

CHAPTER 4

ANALYSIS AND DESIGN

4.1 Analysis

This project is made for make people who lived in boarding house and went to home for vacation is not worry anymore about the safety of the room. So they can go home and enjoy the vacation by using flame sensor to detect fire and infrared sensor to detect people who is trying to go in inside their room without their permission.

The device is using arduino uno , and for delivering the data is getting by all sensors is using ESP8266 Ver. 01. The data is analyzed when get the sensors data and then send to Thingspeak. This project is using Arduino IDE.

Analysis start from the flame sensor. The sensor is tested by lighter to produce fire, and use ruler to check the range of the sensors. The mockups size is 20cm x 22cm.



Illustration 4.1: Testing flame sensor using medium lighter

The testing is using ruler for checking the range and using lighter with medium heat to test.

Table 4.1: Analysis Table Flame Sensor Using Medium Fire Lighter

Range	Sensor data
1 cm	0
2 cm	0
3 cm	0
4 cm	0
5 cm	0
6 cm	0
7 cm	0
8 cm	0
9 cm	0
10 cm	1

The results from table 4.1 , when the lighter is set to a medium heat, the sensor is detecting the fire until 8-9 cm, after reach the 10 cm the sensor is not detecting the fire anymore.

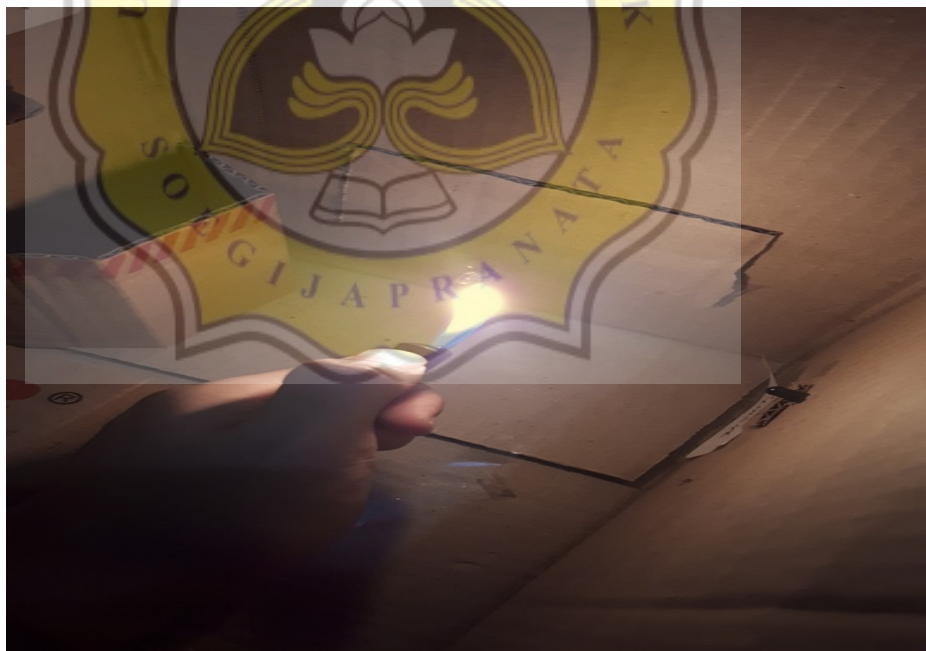


Illustration 4.2: Testing flame sensor using high lighter

Then the test is using high lighter to test the flame sensor. And for the second test is using lighter with high heat.

Table 4.2: Analysis Table Flame Sensor Using High Lighter

Range	Sensor data
1 cm – 4 cm	0
4 cm – 8 cm	0
8 cm – 12 cm	0
12 cm – 16 cm	0
16 cm – 20 cm	0

From table 4.2, when the sensor is tested by a high lighter, the sensor is always detecting everywhere the lighter is on.

