Plagiarisme_TSSA 2022

by Artikel Jad Erna Garnia

Submission date: 06-Apr-2023 12:59AM (UTC-0400)
Submission ID: 2057291908
File name: ilovepdf_merged_14.pdf (1.57M)
Word count: 5876
Character count: 31050

Proceeding of

2022 The 16th International Conference on Telecommunication Systems Services and Applications (TSSA2022)

October 13-14, 2022
Bali, Indonesia

ISBN:
978-1-6654-5594-7 (XPLORE COMPLIANT)

2022 16th International Conference on Telecommunication Systems, Services, and Applications (TSSA) | 978-1-6654-5594-7/22/$31.00 ©2022 IEEE | DOI: 10.1109/TSSA56819.2022.10063915

Copyright and Reprint Permission

2022 16th International Conference on Telecommunication Systems, Services, and Applications (TSSA) | 978-1-6654-5594-7/22/$31.00 ©2022 IEEE | DOI: 10.1109/TSSA56819.2022.10063882

Table of Content

Wireless Interface Communication System On Water Level Monitoring Device Using NRF24L01+ PA LNA Transceiver Module

Adhitya Naufal Firdaus
Department of Electrical Engineering
Universitas Sangga Buana
Bandung, Indonesia
adhityanaufal18@gmail.com

Kusmadi
Department of Electrical Engineering
Universitas Sangga Buana
Bandung, Indonesia
kusmadi@usbypkp.ac.id

Nina Lestari
Department of Electrical Engineering
Universitas Sangga Buana
Bandung, Indonesia
nina.lestari@usbypkp.ac.id

Bambang Susanto
Universitas Sangga Buana
Bandung, Indonesia
bambang.susanto@usbypkp.ac.id

Slamet Risnanto
Department of Informatics Engineering
Universitas Sangga Buana
Bandung, Indonesia
slamet.risnanto@usbypkp.ac.id

Erna Garnia
Universitas Sangga Buana
Bandung, Indonesia
erna.garnia@usbypkp.ac.id

2022 16th International Conference on Telecommunication Systems, Services, and Applications (TSSA) | 978-1-6654-5594-7/22/$31.00 ©2022 IEEE | DOI: 10.1109/TSSA56819.2022.10063875

***Abstract*—Well Measurement of water level is very important for Geothermal Well operations. Manual measurement is very ineffective and inefficient because the water level cannot be monitored in real time. So, a wireless interface communication system was designed to monitor water level using ultrasonic sensor and the NRF24L01+ PA LNA transceiver communication module. The NRF24L01+ PA LNA is a long-distance wireless communication module that utilizes a 2.4-2.5 GHz radio wave frequency equipped with a Low Noise Amplifier and Power Amplifier. The distance data from the sensor transmitted by the NRF24L01+ PA LNA communication module will be displayed on the LCD and the thingspeak website platform. By using this method, the water level can be monitored quickly in real time and efficiently. The test results of communication modules show that the capability of the NRF24L01+ PA LNA module is quite good and effective in transmitting data at a maximum distance of 200 meters.**

Keywords—wireless interface communication, ultrasonic sensor, NRF24L01+ PA LNA, thingspeak, IOT

I. INTRODUCTION

Geothermal is a source of heat energy contained and formed in the earth's crust. Geothermal is a source of thermal energy contained in hot water, steam and rock along with minerals and gases which are genetically inseparable in a geothermal system and for their use a mining process is required. Geothermal energy can be used as a substitute for electric power that uses fuel oil so that it can be used as an alternative energy source to save national oil reserves[1].

Geothermal field are divided into two types of areas, the dominant steam phase and the dominant water phase. The Ulubelu geothermal area, in Lampung Province, is an area that has a dominant type of water. So that each geothermal well cluster is required to have a cooling water pond or water reservoir when testing production wells.

Geothermal wells in the Ulubelu Area have a greater water content than steam with a percentage of 80% : 20%. Therefore the pond level must be maintained in geothermal well operations. Especially when the process of testing and manoeuvring geothermal production wells. However, some cooling water ponds or water reservoirs in production well clusters are not equipped with a Level Transmitter as a water level monitoring tool. So the pond level is measured manually by the operator. This method is ineffective and inefficient because the water level cannot be monitored in real time and potentially cause flooding to the environment.

