CHAPTER 4
ANALYSIS AND DESIGN

4.1 Analysis

This project is made to facilitate the guard of laboratory monitoring. From the installation of this project will get data in the form of noise level, room temperature and the number of people who use the lab. Tools used for this project:

1. Mikrocontroller arduino uno

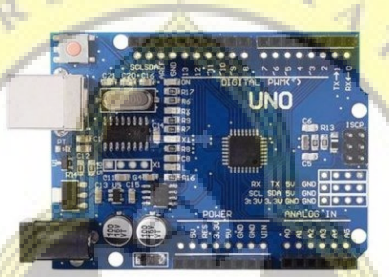

Illustration 4.1: Arduino uno

Arduino Uno is used as a mikrocontroller, to run the all sensor. have thirteen pin, and five pin analog.

2. sensor suara analog DFR0034

Illustration 4.2: Analog sound sensor DFR-0034

DFR-0034 analog sound sensor has VCC, GND and PIN to read analog value. Voltage needed 5 Volt.

3. sensor suhu DHT22

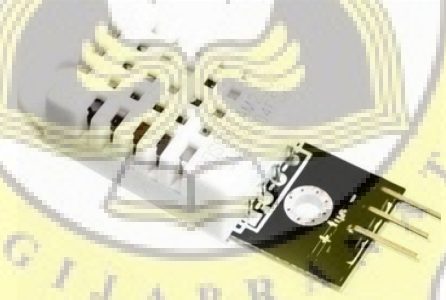

Illustration 4.3: Sensor suhu DHT 22

Temperature sensor DHT-22 has three plugs in the form of VCC, GND and output pins.

4. sensor proximity

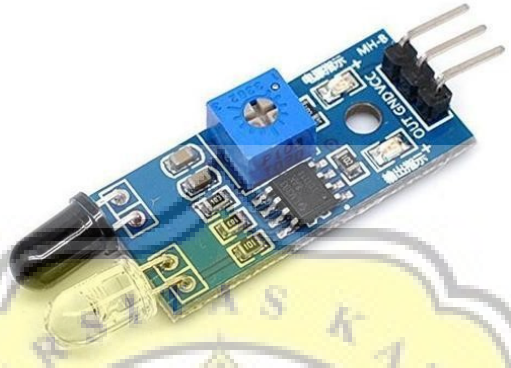

Illustration 4.4: IR avoid obstacle sensor

Obstacle IR sensor has three plugs consisting of VCC, gnd and output pins.

5. esp 8266 wifi module

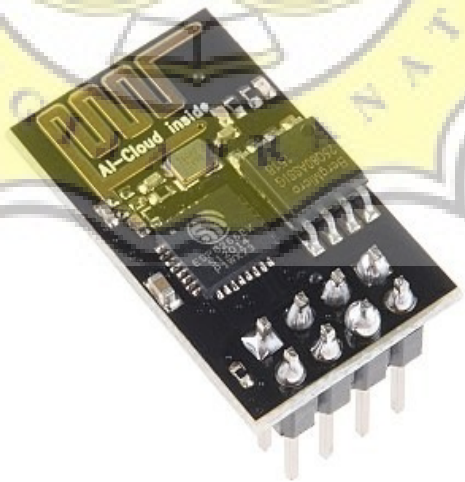

Illustration 4.5: Esp8266 wifi module

ESP8266 wifi module has 8 pins consisting of two VCC, GND, pin rx, pin TX. Voltage required for this sensor is 3.3 volt.

To calibrate the sound sensor using the sound meter application in comparison, the experiment carried out comparing the noise level result to the laptop speaker volume.

Table 4.1: Tabel Kalibrasi Sensor Suara

Volume	Sensor suara	Aplikasi Sound Meter
25%	36 dB	38 dB
50%	55 dB	47 dB
75%	61 dB	56 dB
100%	75 dB	69 dB

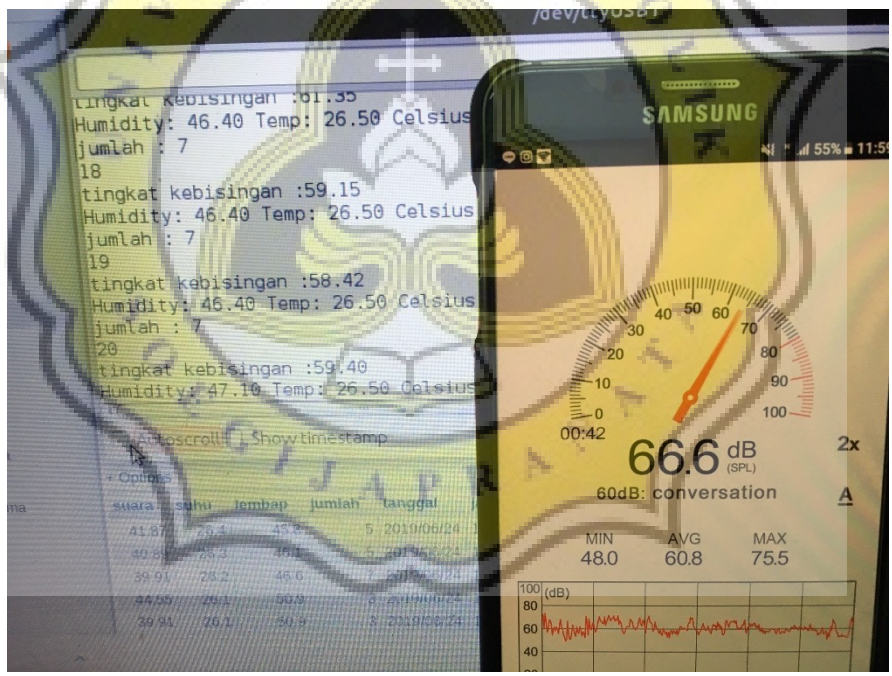

Illustration 4.6: Calibration

From the test data above the result of noise level resulting sensor and Soundmeter application on Android have a slight difference so that the algorithm can be used to perform monitoring in the lab.