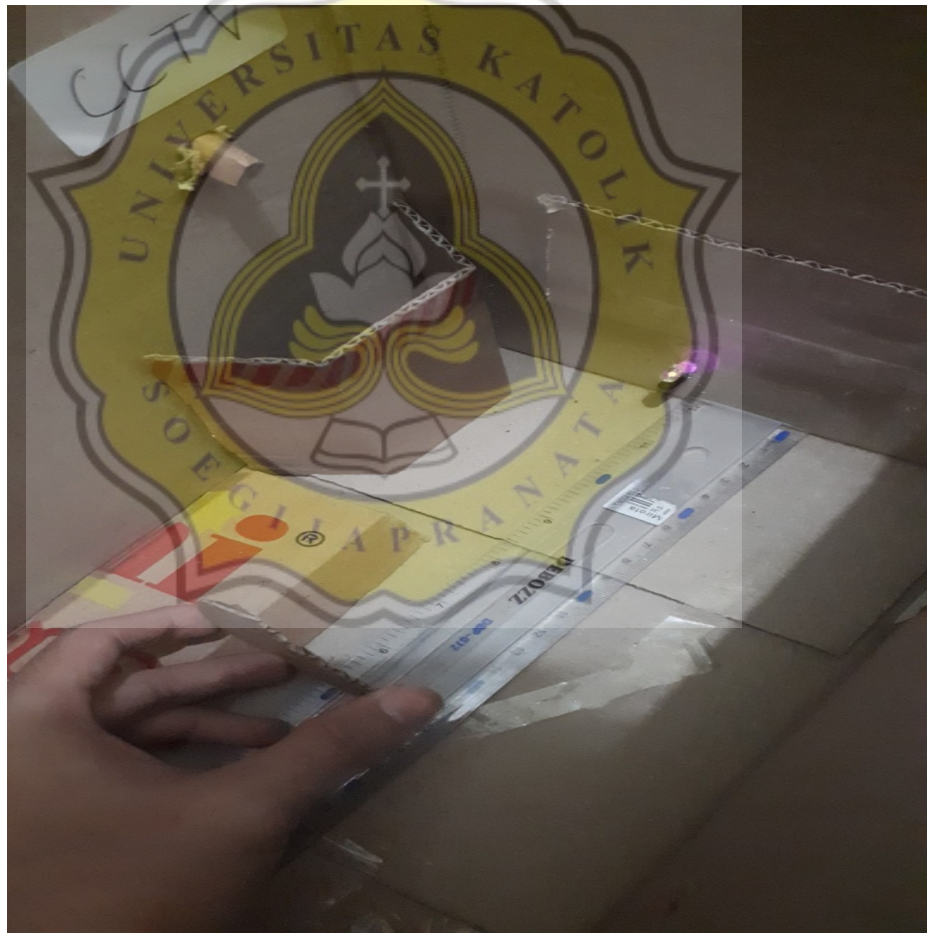


Illustration 4.3: Testing infrared sensor

The next is testing the infrared sensor. By using persons miniature build by a cardboard as the thief.

Table 4.3: Analysis Table Infrared Sensor

Range	Sensor data
1 cm – 5 cm	0
5 cm – 10 cm	0
10 cm – 15 cm	0
15 cm – 20 cm	1
20 cm – 22 cm	1

From table 4.3, the sensor is detecting the miniature until 15 cm in front of the sensor.