Therefore, we need a method to monitor the water level in real time that is easy to operate. So a wireless interface communication system was designed to monitor water level using the JSN-SR04T ultrasonic sensor and the NRF24L01+ PA LNA transceiver communication module. The altitude data is then displayed wirelessly on the LCD and the thingspeak website platform. By using this method, the water level can be monitored quickly in real time and more efficiently.

A. Wireless Communication System

Wireless communication is a form of sending information between two or more points that are not connected by electrical conductors or cables. Connection between points requires a radio channel as a medium for transmitting the information signal sent. As it passes through the radio channel, the signal passes through various obstacles in the propagation path. This results in attenuation of the signal at the receiver device[2].

Wireless channels are the main factor limiting the performance of wireless communication systems. The transmission distance between the transmitter and the receiver can vary from LOS (line of sight) to being covered by obstructions such as buildings, hills and trees (NLOS). In contrast to channels that use predictable cables, radio channels are random and cannot be analyzed easily[3].

B. NRF24L01+ PA LNA Transceiver Module

The NRF24L01 module is a long-range wireless communication module that utilizes the 2.4-2.5 GHz ISM *(Industrial Scientific and Medical)*. The data transmission speed of this module is quite high up to 2 Mbps. The output power, frequency channel, and protocol settings are programmed through the *Serial Parallel Interface* (SPI) interface to communicate with the microcontroller. The current consumption of this module is very low, which is only 9.0 mA at -6 dBm output power and 12.3 mA in receiver mode[4].

In addition, the NRF24L01 module also features a ULP solution or *Ultra Low Power*, which allows months to years

This work is partially supported by the 2022 Research Competitive Grants contract number 3/20/KP-HIBER/LPPM/IV/2022 from the Institute of Research and Community Services, Universitas Sangga Buana, YPKP.

of battery life[5]. The NRF24L01+ PA LNA module are shown in Figures 1. below.

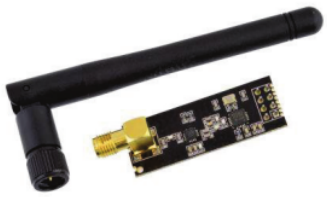

Fig. 1. NRF24L01+ PA LNA Transceiver Module

The specifications of the NRF24L01+ PA LNA module can be seen in table I. below.

TABLE I. SPECIFICATION OF NRF24L01+ PA LNA MODULE

No	Parameters	Specification
1	Maximum output power	+20 dBm
2	Emission mode current (peak)	115 mA
3	Receive Mode Current (peak)	45 mA
4	Power-down mode current	4.2 µA
5	Sensitivity 2Mbps mode in received	-92 dBm
6	Sensitivity 1Mbps mode in received	-95 dBm
7	Sensitivity 6000kbps mode in received	-104 dBm
8	PA gain	20 dB
9	LNA gain	10 dB
10	LNA Noise figure	2.6 dB
11	Antenna Gain (peak)	2 dBI

C. JSN-SR04T Ultrasonic Sensor

JSN-SR04T sensor is a waterproof ultrasonic sensor equipped with a 2.5meter long cable connected to the breakout board as a sensor controller and signal processor. Ultrasonic sensors work by emitting ultrasonic waves. Ultrasonic waves are reflected from the object being directed and then detected by ultrasonic sensors[6]. The JSN-SR04T sensor is shown in Fig 2. below.

Fig. 2. JSN-SR04T Ultrasonic Sensor

To calculate the distance between the sensor and the object being directed, it can be done by calculating the elapsed time between transmitting and receiving sound waves as in the following equation[6].

$$Distance\ (s) = Speed\ of\ Sound\ \ (cm\ /\ s)\ \times time\ (\mu s) \qquad (1)$$

The specification of the JSN-SR04T ultrasonic sensor can be seen table II.

