

CHAPTER 5

IMPLEMENTATION AND TESTING

5.1 Implementation

```
1. void loop()
2. {
3.   nilaipir = digitalRead(sensorpir);
4.   nilaiapi = digitalRead(sensorapi);
5.   nilaipir1 = analogRead(sensorpir);
6.   nilaiapil = analogRead(sensorapi);
7.   if(nilaipir == LOW && nilaiapi == LOW)
8.   {
9.       hasil = 3;
10.      digitalWrite(led,HIGH);
11.      Serial.println(nilaipir);
12.      Serial.println(nilaiapi);
13.      Serial.println(hasil);
14.   }
15.   else if(nilaipir == LOW && nilaiapi == HIGH)
16.   {
17.       hasil = 1;
18.       digitalWrite(led,LOW);
19.       Serial.println(nilaipir);
20.       Serial.println(nilaiapi);
21.       Serial.println(hasil);
22.   }
23.   else if(nilaipir == HIGH && nilaiapi == LOW)
24.   {
25.       hasil = 2;
26.       digitalWrite(led,HIGH);
27.       Serial.println(nilaipir);
28.       Serial.println(nilaiapi);
29.       Serial.println(hasil);
30.   }
31.   else if(nilaipir == HIGH && nilaiapi == HIGH)
32.   {
33.       hasil = 0;
34.       digitalWrite(led,LOW);
35.       Serial.println(nilaipir);
36.       Serial.println(nilaiapi);
37.       Serial.println(hasil);
38.   }
39.   delay(500);
```

This is the code for the sensors. 'sensorapi' is a flame sensor and 'sensorpir' is an infrared sensor. Then 'hasil' is a fuzzy logic to know the room is safe or not. When flame sensor detecting fire, the buzzer (led) will make a noise. But when infrared sensor detecting a people, the buzzer will not make a noise.

```

1. String cmd = "AT+CIPSTART=\"TCP\", \"";
2.   cmd += "184.106.153.149"; //ip thingspeak
3.   cmd += "\",80"; //port http
4.   wifi.println(cmd);

```

The code above is for connecting ESP8266 to thingspeak. "184.106.152.149" is thingspeak ip, then port 80 is a default http port.

```

1.   String getStr = "GET /update?api_key=";
2.     getStr += apiKey;
3.     getStr += "&field1=";
4.     getStr += nilaipir;
5.     getStr += "&field2=";
6.     getStr += nilaiapi;
7.     getStr += "&field3=";
8.     getStr += hasil;
9.     getStr += "&field4=";
10.    getStr += nilaipir1;
11.    getStr += "&field5=";
12.    getStr += nilaiapi1;

```

The code above is for sending data to thingspeak. First the program will update the api key. Then after connect to the api key, the field in the thingspeak will filled by nilaipir, nilaiapi, hasil, nilaipir1 and nilaiapi1.

5.2 Testing

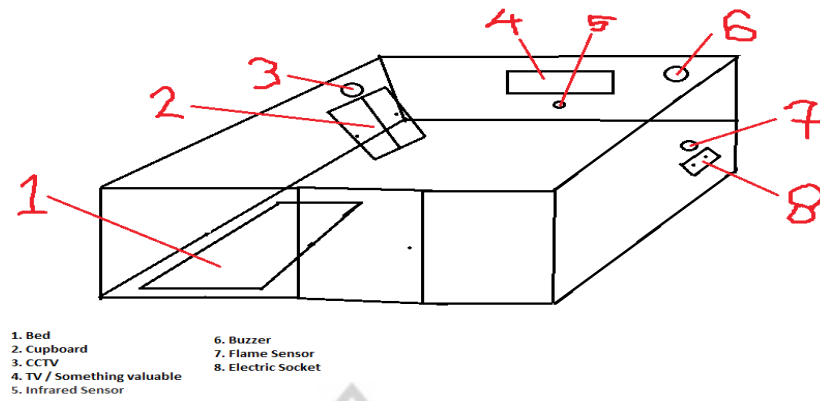


Illustration 5.1: Design mockup

The test is start from making a mockups. The following is the design of the mockups. The mockups is symbolize the boarding house room as the simulation.



