Simple Wireless Nurse Call on Distance Measurement

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Abstract—**On this era, many patients go to the hospital and the clinic because the service is better than yesterday. If there are patient suffer a sickness and on the patient bed so the patient will call the nurse using a bell to call the nurse on the treatment room on the hospital. The previous research uses cable to connect the nurse room with the patient room. In this research we proposed a new scheme that is wireless nurse call. The wireless nurse call will minimize the cable. This research module using Arduino. There are consist of transmitter and receiver module. The system consists of the software and the hardware. There are one master transmitter module and four receiver module. The receiver module is tested on several place and several barriers. The visualization can be displayed on the PC (Personal Computer) or Laptop using Microsoft Visual C# software. The visualization is included the four room notification with display and sound. From the research, this module can work well. From the research, we conclude that the module can work and can over the barrier and several far away from the master module.**

Keywords—Arduino, nurse call, visual C#, wireless

I. INTRODUCTION

The hospital can be filled by much patient with many kind of sickness. The patient is on several condition start from the few to hard suffer of the sickness level. The doctor and the nurse can coordinate to cover the patient illness [1][2][3]. The patient if in the accute condition usually call the nurse from the bed by clicking the bell [4][5][6][7].

The previous module uses cable to connect the master (the nurse control room) and the small module (on the patient bed side) on each treatment room [8][9][10][11][12]. From the research by Taufik Alfianur Wibowo that is the research using cable to transmit the data and the display using seven segment [13][14][15][16]. This research is improved by Sultan Al Badrul Munir, the data transmission using Bluetooth wirelessly with range up to fifteen meter [17][18][19]. But the transmitter is branched by four items so it will so close [20][21][22][23][24].

Ilham Sayekti improved this module by using Xbee to transmit data from transmitter to receiver with range up to twenty meter but there are no LCD display for this module [25][26][27][28][29][30][31]. The improved system by Abrory Lutfi is using cable to connect the transmitter and receiver but this system can allow voice to communicate between the nurse and the patient[32].

From the previous research, this research proposed the new scheme to cover this previous module. This module using one master and four receivers. This module using the Arduino Nano and the Visual C# to implement this system.

This paper is consisted of four section. The first section is Introduction. The second section is System Design. The third section is the result and discussion and the last section is conclusion.

II. SYSTEM DESIGN

The system design contains hardware design and software design. The hardware system contains Arduino Nano, NRF24L01, and push button. The nurse call room can be displayed on the PC or Laptop with Visual C#. The workflow of the system can be seen on the diagram in Figure 1.
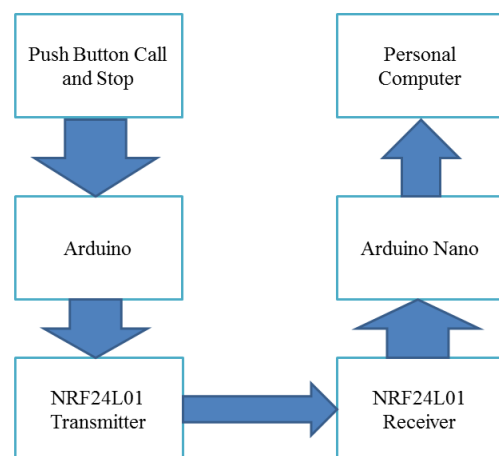

Fig. 1. The Block Diagram

The Fig. **1** shows that the module is connected to the 220 V AC source. The adaptor converts the 220 V AC to the 5 V DC to be connected to the microcontroller. When the push button is pressed so the analog signal will be transferred to the minimum system. This analog signal is changed to the digital signal. The digital signal will be sent by the NRF24L01 transmitter to the NRF24L01 receiver via radio frequency. This information (digital signal) will be displayed on the software designed using Visual C#.