TABLE II. SPECIFICATION OF JSN-SR04T ULTRASONIC SENSOR

No	Parameters	Specification
1	Operating Voltage	DC 3.0 – 5.5 V
2	Working Current	Less than 8 mA
3	Probe Frequency	40 kHz
4	Farthest Range	600 cm
5	Recent Range	20 cm
6	Distance Accuracy	+- 1 cm
7	Resolution	1 mm
8	Measuring Angle	75 degrees
9	Enter the trigger signal	1, 10 uS above the TTL pulse 2, the serial port to send instructions 0X55
10	Output the echo signal	Output pulse width level signal, or TTL
11	Wiring	3– 5.5 V (power positive) Trig (RX) RX Echo (Output) TX GND (power supply) negative
12	Product Size	L42*W29*H12 mm
13	Operating temperature	-20˚C to +70˚C
15	Product color	PCB board is blue

D. Arduino Nano

Arduino Nano is a board development of a small microcontroller based on the ATmega328P chip. Functionally, Arduino nano is almost the same as Arduino Uno.

The specifications of Arduino Nano can be seen in table III. below.

TABLE III. SPECIFICATION OF ARDUINO NANO

No	Parameters	Specification
1	Microcontroller	ATmega328
2	Operating voltage	5 V
3	Input voltage	7-12 V
4	Input voltage range	6-20 V
5	Pin I/O Digital	14 (6 used for output PWM)
6	Pin Input Analog	8
7	DC current per pin I/O	40 mA
8	Flash Memory	16 kB (ATmega168) 32 kB (ATmega328
9	SRAM	1 kB (ATmega168) 2 kB (ATmega328
10	EEPROM	512 Bytes (ATmega168) 1 kB (ATmega328
11	Clock speed	16 MHz
12	Dimension	0.73 cm × 1.70 cm
13	Panjang	45 mm
14	Lebar	18 mm
15	weight	5 g

What sets it apart is that the Arduino nano uses a Mini-B USB connector and doesn't have a power jack and has two more analog pins than the Arduino Uno[7]. Arduino nano is shown in Fig. 3. below.

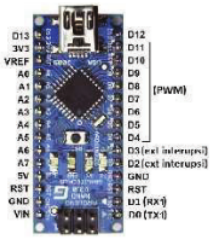

Fig. 3. Arduino Nano

E. NodeMCU ESP8266

The ESP8266 module is a fully supported low-cost WiFi module. Via TCP/IP or UDP. ESP8266 was developed by Chinese developer, "Espreffif". This WiFi module is a SoC (system on chip), so it can be programmed directly with the ESP8266 without the need for an additional microcontroller. The Esp8266 module also offers unmatched functionality to incorporate WiFi functionality into other systems and act as a standalone application with minimal footprint at low cost[8]. NodeMCU ESP8266 is shown in Fig. 4. below.

Fig. 4. NodeMCU ESP8266

The specifications of NodeMCU ESP8266 can be seen in table IV. Below.

TABLE IV. SPECIFICATION OF NODEMCU ESP8266

No	Parameters	Specification
1	Operating Voltage	2.5 – 3.6 VDC
2	Input Voltage	5 VDC
3	GPIO	13
4	ADC	1 Pin (10 Bit)
5	*Wi-fi* Protocol	802.11 b/g/n/e/i

F. Thingspeak

Thingspeak is an open source website based on internet of things that provides services for IoT needs and can receive information using the HTTP protocol over the internet network[9]. Platform is able to collect, store, analyze, visualize, and perform actions on information sent from sensors such as Arduino, Raspberry Pi, Black BeagleBone, and other hardware[10].

G. Cooling Pond

Cooling pond is a reservoir in the geothermal field that serves to accommodate brine or water from production wells during the well testing process or geothermal production well maneuvers. In addition, the cooling pond also functions to maximize the brine before it is channeled to the reinjection well using a pump[11].

The Ulubelu Geothermal Area is one of Pertamina Geothermal Energy's working areas located in the area of Mount Tanggamus, Lampung Province. The Ulubelu Geothermal Area has production wells that have two-phase properties with the dominance of brine (80%) and steam (20%) so that each cluster has an average of two to four cooling ponds. The view of the cooling pond in the geothermal field is shown in Fig. 5. below.

Fig. 5. Ulubelu Geothermal Cooling Pond

II. RESEARCH METHODS

A. Block Diagram

The block diagram below describes the communication system process from input to output. The process is described in Fig. 6. below.

