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Optimization of short message media in the Arduino and Bluetooth-based blank spot areas

Optimization of short message media in the Arduino and Bluetooth-based blank spot areas

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Abstract. Communication is important in human life because communication can bridge all forms of ideas to be conveyed by someone. And the communication media commonly used today are via mobile phones, which can be via SMS messages, WhatsApp, or telephone. The problem is, in some areas the absence of signals or blank spots is a problem for those who rely on communication via mobile phones. For this reason, it is necessary to optimize the short message media in the Arduino and Bluetooth-based blank spot areas. Here the main goal is to make it easier for humans to communicate via mobile phones even in difficult conditions and without a data packet or WIFI signal. The tools used are android, the Lo-Ra module as a long-distance wireless transmission technology platform that can reach distances of 10km, and then also use the Arduino Pro Mini as a microcontroller board and Bluetooth terminal that functions to transmit data from android to Arduino and then forward it to Lo Ra. From the test results, it was found that this tool works well in the blank spot area or difficult to signal, without the need for data packages or WIFI we can still communicate well through the short message media on the cell phone. From the test results, it was found that this tool works well in the blank spot area or difficult to signal, without the need for data packages or WIFI we can still communicate well through the short message media on the cell phone. So, with the invention of this tool, we can still communicate through the medium of short messages even though we are in the blank spot area, and even when we do not have a data package or WIFI.

1. Introduction

The mobile phone as a form of communication technology is acceptable by many peoples. But geographical condition makes them difficult to access. Many potential mobile-phones consumers are in rural areas. They have no enough telecommunications infrastructure [1]. In fact, according to the Telecommunications and Information Accessibility Agency (BAKTI), there are 11% around the territory of Indonesia which still experiences blank spot cellular areas, especially in the frontier, outermost and backward (3T) and border areas [2].

In the current era of globalization, communication is very important for anyone. Communication is urgent in human life, therefore the position of communication in receiving enough strong pressure for humans as members of society [3]. And the most commonly used communication media by the public

today is through mobile phones in this case through the medium of short messages using either SMS or other short message features.

Therefore, when located in areas that are difficult to signal (blank spot area), the use of mobile phones will be a problem in itself. Though often we need to immediately communicate with other parties when an important problem occurs. This issue is the background of the writing of this journal

The purpose of this journal is so that the public can communicate through the medium of short messages on mobile phones even in difficult conditions of signal, without telecommunications data packages and even without Wi-Fi. This short message media based on Android and Arduino aims to make it easier for humans to exchange information while in a blank spot area, where the tool can be used without using signals and data packages. This tool can be used with Bluetooth from a mobile phone with a maximum distance of 5km and can function with difficult signal areas with a rechargeable battery.

2. Research methods

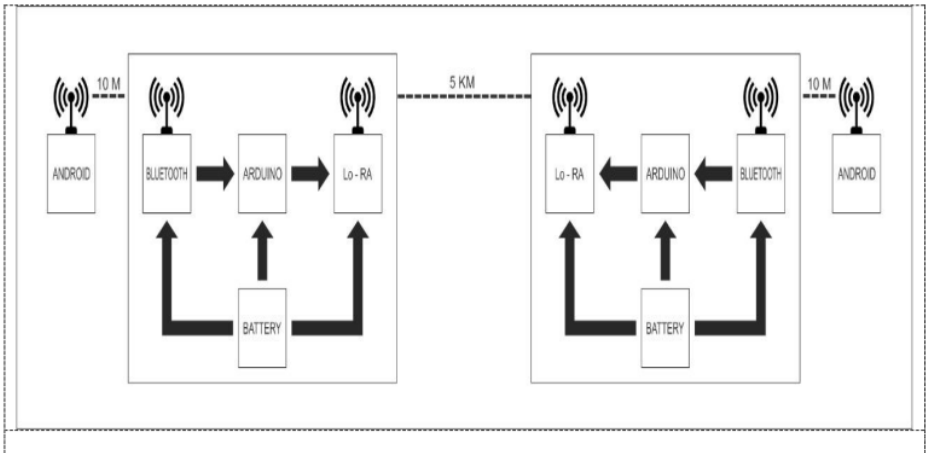

Figure 1. Block diagram.

