

The Design of Smart Management System for Unmanned Clothing Stores

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Abstract. In this paper, we proposed the design of smart RFID clothes management system for unmanned clothing stores. The proposed system consists of smart hanger, wireless communication module, display device, winform software, and server. The performance of the proposed system is verified by means of experimental. Customers can choose any clothes on the server software and can match their faces to the clothes which they are interested for funny choose.

Keywords: Smart management system, RFID technology, Smart hanger, Display device.

1 Introduction

In the 21st century, life for humans being has become busy to the extent that they strive for a comfortable and easy life[2]. In some countries unmanned stores start to become popular. But most of unmanned stores use the vending machine as the main operating method. It is not applicable for clothing management.

We propose the design of smart management system for unmanned clothing stores. The system we proposed consists of RFID reader, RFID tag, wireless RFID hanger, and wireless communication module and winform software. Server software is responsible for tag ID collection from RFID reader and building data centre. Sub software is responsible for keeping exchanging information to server software. Customers can use face detection function to match their faces to the clothes which they are interested.

2 Configuration of Proposed System 2-

1. Smart Hanger

The smart RFID hanger consists of MCU, RF chip, display LED, RFID reader, RFID reader antenna, ring sensor and battery. Figure 1 shows the block diagram of smart hanger, and Figure 2 shows the picture of made hanger. This hanger combined RFID reader and wireless communication module. The reader reads tags at 13.56 MHz and read range are about 180mm. If the ring sensor is activated, the hanger is sent to the server reads the information of the RFID tags attached to the clothing.

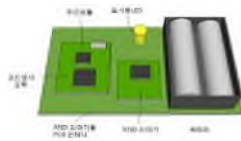


Fig. 1. Block diagram of smart hanger



Fig. 2. Picture of smart hanger

2-2 Wireless communication module

Fig 3 shows the wireless communication module of the proposed system. It is the bridge to collect tag ID from hanger to display computer.



Fig. 3. Wireless communication module



Fig. 4. The example of display device

2-3 Display devices

The display devices displays the information received from the server, and receives customer input via the touch screen are sent to the server. This device is normally an advertising video playing. Figure 4 shows the example of display device.

3 Software

3.1 Server Software

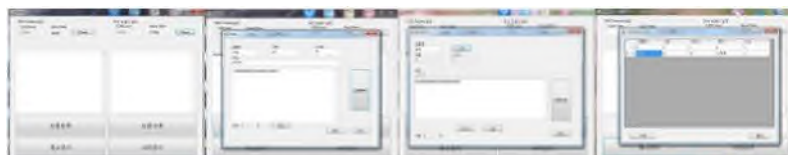


Fig. 5. Data centre software interface

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Server software help server computer to register the clothes ID and send open LED command to help find the clothes. All the registered data can be checked on line. Each clothes only have one ID [3]. Fig. 5 shows the data centre software interface and Fig.6. shows the server software online function. When RFID hanger is touched, the display device will show like Fig. 7.



Fig. 6. Server software online function



Fig. 7. Display computer

3.2 Sub software

Fig. 8 is the sub software interface, and the customer can see the new arrival clothes such as Fig. 9 at real time.



Fig. 8. Sub software interface

Fig. 9. New arrival at sub software Fig. 10. Face detection and face match

4 System Processing

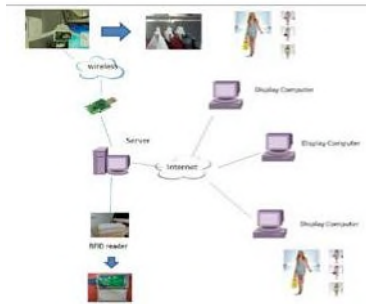


Fig. 11. System Flow

Fig 11 shows the system flow. Operator attaches RFID tags on the clothes and then use the server software register every cloth. All the information will be saved at data centre. Users can find their favorite clothes on line also can see the clothes details when they lift up the hanger.

5 Experiment

Our experiment was set-up like Fig 12, the tag was attached on clothes, and then the clothes were arranged in a line.



Fig. 12. A picture of experimental set up

Table.1. Accuracy average

Distance(m)	PRR(%)
10	100
20	100
30	100
40	99

We test the read range of the RFID hanger and the communication range between the display computer and the RFID hanger. The result shows less than 40m the accuracy average is 99.75%.

6 Conclusion

In this paper, we proposed the design of smart management system for unmanned clothing stores. The proposed system consists of smart RFID hanger, wireless communication module, display device, winform software and server. The smart RFID hanger consists of MCU, RF chip, display LED, RFID reader, RFID reader antenna, ring sensor and battery. The reader has an ATmega 8 chip and EM4094 chip. The reader reads tags at 13.56 MHz and read range are about 180mm. The wireless communication module use Msp430 and CC2420 chip to keep a communication within 60m. The display devices displays the information received from the server, and receives customer input via the touch screen are sent to the server. In order to verify the effectiveness of proposed system, we have done the experiment. The experimental results confirm the excellent performance of the proposed system.

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