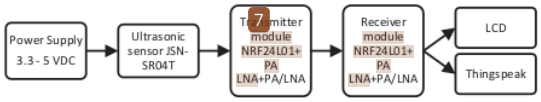

Fig. 6. Communication Systems Block Diagram

B. Design

The design are very important in this research. The design is divided into mechanical design, program design, transmitter module design and receiver module design.

a). Mechanical Design

After the system can function properly, a mechanical design is needed to maintain the reliability of sensors and other devices. The mechanical design carried out is making the cover module transmitter and the cover module the receiver. The mechanical design of the cover module transmitter and receiver can be seen in Fig. 7. below.

Fig. 7. Mechanical design of the transmitter and receiver module

b). Program Design

Program design or coding is done so that the device can operate according to the concept. The program is designed using Arduino IDE including the transmitter or sensor side and the receiver or user interface.

c). Design of the Transmitter Module

The transmitter module includes port as a power source connector, the JSN-SR04T ultrasonic sensor as a distance

detection sensor, Arduino Nano as a controller and the NRF24L01+ PA LNA module as a communication medium that will transmit distance or altitude data wirelessly. Module transmitter is done using the software Eagle. The design can be seen in Fig. 8 below.

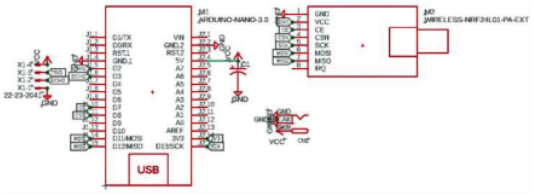

Fig. 8. Design of transmitter module

d). Design of the Receiver Module

The receiver module includes NRF24L01+ PA LNA as a communication medium that will receive data wirelessly from the transmitter, NodeMCU ESP8266 as an additional controller that converts distance or altitude data to an LCD display and the thingspeak as a platform IoT as a cloud and user interface to display data via an internet connection. Module design receiver is done using software Eagle. The design can be seen in Fig. 9 below.

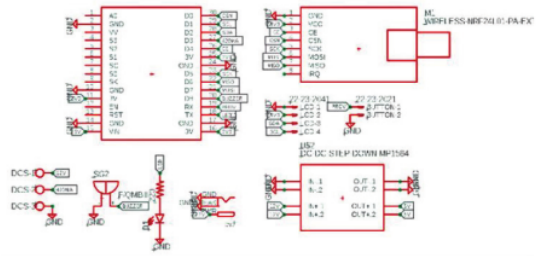

Fig. 9. Design of receiver module

C. Testing Method

At this stage, the data collection method is carried out to test the function and reliability of the system. The data collection includes the JSN-SR04T ultrasonic sensor data collection and the NRF24L01+ PA LNA wireless module.

a. JSN-SR04T Ultrasonic Sensor Data Collecting

JSN-SR04T ultrasonic sensor data collection was done by placing the JSN-SR04T ultrasonic sensor in an aquarium filled with water with different height variations. The water level data detected by the sensor is then sent by the NRF24L01+ PA LNA wireless module to be displayed on the LCD display and web thingspeak.

b. Data retrieval of Communication Distance of NRF24L01+ PA LNA Module

Data retrieval of communication distance of NRF24L01+ PA LNA module is done by moving the receiver at different distance variations.

c. Time and Place

Research This research was conducted from May 2022 to June 2022. The place of research was conducted at PT. Pertamina Geothermal Energy Ulubelu Area, Tanggamus Regency, Lampung Province.

d. Tools and Materials

In conducting research, tools and materials are needed to design tools according to the concept. The equipment used in this study is shown in table V. below.

TABLE V. TOOLS AND MATERIALS

No	Name	Total
1	NRF24L01+ PA LNA	2
2	Arduino Nano	1
3	ESP8266 NodeMCU	1
4	DC Jack Barrel	2
5	Voltage to current converter 0-5v to 4-20m	1
6	Power Supply 12V 1A	1
7	Push Button	1
8	Female Header	2
9	Male Header	1
10	LCD with I2C 1602	1
11	Capacitor 1000uF 6.8V	1
12	Waterproof Ultrasonic sensor JSN-SR04T	1
13	Buzzer	1
14	LED	1
15	Resistor 220 ½ W	1
16	Buck Converter MP1584	1

D. Flowchart

The flow chart of the wireless interface communication system based on the NRF24L01+ PA LNA transceiver module is shown in Fig. 10 below.

