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Temperature Control System Design Chicken Coop Using Gateway SMS

Indah Sulistiyowati, Rosy Akhmad Haris, Eko Agus Suprayitno, Jamaaluddin

Electrical Engineering Department, Universitas Muhammadiyah Sidoarjo, Sidoarjo, Indonesia

Abstract. This research will be made a special chicken coop that works automatically. This chicken coop works based on the temperature in the cage. To know the temperature value in the enclosure is used temperature sensor LM35. From LM35 temperature sensor then processed to activate the relay module, where the relay works turn on the DC fan motor and the DC water pump. Here SMS Gateway serves as a warning alarm when there is a target temperature problem . In testing this system the cage can work well, it is shown that the system can stabilize the temperature inside the chicken coop as desired. With this research is expected to change from open cage into a closed cage in order to improve the production of chicken pieces.

1. Introduction

Poultry business in Indonesia at this time is very good because the chicken is considered to meet the nutritional needs in this animal protein. Data from the BPS census in 2013 when viewed from the number of livestock kept by agricultural households in Indonesia, the broiler is the most cultivated cattle (1 306 663 850 tails), followed by local chickens (87 904 370 head) and chicken laying (81 148 992 tail). And to produce good quality chicken is a good chicken coop.

Cages commonly used in chicken farms are open systems (closed house system) and closed (closed house system). Unfortunately the open system enclosure is not good when weather conditions do not support. Therefore Closed House (Closed House) needs to be used for breeders because it is able to release heat, water vapor, harmful gases like CO, CO₂, and NH₃ in the cage. While the ideal temperature of chicken in ages 1-7 days up to 29-35 days as follows: 32.5 0C, 30.0C, 28.4 0C, and 29.1 0C. As for the humidity conditions ranging from chicken age 1-7 days to 29-35 days as follows: 63.5%, 65.1%, 67.5%, 70.45%, and 70.9% can be fulfilled with the function setting fan motor (Prihandanu, 2015).

In this research a closed cage enclosure is safe and comfortable, so it takes a control that is able to control the fan motor, pump motor and a tool that can provide information when there is a problem in the chicken coop, due to the location of the chicken coop away from the settlement. Therefore Arduino is used to control the fan motor and pump motor and then connected with the sms gateway as the sender of the message when there is a problem in the chicken coop.

2. STUDY LITERATURE

3 Arduino Microcontroller

Arduino is a microcontroller that is designed to be used easily by artists and designers (who are not technical people). Thus without knowing the programming language, Arduino can be used to produce sophisticated works. This is as expressed by Mike Schmict [4].



Figure 1. Board Arduino Uno (Yuwono, 2016)

b. Temperature Sensor LM 35

LM35 temperature sensor is an electronic component that serves to convert the amount of temperature into electrical quantities in the form of voltage. The LM35 Temperature Sensor is an electronics component created by National Semiconductor. LM35 has high accuracy and is easier to use when compared to other temperature sensors, LM35 also has a low impedance output and high linearity so it can easily be connected with a special control circuit and does not require advanced settings [8]

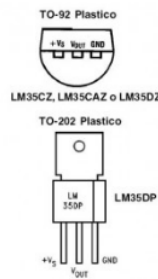


Figure 2. LM 35(Basic Sensor Techniques, 2013)

c. Liquid Crystal Display (LCD)

LCD is an electronic display made with CMOS logic technology that works by reflecting light around it against the front-lit or sending light from Black-lit. LCD also serves as a data viewer in the form of characters, letters, numbers and graphics. In this research will be used LCD 16 x 2 [9].

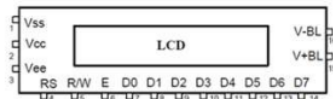


Figure 3. LCD pin configuration (Hari Santoso, 2015)

d. SMS Gateway

SMS Gateway is a link for SMS data traffic, both sender and receiver. Currently SMS Gateway is better known as a communication bridge between computers and mobile phones. With the vast range of SMS apps that are developing today SMS Gateway applications can be used almost unlimited benefits, so it is perfect for use in conveying important / very important events



Figure 4. SMS Gateway module (Hidayatullah Hamid,2013)

3. RESEARCH METODE

In this research method of temperature control system design chicken coop using SMS gateway is used 4 dc motor fan and 1 water pump where all these systems will be controlled by Arduino UNO microcontroller and equipped with a security system sms gateway that serves as a means of information to the owner of the enclosure when there is a problem in the cage.

3.1. Tool Design

The temperature inside the enclosure will be detected by LM35 to be converted into an electric voltage then the voltage is sent to the Arduino via an analog pin. The voltage used by the analog pin is the internal reference voltage (1.1V) to obtain an accurate temperature result with a dividing factor of 9,309 in the Arduino program. The result of that temperature will be displayed on the LCD by transferring the digital signal through SDA pin and SCL pin. The data signal read by the LCD is a digital signal in ASCII form. Besides displaying the temperature with the LCD, the Arduino also gives output to the relay module to power the dc motor from the fan if the temperature inside the enclosure is more than the normal temperature.

