CHAPTER 4
ANALYSIS AND DESIGN

4.1   Analysis

The project was to predict air humidity, temperature, and soil humidity and to know the effects of air humidity and temperature on the two rooms that had different air and money temperatures. One way to do this is by using air moisture and DHT11 temperatures, soil moisture sensors soil streams and Arduino UNO.

How the moisture and temperature DHT11 works, the soil soil moisture sensors soil soil, Arduino UNO, and Ethernet shield:
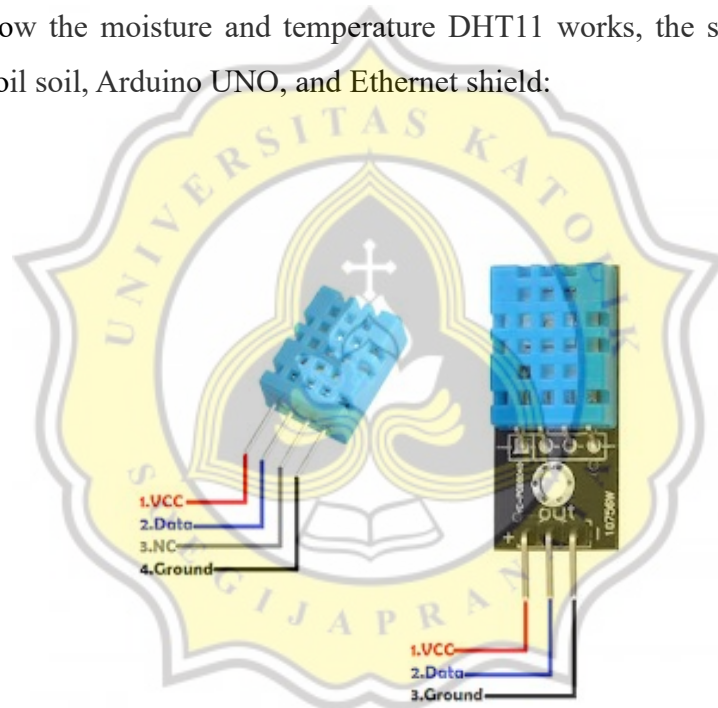

Illustration 4.1: DHT11

- The DHT11 sensor is the sonar and IC controller component insect that is packed in one package. The DHT11 censorship has DTC (coeffitcient) resistance resistance (s), which has a characteristic if the resistance values are incomparably inverted by rise in temperature, the higher the

temperature of the room, the smaller the NTC and the higher the NTC rate, the lower the temperature of the room.

- there is also a humidity sensor with a characteristic resistance to changes in water levels in the air.

- data from both of these sensors are processed in IC controller, IC will output data output in the form of a single wire bi-directional. DHT11[1]

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1 google" Cara kerja dan karakteristik Sensor DHT11 ", accessed from https://www.andalanelektro.id/2019/10/cara-kerja-dan-karakteristik-sensor-dht11-arduino-dan-contoh-programnya.html, pada 9 juni 2020.

Illustration 4.2: Soil Moisture

- The soil moisture sensors consist of two probes to pass current through the ground and read its resistance to get a level of moisture value.
- The more water makes the soil easier to conduct electricity, while dry soil presents electricity was very difficult.
- The Soil moisture[2] FC-28 sensors have a 3.3V or 5V voltage specs, output voltage 0-4.2v, 35mA current, and 1024 bits value range 0-1023 bits.

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2   Husdi,"Monitoring Kelembaban Tanah Menggunakan Soil Moisture Sensor FC-28 dan Arduino UNO", accessed from https://www.researchgate.net, pada 9 juni 2020.

Illustration 4.3: Arduino UNO

- Microcontrollers function to receive input programs.

- Program input using C-+ +.

- Arduino UNO[3] fully controlled by ATmega328. .

- Used 14 input and output pins.

- Linked by computer by USB cable or by an AC and DC adapter.

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3 google,"Pengertian   dan   Fungsi   Arduino   UNO",   accessed   from
http://electricityofdream.blogspot.com/, pada 9 juni 2020.