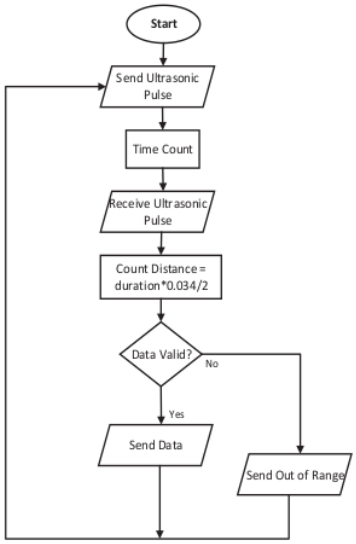

Fig. 10. Transmitter module flowchart

III. TESTING AND THE RESULT

The implementation of the research is to design a wireless interface communication system on a portable water level device using the transceiver NRF24L01+ PA LNA. The system consists of two main devices, namely transmitter that functions as a signal sender in the form of distance data from the JSN-SR04T ultrasonic sensor and receiver that functions as a signal receiver in the form of distance data which will then be displayed on the interface display.

A. Testing of Communication Module NRF24L01+ PA LNA

Testing the communication range of the NRF24L01+ PA LNA module is done by moving the transmitter. In this test, the transmitter used to measure the distance or water level in the culvert every 10 meters module the receiver is placed in a room that is blocked by a building. To test the communication of the NRF24L01+ PA LNA module, measurements were taken at a distance of less than 100 cm. Buzzer will sound when the measured distance is less than 100 cm. When the buzzer does not sound and the reading on the LCD display is stuck at a measurement of less than 100 cm, it indicates that the NRF24L01+ PA LNA module is no longer able to communicate. So, from this test obtained the maximum distance range that can be operated. An overview of data collection can be seen in Fig. 11 below.

Fig. 11. Placement of transmitter module

Fig. 12. Placement of receiver module

a). Data retrieval of Communication Module NRF24L01+ PA LNA

Communication distance of NRF24L01+ PA LNA module is tested by moving the transmitter at different distance variations. So that from this test data is obtained how far the range of the NRF24L01+ PA LNA module is in transmitting signals or data. The data is taken every 10 meters in the culvert to assess the communication range capability of the NRF24L01+ PA module. The sampling point is shown in Fig. 13 below.

Fig. 13. NRF24L01+ PA LNA sampling point

The results of data collection that have been obtained are described in table VI below.

TABLE VI. TEST RESULT OF NRF24L01+ PA LNA MODULE

No	Range (m)	Manual Measurement (cm)	Sensor Measurement (cm)	Deviation (cm)	Error (%)	Buzzer (ON/OFF)
1	10	57.2	57	0.2	0.35%	ON
2	20	59.15	59	0.15	0.25%	ON
3	30	59.6	59	0.6	1.01%	ON
4	40	60.2	60	0.2	0.33%	ON
5	50	60.4	60	0.4	0.66%	ON
6	60	65.4	65	0.4	0.61%	ON
7	70	65.7	65	0.7	1.07%	ON
8	80	61.8	61	0.8	1.29%	ON
9	90	69.5	69	0.5	0.72%	ON
10	100	69.8	69	0.8	1.15%	ON
11	110	74.1	73	1.1	1.48%	ON
12	120	73.9	73	0.9	1.22%	ON
13	130	71	70	1	1.41%	ON
14	140	69.2	68	1.2	1.73%	ON
15	150	69.1	68	1.1	1.59%	ON
16	160	71	70	1	1.41%	ON
17	170	72.2	71	1.2	1.66%	ON
18	180	72.4	71	1.4	1.93%	ON
19	190	73.2	72	1.2	1.64%	ON
20	200	74.5	73	1.5	2.01%	ON
21	210	75	0	75	100%	OFF
22	220	75.3	0	75.3	100%	OFF
23	230	75.8	0	75.8	100%	OFF
AVERAGE		68.50	57.96	10.54	14%	

The data in table VI above shows the results of measuring the water level flowing in culverts with different distance variations. From the test results of the NRF24L01+ PA LNA communication module above, the results show that the average error is 14% and it is known that there are fluctuations in the deviation value. The measurement deviation fluctuations that occur are due to the influence of the ripples of water flowing in the culverts.

