DESIGN OF EMERGENCY PUSH BUTTON MONITORING AS AN IOT-BASED ALARM AT AVIATION POLYTECHNIC SURABAYA

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ABSTRACT

Aviation Polytechnic Surabaya is one of the official schools under the Ministry of Transportation which has the main task and function of carrying out professional education in the fields of expertise in Aviation Engineering, Aviation Safety and Aviation Management. At the Surabaya Aviation Polytechnic, students are educated on campus and in dormitories. In connection with the facilities and infrastructure available at the Surabaya Aviation Polytechnic, it is not complete enough, such as specialized security services in each dormitory which is the place of most cadet activities so that the possibility of an emergency occurs beyond the expectations of the caregiver on guard. So to convey emergency information, the author makes a tool, namely the IoT-based Emergency Push Button which can be used by cadets to provide information to the caregivers in the PMMK building at any time, morning, noon, or night. This research design includes several components including the LoRa module, NodeMCU ESP8266, ISD1820, Emergency Push Button and other supporting tools. The way this design works is by pressing the Emergency button at the scene of the emergency then through the microcontroller will send data using the LoRa Transmitter module and the results will be received by the Receiver which is displayed through the LCD as a pointer to which Transmitter location is active and the ISD1820 module in the form of a warning sound. The results of the research that has been done that all components work according to their respective functions. Starting from Tranmitter 1 and 2 (LoRa, ESP8266, ISD1820, Push Button) and Receiver (LoRa, ESP8266, LCD, ISD 1820). For the communication distance between LoRa, the farthest distance ± 75 m is obtained. This distance is very dependent on the type of LoRa used, antenna usage, obstacles, etc.

Keywords: *LoRa Module, Emergency Push Button, Monitoring*

1. INTRODUCTION

Surabaya Aviation Polytechnic or commonly abbreviated as Poltekbang Surabaya is an official school under the auspices of the Transportation Human Resources Development Agency. It has the main task and function of carrying out professional education in the fields of expertise in aviation engineering, aviation safety and aviation management. The education system is semimilitary-based and requires its cadets to live in dormitories (Alpha, Charli, Delta, Eko, Foxtrot, Hotel/Dormitory). Especially for the cadet dormitory, which is the place where most of the cadets' movements are active, there will be a lot of possibilities for something to happen outside the supervision of the caregivers on guard, and in the dormitory, there are only CCTV facilities that are used to monitor the movement of cadets while conveying important or emergency information regarding the safety of cadets to the caregivers is not yet available. CCTV has several weaknesses including 1.) the existence of CCTV only monitors in open places such as dormitory corridors, front of dormitories, cannot be installed in areas that are private such as bathrooms, cadet barracks, etc. 2.) Monitoring is visual without being able to provide information to those responsible, so if CCTV is not monitored directly, the incident that wants to be reported cannot be known by the caretaker. So from these problems a tool is made that can perfect and complement the function of CCTV not only the problem is known by looking at CCTV directly but when CCTV is not monitored even emergency / emergency events can be known by the caretaker, one of the tools is the Emergency Push Button or Emergency Push Button. Emergency Push Button is a button or switch that is used in an emergency to provide important information that requires action and handling as quickly as possible, meaning that this button can be accessed and used during a truly emergency situation such as a fire, an accident related to equipment, someone's safety, etc. The existence of an effective and reliable emergency push button is very important to ensure the safety and security of all cadets in the area. The existence of an effective and reliable emergency push button is very important to ensure the

safety and security of all cadets in a related area. Based on the explanation above, the authors make a design that can be used to solve existing problems through the design of a tool that is implemented through this final project entitled "MONITORING EMERGENCY PUSH BUTTON DESIGN AS AN INTERNET OF THINGSBASED ALARM AT THE SURABAYA AIRPORT POLITEKNIK".

2. METHOD

The basic concept of this Emergency Push Button will consist of two main components, namely the Transmitter as a signal sender and the Receiver as a signal receiver sent via the LoRa-02 SX1278 module. This tool will work by sending signals in the form of data that has been processed using NodeMCU Esp 8266 using the LoRa module. Works by using 5 VDC power as the main source obtained from each adapter, and is useful for activating Esp 8266 and LoRa. NodeMCU Esp 8266 will act as a data control that will send data using LoRa Transmitter as a data sender and activate the Speaker to issue a warning sound. But before that, in order for Esp 8266 and its LoRa Transmitter to work, Emergency button 1 or 2 must be pressed. After one of the buttons is pressed, Esp 8266 and LoRa Transmitter will work to send data which will be received by the LoRa Receiver and NodeMCU Esp 8266 as a data receiver and give commands to the design.