4.2 Design

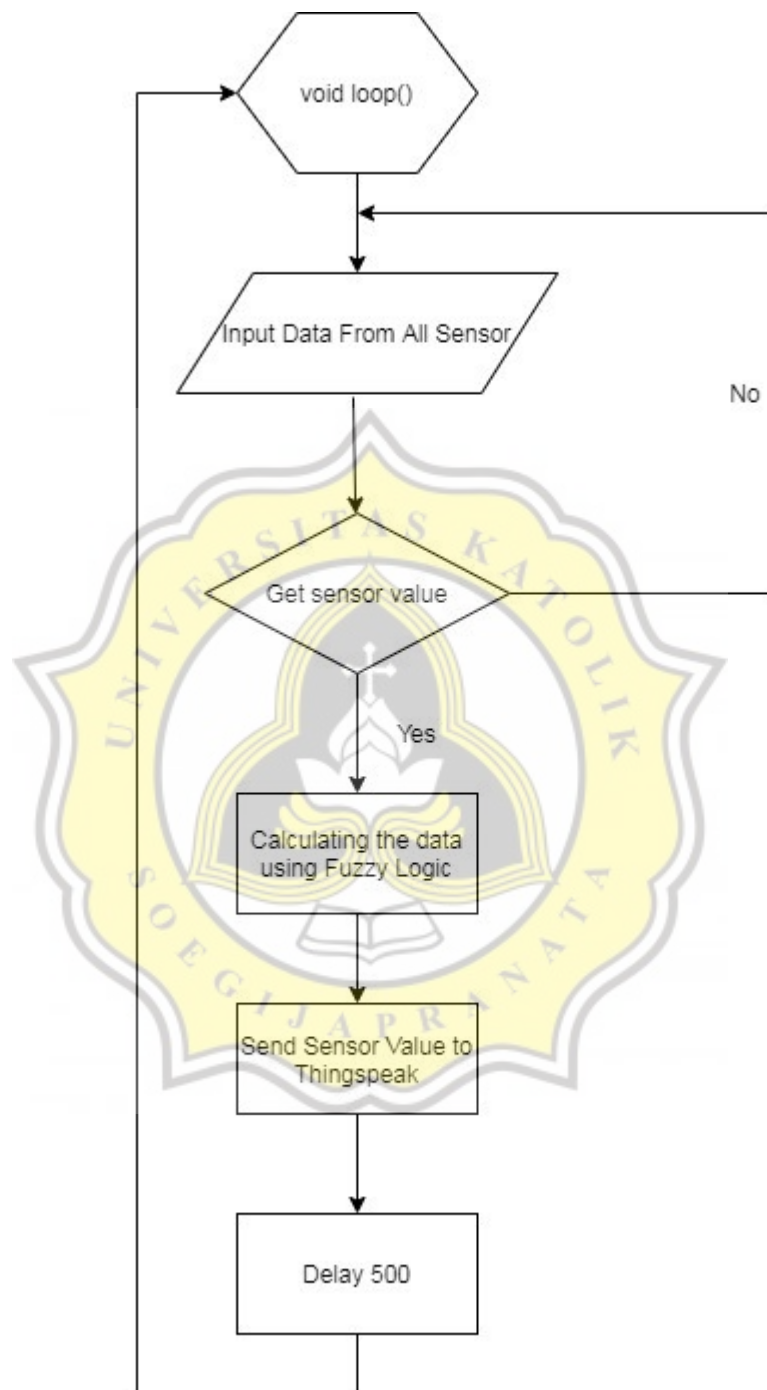


Illustration 4.4: Flowchart prototype

Flowchart explaining the prototype. First, the prototype should input the data from all sensors. Then get the values of the sensors. If the sensors is not get the values, then back to input data until the program got the values. If the sensors get the values, it will go to next step : calculating the data using fuzzy logic. Fuzzy logic is a right way to map an input space into an output space. For very complex systems, the use of fuzzy logic is a one solution for that systems. For this system, the fuzzy logic is like this:

Table 4.4: Table Fuzzy Logic

Sensor Values	Result
0	Safe
1	Intruder Alert (Somebody coming)
2	Fire Detected (Detect Fire)
3	Check Previous Data (Detect People and fire)

After calculating the values, then going to next step, is a send the data or the values to the thingspeak. People can see the data there. Then going back to the first step, the data will send every half second.

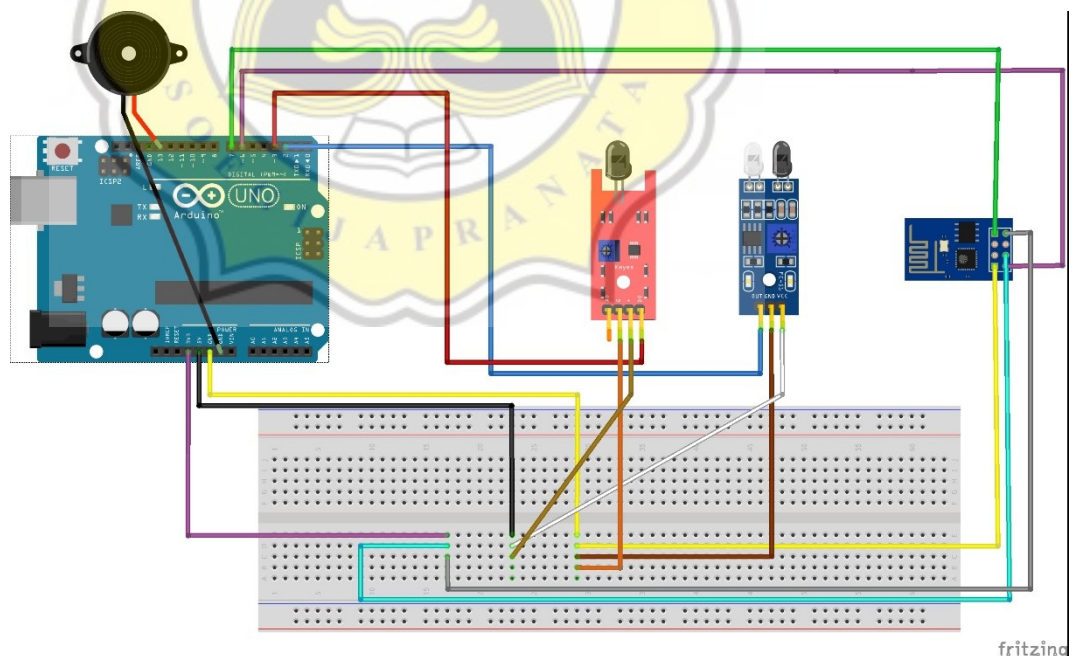


Illustration 4.5: Circuit of the prototype

The circuit of the prototype is using ESP8266 Wi-Fi Module to send data from all sensors, infrared sensor to detect people or thief who is trying to get in to the rooms without their permission, flame sensor to detect the fire, and buzzer when the the room is on fire, the buzzer will sounding voice.



Illustration 4.6: The prototype from the front

Illustration 4.6 is a real picture from the prototype. In the middle there is an infrared sensor. Then at the next is a buzzer to make a voice when flame detector detect fire. Then the last is a flame sensor, above the electricity socket.



Illustration 4.7: The prototype from behind

At illustration 4.7 is a picture from behind the prototype. There is a ESP8266 Wi-Fi Module and breadboard to connect all sensors from the arduino. Here is where the cable is connect each other.