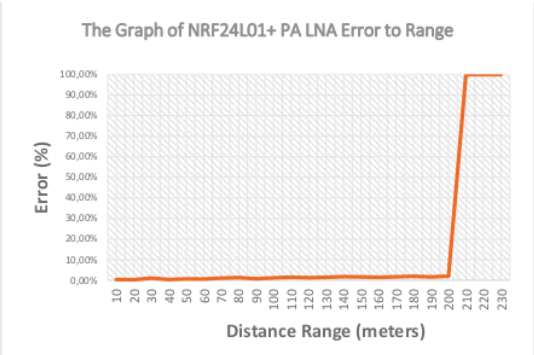

Fig. 14. Graph of NRF24L01+ PA LNA Error to Range

Then it analyzed for the maximum communication distance range testing of the NRF24L01+ PA LNA module. The analysis is shown in the graph in Fig. 14.

The graph above shows the communication range for measurement errors that occur. From the graph, it is known that at a distance of more than 200 meters, the measurement error shows a value of 100% which is indicated by an LCD display that shows a zero value and buzzer that does not sound. This indicates that the NRF24L01+ PA LNA module is no longer able to receive communication signals.

One of the factors that causes the limited range of communication distance of the NRF24L01+ PA LNA module is the occurrence of fading during signal reception. Fading is a symptom of collision in the radio wave path which results in increased attenuation of the received signal. The attenuation is in the form of buildings and elevation differences at the time of testing so that it hinders the data transmission process. In fixed geographical conditions, fading can be affected by changes in the weather in the atmosphere. Because the propagation of radio waves must be one line of sight and changing atmospheric conditions allow reflection, diffraction and refraction to occur[12].

It can also be seen that the range of communication distances that can be covered by the NRF24L01+ PA LNA module is proven to be further when compared to the previous version of the NRF24L01 module which has a maximum mileage specification of 100 meters in unobstructed conditions *(Line of Sight)* [4].

So, from the tests that have been carried out it can be seen that the ability of the NRF24L01+ PA LNA module is quite good and effective in transmitting data at a maximum distance of 200 meters.

IV. CONCLUSION

After doing this research, we know that the communication system on portable water level monitoring device using NRF24L01+ PA LNA transceiver module has been successfully implemented. Based on the test, it can be seen that the ability of the NRF24L01+ PA LNA module is quite good and effective in transmitting data at 200 meters maximum distance.

REFERENCES

[1] M. Soltani *et al.*, "Environmental, economic, and social impacts of geothermal energy systems," *Renew. Sustain. Energy Rev.*, vol. 140, p. 110750, Apr. 2021, doi: 10.1016/j.rser.2021.110750.

[2] R. Gunawan, Sukadwilinda, K. Kusmadi, E. Gamia, D. Saepudin, and N. Hendajany, "Automatic asset location determination for warehouse management system based on Wi-Fi signal strength," 2020, doi: 10.1109/TSSA51342.2020.9310830.

[3] Kusnandar, Kusmadi, A. Najmurrokhman, Sunubroto, Chairunnisa, and A. Munir, "Development of high sensitivity amplifier for VLF receiver application," in *2015 International Conference on Electrical Engineering and Informatics (ICEEI)*, Aug. 2015, pp. 328–331, doi: 10.1109/ICEEI.2015.7352520.

[4] I. W. Sudiarta, R. F. Akmaludin, D. W. Kumiawidi, and M. S. Yadnya, "Wireless system for active seismic method," in *2016 International Symposium on Electronics and Smart Devices (ISESD)*, Nov. 2016, pp. 85–87, doi: 10.1109/ISESD.2016.7886697.

[5] Basari and M. A. Agung, "Wireless ECG Patient Monitoring System Performance Aimed at Off-/On-body Communications," in *2018 Progress in Electromagnetics Research Symposium (PIERS-Toyama)*, Aug. 2018, pp. 1000–1004, doi: 10.23919/PIERS.2018.8597687.

[6] N. M. Fathur Rahman, S. Manjang, and Z. Zainuddin, "Water level monitoring using ultrasonic-pipe in open channel," in *2017 15th International Conference on Quality in Research (QiR) : International Symposium on Electrical and Computer Engineering*, Jul. 2017, pp. 262–266, doi: 10.1109/QIR.2017.8168493.