Illustration 5.2: The prototype

The sensors is already installed to the mockups. The layout from the design is applied to the box just like as the design from illustration 5.1.

Table 5.1: Example for Fuzzy Logic

Infrared Sensor	Flame Sensor	Fuzzy Logic
1	1	0 (Safe)
0	1	1 (Intruder Alert)
1	0	2 (Fire Detected)
0	0	3 (Check Previous Data)

The data from sensors is calculated by Fuzzy Logic to determine the room is safe or not. To get data from the prototype, by using lighter and dummy made from cardboard. The test is using ruler to calculate the distance, how far lighter and dummy is detected by sensors.

Table 5.2: Testing Table

Range	Data Infrared Sensor	Data Flame Sensor	Fuzzy Logic
1 cm – 5 cm	0	0	3 (Check Prev. Data)
5 cm – 10 cm	0	0	3 (Check Prev.Data)
10 cm – 15 cm	0	1	1 (Intruder Alert)
15 cm – 20 cm	1	1	0 (Safe)
20 cm – 22 cm	1	1	0 (Safe)

From table 5.2, all of sensors is not detecting from 15cm. it is good for mockup 22 cm x 20 cm.

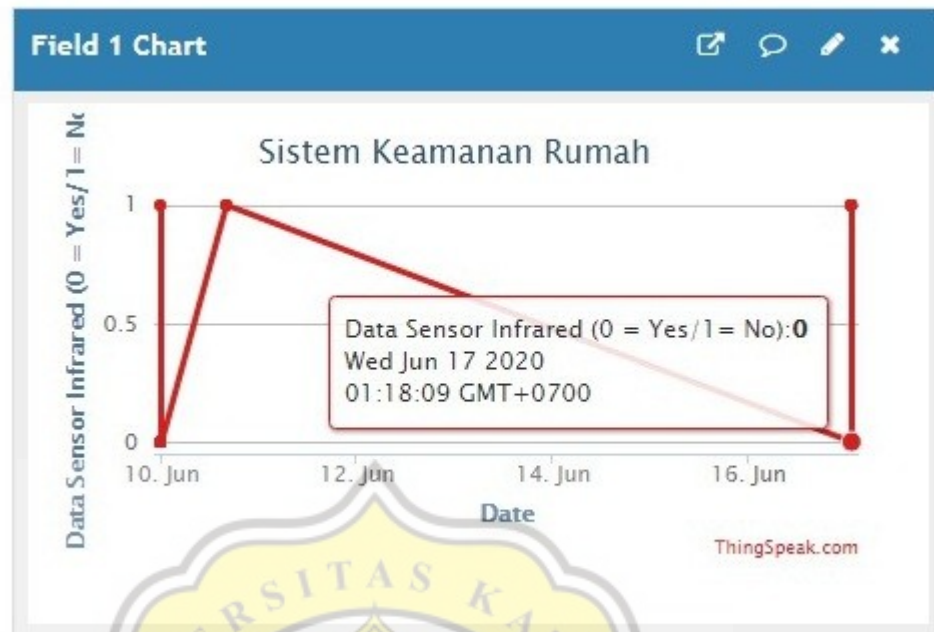


Illustration 5.3: Screenshot Testing Infrared Sensor from thingspeak

The picture above is the screenshot from infrared sensor, who is successfully uploaded to thingspeak. Showing the infrared sensor “0” or its detecting something.



