark tds a maximum of 599 mg/l	Value 42 mg/l	read : Good
2	Mineral water added solution acid (Mixed Water Fertilizer)	The tool can read mark tds 600 mg/l	mg/l value 667	read: Dangerous

Table 3. Table Tds Sensor Testing

From testing on concluded that when content tds in the water below 600 mg/l then will deep water reading circumstances ok .

Temporary If mark tds above 600 mg/l then will read dangerous.

1) Automatic Faucet Test Results

Test To -	TDS sensors	Turbidity Sensors	Results
1	Dangerous	Good	Drain
2	Good	Bad	Drain
3	Dangerous	Bad	Drain
4	Good	Good	OFF

Table 4. Table Automatic Faucet Testing

From testing on concluded that when the status of the Turbidity sensor and TDS sensor is good then Automatic Faucet No will lit . For making Automatic Faucets light up then the status of the TDS and Turbidity sensors should be dangerous and or bad.

2) Water Level Test Results

Test To -	Water Height	Water level	Results
1	<25%	Level 1	Fill in
2	25% - 50%	Level 2	Fill in
3	51% - 75%	Level 3	Drain
4	76% - 100%	Level 4	OFF

Table 5 Table Water Level Sensor Testing

From the experiment above, the water pump will light up automatically when the water is at level 1 and will be automatic stop filling in when is at level 4.

3.3 DISCUSSION

Following table results web observation and prototype water reservoir turned on :

Test to -	Sensor Parameters			Levels	Action
	pH	Tds	Turbidity		
1	7	151	13.3	3	OFF
2	7	146	6.68	3	OFF
3	7	149	3.89	3	OFF
4	7.3	147	9.29	4	OFF
5	6.65	279	7.68	2	Fill in
6	7	122	85.55	3	Drain
7	7	275	7.57	4	OFF
8	6.63	277	1.14	4	OFF
9	7.5	410	1.28	4	OFF
10	7	272	52.05	3	Drain
11	7	353	1.91	1	Fill in

Table 6. Sensor Data Table on the Web

From the table above, got concluded that when the water is the deep reservoir detects a Turbidity level or turbidity of more than 5 NTU and or TDS levels exceeding 1000 mg/l then in a manner automatic faucet will open and throw water inside the reservoir. When the water is inside the reservoir and detected finished so water pump will direct light up and fills the reservoir until touches the limit above the water level.

4. CONCLUSION

- a. The whole system has proven can walk well in detecting and transmitting results reach the user.
- b. The application needs to be connected to the internet to get running sensors. Based on testing, the solenoid valve will open when water conditions with indicator main maximum turbidity value of 25 NTU and tds a maximum of 900 mg/l. So even though the water is in deep circumstances full though when turbidity and TDS values are not in good status then the water will be directly wasted. Then the faucet will fill in when the water is gone in the state of the most basic.
- c. accuracy read sensor value is low caused by the use of sensors that have quality not enough Good so that mark accuracy Not yet can say very accurate

5. SUGGESTION

From the results planning tools and the web that has realized naturally Still there is a number of lack , for That needed development on design next. Following are some suggestions that become reference For can developed, among others:

- a. Plus some other sensors measure water quality in more detail so that the accuracy of water data is maintained.
- b. Increase speed pause time sending sensor data.
- c. Using sensors with level quality _ and accuracy high.
- d. There is a notification to the web when happening sensor malfunction
- e. User login is developed No only For one user with One reservoir clever but can access a number of reservoir clever with each user reservoir _

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