When the dc motor fan works, the relay acts as an electrical switch that works based on the target temperature, while the power from the fan is taken from the 12V power supply. While the SMS gateway is used as a security to provide information ownership of the cage when there is a problem in the cage, by sending an sms to the destination number that has been entered into the program Arduino UNO for sms gateway as shown in Figure 5.

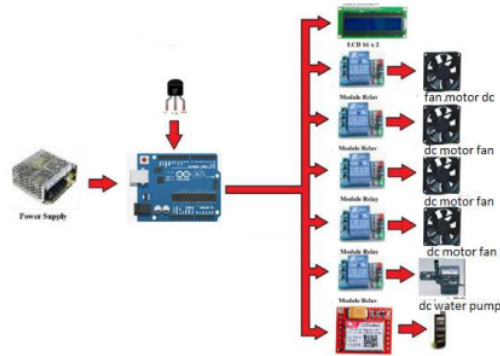


Figure 5. Tool Design

3.2. Miniature Closed House Hiding Design

In miniature design of closed chicken coop system design using temperature sensor and sms gateway will be made miniature as picture 6

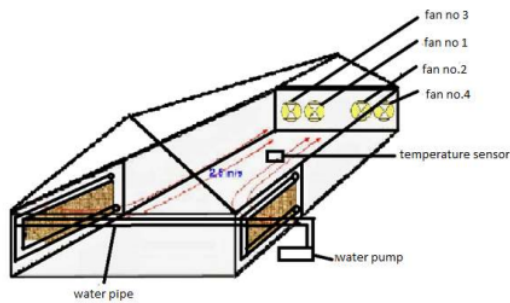


Figure 6. Design closed chicken coop

In miniature design enclosed chicken coop will be made by using 4 dc fan motor and 1 water pump where all these systems will be controlled by Arduino UNO microcontroller. Here also will be equipped with a security system SMS gateway where if there is a problem in the cage then this tool serves as a means of information to the owner of the cage. All of these systems work based on temperature sensors that have been set to function by the Arduino UNO microcontroller.

4. RESULT AND ANALYSIS

Testing the whole system circuit is done to find out whether the Design of Temperature Control System Chicken Coop Using Sms Gateway works in accordance with what is desired and to know whether the system can still run with a long duration of time.

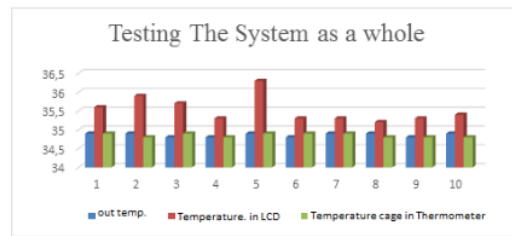


Figure 7. Testing the system as a whole

The picture above describes the experimental cage temperature experiment wave automatically. Seen stable in the cage temperature, every 5 minutes of temperature data in the enclosure there is no increase or decrease in temperature is drastic but the temperature in the cage can not go down between the temperature of 250C - 290C in accordance with the safe temperature of the cage. This is because fan is not in accordance with the desired specifications even though the fan in the cage is functioning all. The blue line indicates the outer temperature of the enclosure and the red line indicates the enclosure temperature.

Table 1. System overall testing

No	Time	Out. Temp.	Temp. in LCD	Temp. in Thermometer	Fan 1	Fan 2	Fan 3	Fan 4	Water Pump	SMS Gateway
1.	12;05	34,9 ⁰ C	35,6 ⁰ C	34,9 ⁰ C	1	1	1	1	1	1
2.	12;10	34,9 ⁰ C	35,9 ⁰ C	34,8 ⁰ C	1	1	1	1	1	1
3.	12;15	34,8 ⁰ C	35,7 ⁰ C	34,9 ⁰ C	1	1	1	1	1	1
4.	12;20	34,8 ⁰ C	35,3 ⁰ C	34,8 ⁰ C	1	1	1	1	1	1
5.	12;25	34,9 ⁰ C	36,3 ⁰ C	34,9 ⁰ C	1	1	1	1	1	1
6.	12;30	34,8 ⁰ C	35,3 ⁰ C	34,9 ⁰ C	1	1	1	1	1	1
7.	12;35	34,9 ⁰ C	35,3 ⁰ C	34,9 ⁰ C	1	1	1	1	1	1
8.	12;40	34,9 ⁰ C	35,2 ⁰ C	34,8 ⁰ C	1	1	1	1	1	1
9.	12;45	34,8 ⁰ C	35,3 ⁰ C	34,8 ⁰ C	1	1	1	1	1	1
10.	12;50	34,9 ⁰ C	35,4 ⁰ C	34,8 ⁰ C	1	1	1	1	1	1

Notes: 0 = does not work
 1 = done

This table contains written test data ie temperature outside the chicken coop and the temperature inside the chicken coop and the function of the attached equipment. The table contains ten times the existing temperature data retrieval enclosed, to ensure all components can work according to the program.

5. CONCLUSION

After doing some testing then obtained result that chicken coop system with Arduino control using LM35 temperature sensor can run according to desired mechanism. Similarly sms gateway can inform the owner when the temperature inside the chicken coop is below 250C and above temperature 350C.

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