The software interface can be seen on the Fig. **2**. The software is located on nurse control room. The software

shows the four room notification. There are four room. If the module on the room one is clicked so this notification will be displayed on the room one on the software shown in Fig. **2**.
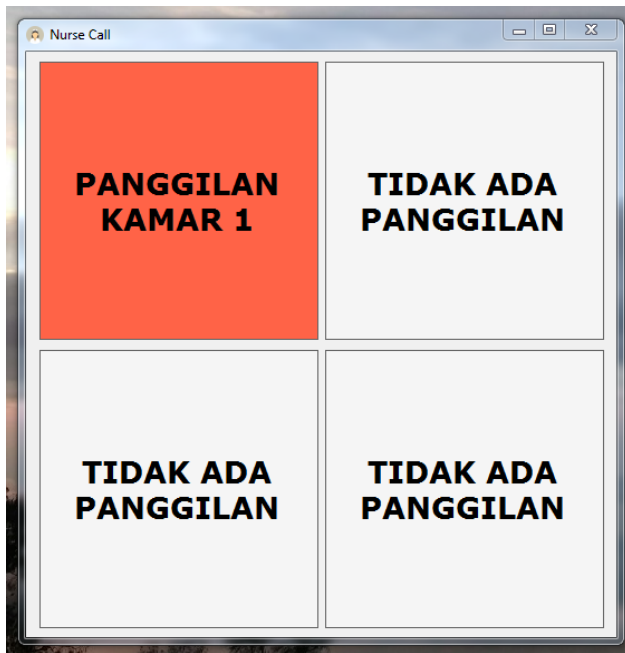

Fig. 2. The Display When Room 1 is Clicked

The research module can be seen on the Fig. 3. The device is transmitter and the receiver. The transmitter is in the patient room and the receiver is in the nurse office that connect to the computer. The opening interface in computer can be seen on the Fig. 4. The OK button is used to connect to the receiver device.
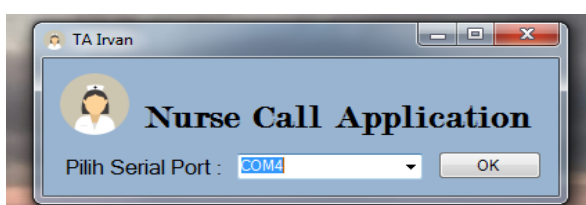

Fig. 3. The Proposed Module

Fig. 4. The Software Opening

III. THE RESULT AND DISCUSSION

The module is tested by using several various of obstacle and distance. The distance will be shown on the Table I.

TABLE I. THE DISTANCE MEASUREMENT TESTING WITHOUT OBSTACLE

Distance (meter)	The Condition on Data Transmission			
	Transmitter 1	Transmitter 2	Transmitter 3	Transmitter 4
3	Success	Success	Success	Success
5	Success	Success	Success	Success
8	Success	Success	Success	Success
10	Success	Success	Success	Success
13	Success	Success	Success	Success
15	Success	Success	Success	Success
18	Success	Success	Success	Success
20	Success	Success	Success	Success
23	Success	Success	Success	Success
25	Success	Success	Success	Success
28	Success	Success	Success	Success
30	Success	Success	Success	Success
33	Success	Success	Success	Success
35	Success	Success	Success	Success
38	Success	Success	Success	Success
40	Success	Success	Success	Success
43	Success	Success	Success	Success
45	Success	Success	Success	Success
48	Success	Success	Success	Success
50	Success	Success	Success	Success
53	Success	Success	Success	Success
55	Failed	Failed	Failed	Failed

Based on the results in Table I, it can be analyzed that testing the module with a variable distance without an obstacle as much as 11 times the data collection, it is found that the farthest distance that the module can sending the data reach as far as 53 meters.

IV. CONCLUSION

Based on the results of the research, it can be concluded that the appliance cannot work using a battery voltage source, for example using a power bank. During the test, several factors can be found that can affect the distance the device can reach that is wall material, wall thickness and networks or signals such as Wi-Fi signals that are around the module.

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