After the data is received, the Esp 8266 Receiver will activate the LCD to display the location or position of which button is pressed by Transmitter 1 or 2 and also activate the Speaker as a warning alarm to notify that something emergency has happened. To turn off the LCD and speaker, you need to press the Reset button available on the Receiver and the device will return to the standby position. Some of the main components used in making the project

1. NodeMCU Esp 8266
2. LoRa-02 SX1278
3. ISD 1820
4. LCD 16 x 2
5. Push Button

3. RESULT AND DISCUSSION

a. Transmitter Circuit

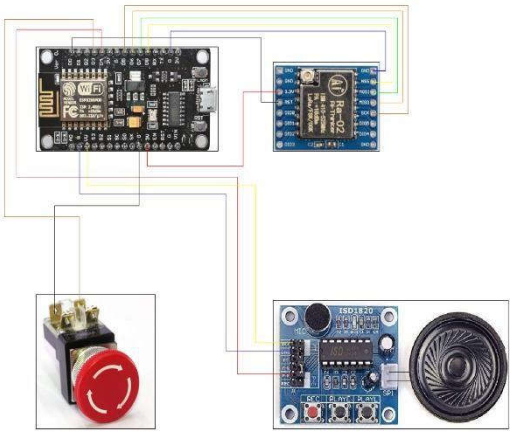

Figure 1. Interfacing all component on the Transmitter

Analysis: Testing the condition of the ISD 1820 module on each component of the Transmitter and Receiver shows that the components are in good condition, meaning they work according to their function.

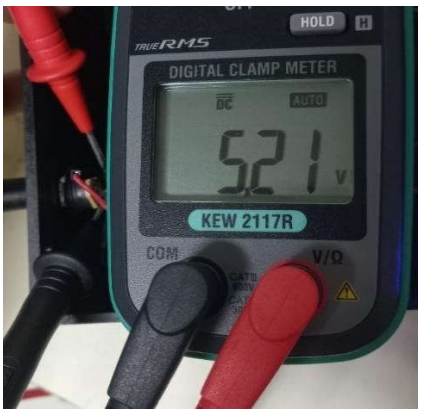

Figure 2. The amount of source voltage on the Transmitter

Analysis: After several tests, the data obtained shows that the input voltage of the power supply is in accordance with what is needed even though there is a difference in numbers, but it is not a problem because the difference is small between the measurement and the desired number

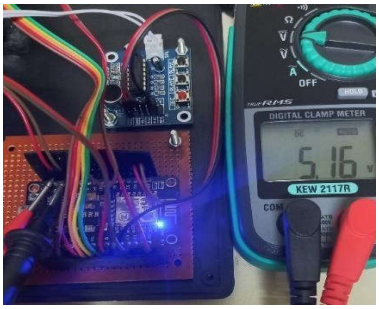

Figure 3. Input votage entering the NodeMCU Esp 8266 Transmitter

Analysis: After taking measurements, it is known that the input voltage entering Esp 8266 is 5.16 VDC, although there is a difference in numbers, it does not matter

because the number is very small between the measurement and the desired one.

Condition	Tx 1	Tx 2	Rx
Good	✔	✔	✔
Not Good	-	-	-

Ket : Good (can issue a warning sound when the emergency button is pressed)

Not Good (Doesn't issue a warning sound when the emergency button is pressed)

Tx 1 = Transmitter 1, Tx 2 = Transmitter 2,

Rx = Receiver

Table 1. ISD 1820 Module condition Testing

Analysis: Testing the condition of the ISD 1820 module on each component of the Transmitter and Receiver shows that the components are in good condition, meaning they work according to their function.

b. Receiver Circuit

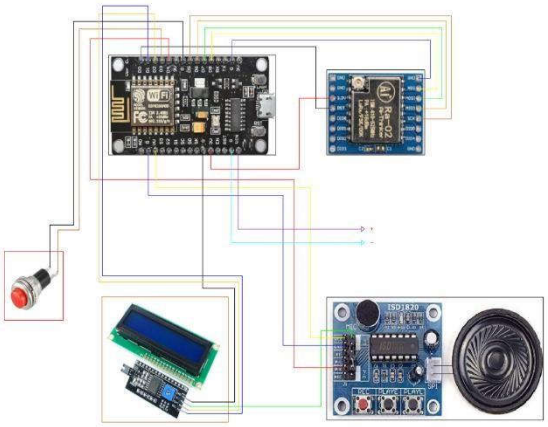

Figure 4. Intercaing all component on the Receiver

The picture above shows the circuit contained in the Receiver and the components used in it

Figure 5. The amount of input voltage on the Receiver

Analysis: After several tests, the data obtained shows that the power supply input voltage is in accordance with what is needed even though there is a difference in numbers, but it does not matter because the difference is small between the measurement and the desired number.