This is an overview of the tools used for short message media in the blank spot area. That is, an Android phone that is connected to a device that consists of Telemetry Lo Ra - Arduino Pro Mini – Bluetooth HC 05 and then connected to the battery (Figure 1).

To communicate, then we need 2 tools, each of which will be associated with an android phone that will be used to communicate. The tool can communicate with an android cell phone via the Bluetooth terminal application that we can install on the android smartphone. By using this tool, we can communicate in the blank spot area without using a data packet and Wi-Fi signal.

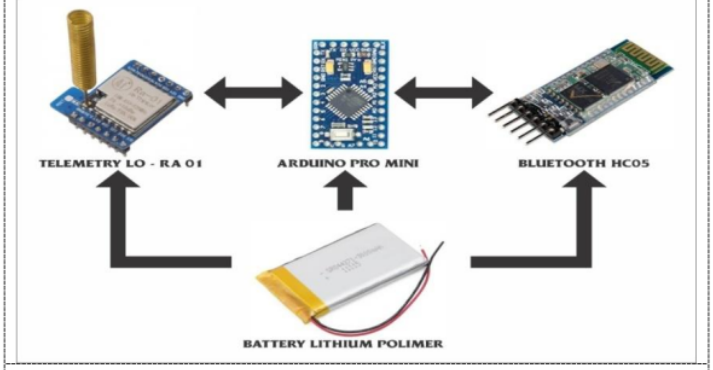

Figure 2. Details of the tool used.

Explanation:

- Telemetry Lo Ra 01: (Long Range) is a low-wide-area network (LPWAN) technology that enables long-distance transmission (more than 10 km in rural areas) with low power consumption [4]. LoRa and LoRaWAN allow remote connectivity to the Internet of Things (IoT) devices in various types of industries [5]. In this tool, LoRa functions as a medium for sending messages remotely. According to the datasheet, it can communicate as far as 10Km with a frequency of 433MHz [6].
- Bluetooth HC-05 application functions as a data transfer media [7].
- Arduino as a microcontroller to regulate actions and provide work orders on the tool.
- Power support uses a lithium battery that can be recharged with a 1,5-volt mains voltage.

3. Result and analysis

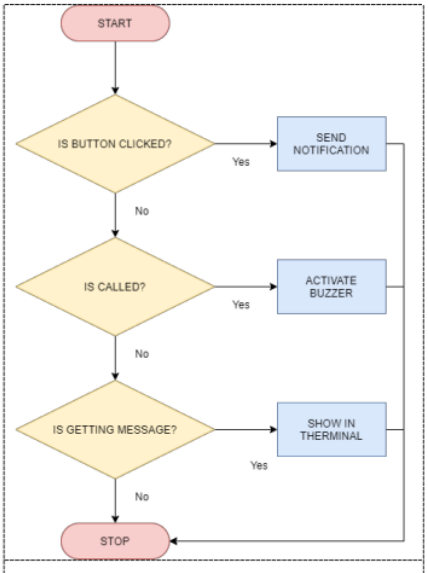

Figure 3. Flow chart.

From the flow chart above, it appears that this system has 3 main functions, namely reading buttons, giving notifications by turning on the buzzer, and the process of receiving and sending messages in two directions. In the process of receiving and sending messages there is a workflow from the Bluetooth Terminal on Android that sends data to Arduino via Bluetooth HC-05, then sent to LoRa via Arduino, after that from LoRa is transmitted to other LoRa and so on until it returns to the Bluetooth Terminal on communication opponent. The main point in this system is how between LoRa and other LoRa can communicate at its farthest distance. In the LoRa datasheet it has a range of 410-525MHz with the lowest sensitivity or RSSI of -141dBm as shown below:

Table 1. The sensitivity of data reception.