Illustration 4.4: Ethernet Shield

- Ethernet shield[4] is used to connect Arduino with the Internet using wired cables.
- Arduino Ethernet shield made based on wiznet W5100 Ethernet chips.
- W5100 provides IP for TCP and UDP sustain 4 socket simultaneously.
- Ethernet shield USES an RJ-45 cable to connect Arduino UNO to the Internet with integrated line transform and also power over Ethernet.
- Ethernet shield works by giving IP to Arduino and PC to connect online, only by connecting Ethernet shield to board Arduino and using cable RJ-45 to connect directly to the Internet.

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4   google,"Pengertian Ethernet Shhield dan Cara Kerjanya", accessed from https://www.immersa-lab.com/,pada 9 juni 2020.

NO.	RUANGAN 1			
	Humidity	Temperature	K.Tanah	Date
50	76 %	30.4 C	89 %	2020-06-20 15:24:31
49	79 %	30.5 C	48 %	2020-06-20 11:45:35
48	79 %	30.2 C	48 %	2020-06-20 11:44:13
47	83 %	29.8 C	49 %	2020-06-20 10:44:13
46	83 %	29.7 C	50 %	2020-06-20 09:44:14
45	84 %	29.6 C	51 %	2020-06-20 08:44:14
44	81 %	29.3 C	52 %	2020-06-20 07:44:15
43	79 %	29.4 C	52 %	2020-06-20 06:44:16
42	85 %	29.3 C	53 %	2020-06-20 05:44:17
41	86 %	29.2 C	54 %	2020-06-20 04:44:18

Illustration 4.5: Data dari Sensor

Table above shows data obtained from sensors:

- First column containing id from each data.
- A second column contains data of air humidity obtained from DHT11 sensors.
- A third column contains room temperature data recovered from DHT11 sensors.
- A fourth column contains data of soil moisture soured from soil soil sensors, The fifth column contains time data for storing data.
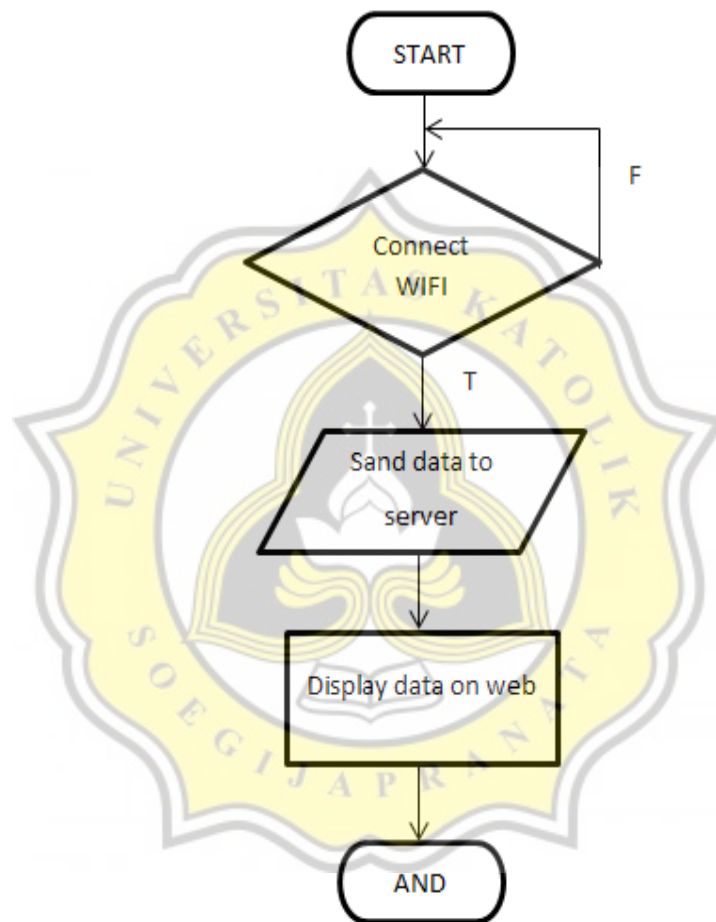
4.2　Desain