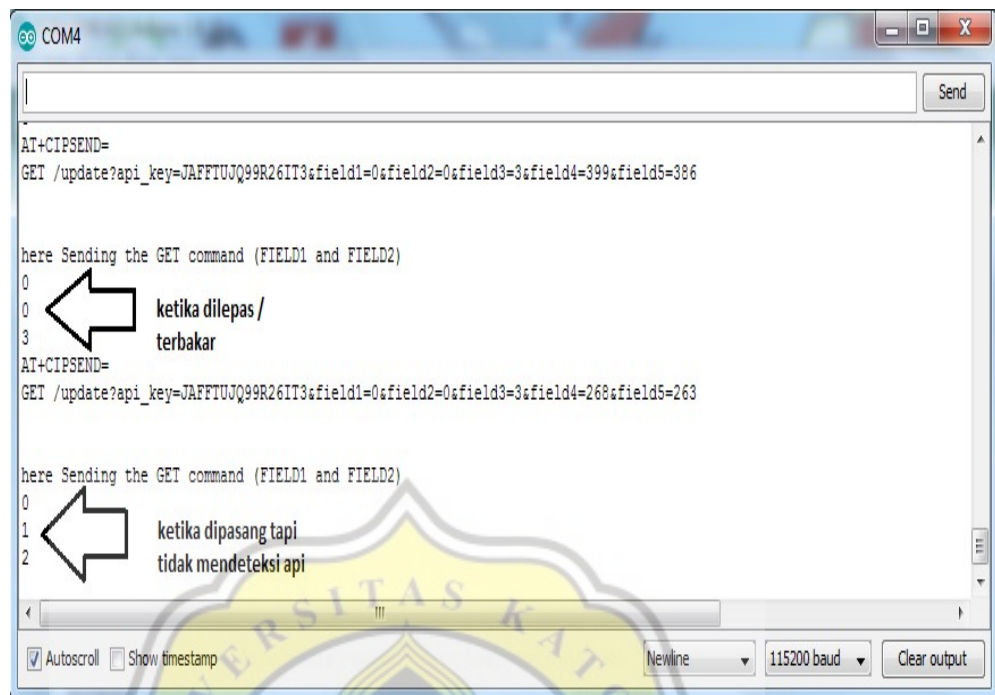
Illustration 5.4: Screenshot Testing Flame Sensor from thingspeak

Next is a screenshot flame sensor data from thingspeak. From the illustration 5.4, flame sensor is being tested. Then the data is said 1 or no because the flame sensor is not detecting any fire.



Illustration 5.5: Screenshot Data Fuzzy Logic from thingspeak

Now the last is screenshot for the fuzzy logic. When the sensors is uploaded to the thingspeak, then the data is calculated here. When it said 0, its mean safe. When it said 1, there's intruder come to the room. When the data said 2, it means on fire, which is the flame sensor is detecting fire. The last is when the data said 3, then user should check the previous data. If the previous data is 1, that means there's intruder who is trying to burn the rooms. If the previous data is 2, then that means the room is burned itself and there's people is coming to extinguish the fire.



```

COM4
Send
AT+CIPSEND=
GET /update?api_key=JAFFTUJQ99R26IT3&field1=0&field2=0&field3=3&field4=399&field5=386

here Sending the GET command (FIELD1 and FIELD2)
0
0 ← ketika dilepas /
3 ← terbakar
AT+CIPSEND=
GET /update?api_key=JAFFTUJQ99R26IT3&field1=0&field2=0&field3=3&field4=268&field5=263

here Sending the GET command (FIELD1 and FIELD2)
0
1 ← ketika dipasang tapi
2 ← tidak mendeteksi api
Autoscroll Show timestamp Newline 115200 baud Clear output

```

Illustration 5.6: Simulation for flame sensor when gets burned

The next test is simulation when the sensors is get burned to know how the system works. But the test is not burn the sensor for real, just releasing the cable. First test is the flame sensor. When the flame sensor is get burned, the system is still detecting as “0” or “yes”. So the data still sending as a yes , the room is get burned.

```

COM4
Send
AT+CIPSEND=
GET /update?api_key=JAFFTUJQ99R26IT3&field1=0&field2=1&field3=2&field4=447&field5=415

here Sending the GET command (FIELD1 and FIELD2)
0
1
2
ketika kabel dilepas /
simulasi terbakar

AT+CIPSEND=
GET /update?api_key=JAFFTUJQ99R26IT3&field1=0&field2=1&field3=2&field4=235&field5=237

here Sending the GET command (FIELD1 and FIELD2)
1
1
0
saat alat normal dan
tidak mendeteksi apa-
apa

Autoscroll Show timestamp Newline 115200 baud Clear output

```

Illustration 5.7: Simulation for infrared sensor when gets burned

The last test is from the infrared sensor. When the cable or the sensor is get burned, the system will sending data as a “1” or “no”, so the infrared sensor will not detecting intruder anymore.