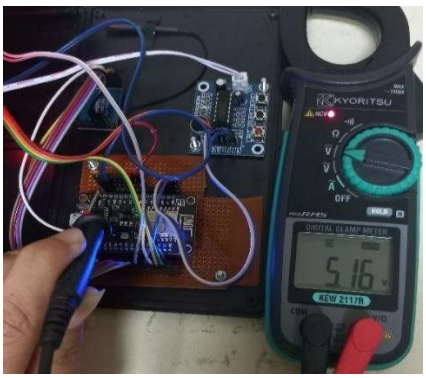

Figure 6. The amount of voltage entering the NodeMCU Esp 8266 Receiver

Analysis: After several tests, the data obtained shows that the power supply input voltage is in accordance with what is needed even though there is a difference in numbers, but it does not matter because the difference is small between the measurement and the desired number.

Figure 7. Condition of LoRa Receiver in Standby and active Transmitter

Analysis: Conditions on the LCD screen that are safe and normal conditions and when the Transmitter condition is active

c. Overall Tool Testing

The results of this test aim to determine how far the communication distance between the Transmitter and Receiver is

Area	Tx 1	Tx 2	Rx	Distance
BR – EMP	✔	✔	✔	**26 m**
BR – GSG	✔	✔	✔	**70 m**
BR – GS	✔	✔	✔	**58 m**
South Foxtrot	-	-	-	**95 m**

Dormitory	-	-	-	**200 m**

Ket : BR (Bintar Room)

GSG (Gedung Serba Guna)

✔ = Working , - = Not Working
Tx = Transmitter , Rx = Receiver

Table 2. Experimental Testing Comunication Distance from Transmitter and Receiver at Several Points

4. CLOSING

A. Conclution

How is the working system of the Emergency Push Button Monitoring Design?

The working system of the tool that the author has made is started by activating each Transmitter and Receiver. After both are active, the emergency button located on the Transmiiter unit is pressed which will turn on the Speaker while sending data or signals wirelessly using the LoRa module that has been set up and controlled by ESP 8266 and the data sent will be received by LoRa which is in the Receiver unit controlled by ESP 8266 and ESP 8266 which is in the Receiver will turn on the Speaker LCD will display which location or Transmitter is active. And to turn off the Speaker and LCD so that they don't continue to live, you can press the reset button on the Receiver so that the Speaker and LCD are off.

How to know the reliability of this Emergency Push Button Monitoring Design?

The way the author does to find out the reliability of this Emergency Push Button Monitoring Design is to measure how far the communication distance is between the Transmitter and Receiver units, and get the following results:

Area	Tx 1	Tx 2	Rx	Distance
BR – EMP	✔	✔	✔	**26 m**
RB – GSG	✔	✔	✔	**70 m**
RB – GS	✔	✔	✔	**58 m**
South Foxtrot	-	-	-	**95 m**

Dormitory	-	-	-	**200 m**

Ket : BR (Bintar Room)

GSG (Gedung Serba Guna)

✔ = Working , - = Not Working
Tx = Transmitter , Rx = Receiver

Table 3. Conclution of Experimental Testing Transmitter and Receiver

Based on the results of the experiments that have been carried out, the results of the farthest distance of communication between the Transmitter and Receiver are approximately 75 m and the data sent also does not experience delay. with the note that the tool or unit that the author uses, LoRa-02 SX1278, is the lowest type in its class so naturally the distance obtained is not too far. So to get a longer distance it is necessary to add an extended antenna to strengthen the signal and replace the LoRa module to a better one, such as E32, SX1262, SX1276, etc.

B. Advise

In perfecting and improving the function and performance of a tool, modification and development are needed. The suggestions from the author to improve and develop this tool, among others:

1) For future research development, the use of the LoRa communication module in order to transmit data further can add an extended antenna as a signal amplifier to make it more stable.
2) Replacing the LoRa-02 SX1278 module with a better type such as the E32 type, SX127X series, and others so that the results are obtained further.
3) Can present a 2-way communication feature between the Transmitter and Receiver

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