Frequency	Spread factor	SNR	Sensitivity
4433MHz	7	-7	-125
	10	-15	-134
	12	-20	-141
470MHz	7	-7	-125
	10	-15	-134
	12	-20	-141

Note: The above data are measured by the Semtech Shezhen laboratory.
The test condition: Power output 20dBm, bandwidth 125KHz

In the table picture above, it is noted that the test data above was obtained by Semtech Shenzhen Laboratory with an output power condition of 20 dBm. However, the LoRa sold in the market has a maximum output power of 18dBm so that the lowest sensitivity value is different. From the results of measurements on the system obtained RSSI values as follows:

Table 2. First RSSI measurement.

Distance (m)	RSSI (dBm)
10	75
50	81
100	89
150	97
200	105
250	112
300	120
350	128
400	136

The table above is a measurement of the value of RSSI in a densely populated residential environment, so that a lot of interference arises either from buildings or electromagnetic effects of radio signals, cellular, and others. At a distance of 400 m, the RSSI value is -136 dBm, which is the lowest value that can be achieved in this condition. After the distance is further extended the communication shows instability, so the measurement is limited to a distance of 400m.

Table 3. Second RSSI measurement.

Distance (m)	RSSI (dBm)
100	70
200	77
300	84
400	92
500	99
600	106
700	113
800	121
900	128
1000	135

The table above is a measurement of RSSI carried out on the ground so that to minimize interference so that it can increase the distance of communication. Due to the limitations of the test site, the test can be carried out to a distance of 1000m with the lowest RSSI value of -135 dBm. The RSSI value in this test is obtained from an internal calculation conducted by LoRa so that the output value can be easily removed. If seen in tables 2 and 3, it can be concluded that the distance in the LoRa can be increased by minimizing interference. The value of the RSSI does not only refer to the distance because in this experiment the power expended is the same, then the RSSI value is affected by the existing interference, for example from buildings or other electromagnetic signals.

4. Conclusion

From the testing process and data collection for several times, it can be concluded as follows:

- The distance of communication between LoRa is influenced by interference.
- RSSI value not only refers to distance but also due to interference
- To increase the distance between LoRa you should use an antenna that has a greater gain.
- The distance between LoRa can be increased if there is a larger network. Because LoRa has a Broadcast system, so Lo Ra can make another LoRa a bridge to reach the destination.

Acknowledgments

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References

[1] Berto K 2015 Cellular Phone and the Usage (Problems of Cellular Phone's Usage in Blank Spot Areas of Indonesia) *Jurnal Studi Komunikasi dan Media* **19**(2) 259-283

[2] Kominfo 2018 *BAKTI: 11% wilayah Indonesia masih blank spot seluler* [Online] (Retrieved from: https://kominfo.go.id/content/detail/13606/bakti-11-wilayahindonesia-masih-blank-spot-seluler/0/sorotan_media)

[3] Bahri A N 2018 Peran Komunikasi Antar Pribadi pada Lingkungan Kerja dalam Perspektif Islam *Jurnal Ilmiah Sosiologi Agama (JISA)* **1**(1) 128-142

[4] Sanchez-Iborra R, Sanchez-Gomez J, Ballesta-Viñas J, Cano M D and Skarmeta A F 2018 Performance evaluation of LoRa considering scenario conditions *Sensors* **18**(3) 772.

[5] Khutsoane O, Isong B and Abu-Mahfouz A M 2017 IoT devices and applications based on LoRa/LoRaWAN *IECON 2017-43rd Annual Conference of the IEEE Industrial Electronics Society* 6107-6112

[6] Mohan V 2018 *10 Things About LoRaWAN & NB-IoT* [Online] (Retrieved from: https://blog.semtech.com/title-10-things-about-lorawan-nb-iot)

[7] Nasution M A D, Hartama D, Anggraini F, Dewi R and Desiana E 2020 Automatic Car Control Prototype With Sound Application In Android Arduino Uno-Based *Jurnal Mantik* **3**(4) 750-757

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