[7] N. N. S. Hlaing, M. Naing, and S. S. Naing, "GPS and GSM Based Vehicle Tracking System," *Int. J. Trend Sci. Res. Dev.*, 2019, doi: 10.31142/ijtsrd23718.

[8] A. M. A. Jalil, R. Mohamad, N. M. Anas, M. Kassim, and S. I. Suliman, "Implementation of vehicle ventilation system using NodeMCU ESP8266 for remote monitoring," *Bull. Electr. Eng. Informatics*, vol. 10, no. 1, pp. 327–336, Feb. 2021, doi: 10.11591/eei.v10i1.2669.

[9] A. H. Miry and G. A. Aramice, "Water monitoring and analytic based thingspeak," *Int. J. Electr. Comput. Eng.*, vol. 10, no. 4, p. 3588, Aug. 2020, doi: 10.11591/ijece.v10i4.pp3588-3595.

[10] H. Benyezza, M. Bouhedda, K. Djellout, and A. Saidi, "Smart Irrigation System Based Thingspeak and Arduino," in *2018 International Conference on Applied Smart Systems (ICASS)*, Nov. 2018, pp. 1–4, doi: 10.1109/ICASS.2018.8651993.

[11] V. V. Belikov, A. B. Rumyantsev, and S. V. Norin, "Investigation of Variants of Optimizing the Temperature Regimes of Nuclear Power Plant Cooling Ponds by Numerical Methods," *Power Technol. Eng.*, vol. 51, no. 6, pp. 653–659, Mar. 2018, doi: 10.1007/s10749-018-0887-3.

[12] K. Kusmadi, A. Saputra, M. Yunus, Chairunnisa, and A. Munir, "Impact of CSRR Incorporation in Lowering Resonant Frequency of X-Band SIW Antenna," *2019 IEEE 13th Int. Conf. Telecommun. Syst. Serv. Appl.*, pp. 89–92, Oct. 2019, doi: 10.1109/TSSA48701.2019.8985473.

Plagiarisme_TSSA 2022

ORIGINALITY REPORT

10%	6%	9%	%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	"Copyright and Reprint Permission", 2022 16th International Conference on Telecommunication Systems, Services, and Applications (TSSA), 2022 Publication	2%
2	repository.unp.ac.id Internet Source	2%
3	hdl.handle.net Internet Source	2%
4	Asep Najmurrokhman, Kusnandar, Udin Komarudin, Ahmad Daelami, Restu Arisandy. "Development of Internet-of-Things based Building Monitoring System for Supporting the Disaster Mitigation in The City", 2019 4th International Conference on Information Technology, Information Systems and Electrical Engineering (ICITISEE), 2019 Publication	1%
5	repository.ub.ac.id Internet Source	1%

6	Mariyanto, Has Priahadena, Wahyudi W. Parnadi. "Application of vertical electrical sounding method to identify distribution of hot groundwater around the hotsprings in geothermal prospect area", ASEG Extended Abstracts, 2019 Publication	1 %
7	Mobasshir Mahbub. "A smart farming concept based on smart embedded electronics, internet of things and wireless sensor network", Internet of Things, 2020 Publication	1 %
8	Beki Subaeki, Khaerul Manaf, Asep Effendi R., Peti Savitri, Fitri Syabandyah, Hanhan Hanafiah Solihin. "Input-Process-Output Dimensions for Measuring the Success of Online Tax Information Systems", 2019 IEEE 13th International Conference on Telecommunication Systems, Services, and Applications (TSSA), 2019 Publication	1 %
9	core.ac.uk Internet Source	1 %
10	"Table of Content", 2021 7th International Conference on Wireless and Telematics (ICWT), 2021 Publication	1 %

Exclude quotes	On	Exclude matches	< 1%
Exclude bibliography	On		

Plagiarisme_TSSA 2022

GRADEMARK REPORT

FINAL GRADE

/0

GENERAL COMMENTS

Instructor

PAGE 1

PAGE 2

PAGE 3

PAGE 4

PAGE 5

PAGE 6

PAGE 7

PAGE 8

PAGE 9

PAGE 10

PAGE 11

PAGE 12

PAGE 13