4.2.1　Flowchart

Illustration 4.6: Flowchart

The program starts at Arduino UNO. Arduino uno would be connected with Ethernet shield to connect with the Internet if not connected with the Internet Ethernet shield would repeat to connect with the Internet. Once connected to the Internet Ethernet shield will transmit data of air humidity, room temperature, and soil humidity to the server every 1 hour. Air humidity data, temperature of rooms, and soil humidity

already stored in the server will be displayed on tables that are on the web for monitoring.

4.2.2 Design Installation

DHT11 and soil moistufying sensors are kept in each room, which is air-cooled and that avoid air-conditioning to detect air humidity, room temperature, and soil humidity. The sensor systems here detect air humidity, room temperature, and soil humidity, so the data is sent to the PHPmyadmin server.

4.2.3 Design Schematic
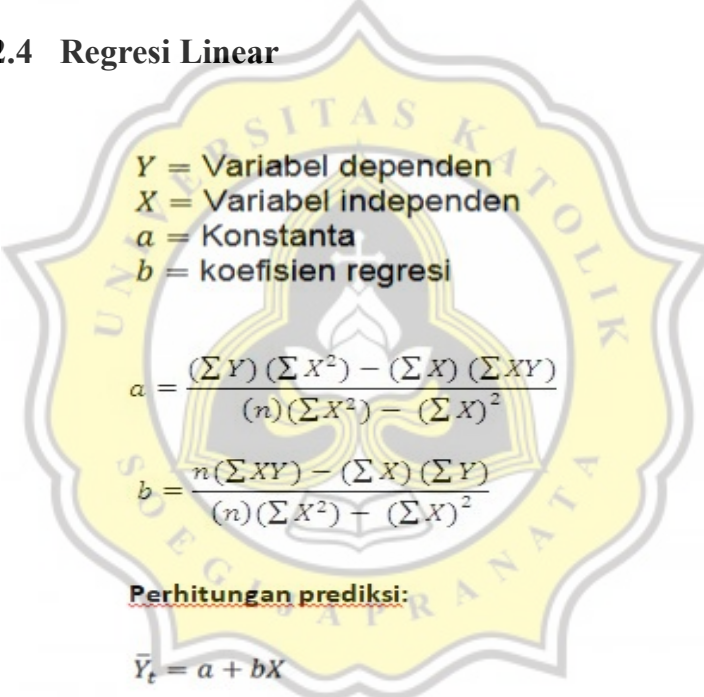

Illustration 4.7: Design Schematic

Informasi:

Ethernet Shield Sins was used in this project are totally four pins, PIN 2, PIN 3, A0, A1, 5V, GND. The author added an arduino uno device as a power supply.

Here is the order of the installation pin:

- DHT11 Room 1 is using 3 pin VCC (5V), GND, PIN 2.

- DHT11 Room 2 is using 3 pin VCC (5V), GND, PIN 3.

- Soil Moisture Room 1is using 3 pin VCC (5V), GND, A0.

- Soil Moisture Room 2 is using 3 pin VCC (5V), GND, A1.

4.2.4 Regresi Linear

$Y = $ Variabel dependen
$X = $ Variabel independen
$a = $ Konstanta
$b = $ koefisien regresi

$$a = \frac{(\sum Y)(\sum X^2) - (\sum X)(\sum XY)}{(n)(\sum X^2) - (\sum X)^2}$$

$$b = \frac{n(\sum XY) - (\sum X)(\sum Y)}{(n)(\sum X^2) - (\sum X)^2}$$

Perhitungan prediksi:

$$\bar{Y}_t = a + bX$$

Illustration 4.8: Regresi Linear

Linear Regression Linear regression is a statistical method that works to test the extent of a causal link between the underlying factor to the variable. In most cases the factor represented by X could be called the predictor and the factor represented by Y could also be called the Respose. Linear regression is one of the statistical methods used to predict and predict quality or quantity.