After calibrating the sensor with the speaker, then monitoring the noise level in the laboratory.

Table 4.2: Tabel Keterangan Tingkat Kebisingan

Tingkat kebisingan	Keterangan
36	Sepi
55	Normal
68	Mengobrol
80	Ramai
100	berteriak

Data above is the level of noise with the condition in the laboratory when the condition of low lab or not used noise level shows the value of 36, which is the standard when the sensor does not detect sound, then when the lab has been used but The calm state of the sound sensor shows the value of 55dB and continues to increase when lab conditions are crowded.

Table 4.3: Tabel Data Tingkat Kebisingan Lab

Jumlah Mahasiswa	Tingkat kebisingan
0-10	55 dB
10-20	70-80 dB
20-30	50-60 dB
30-40	55 dB

From the data in the table we can see the number of influential students with increasing levels of noise in the lab. But while the lab conditions crowded with noise level also shows the standard value.

4.2 Desain

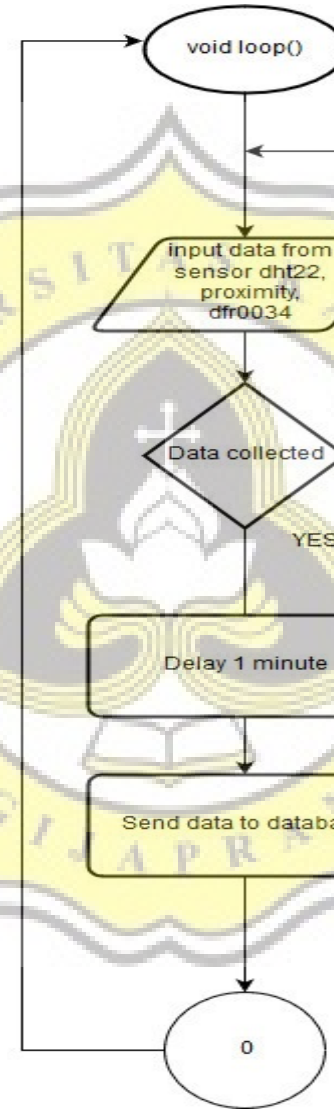

Illustration 4.7: Sensor flow chart

The above flowchart explains how the tool works by collecting data from 3 sensors for one minute, if the data is not collected then the process will automatically redo until it gets data. The collected Data will be sent to the server

with esp8266 and saved to the database. After data is sent, the process will be repeated again to collect further data continuously.

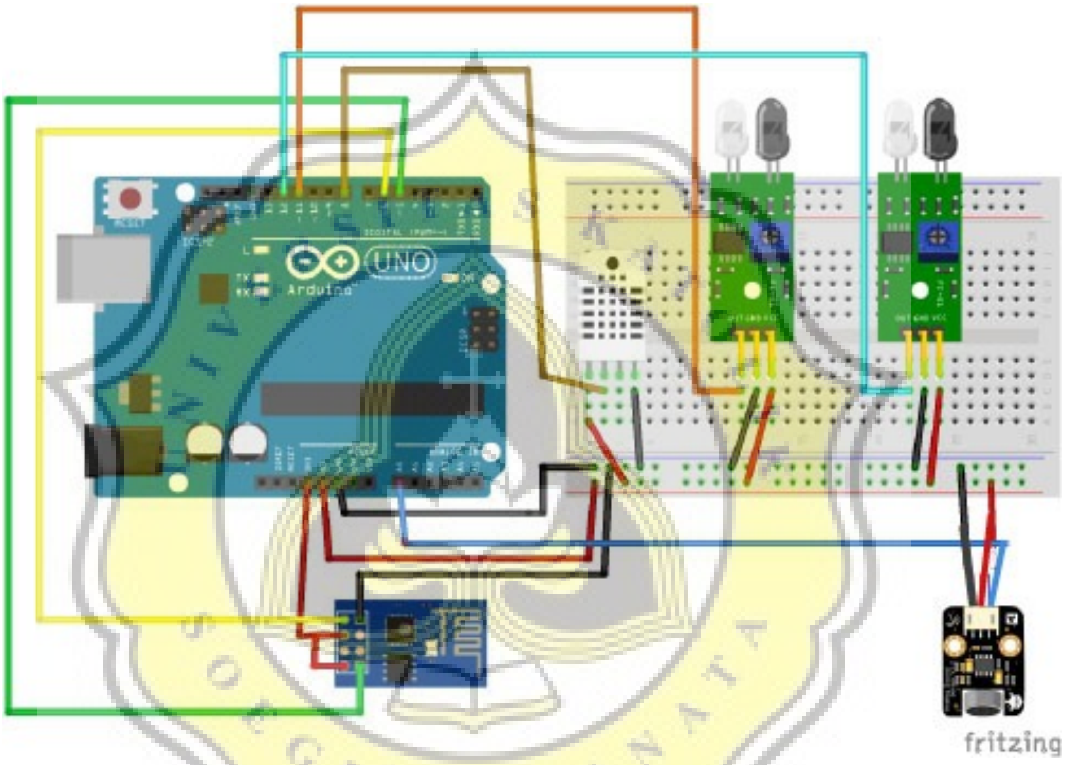

Illustration 4.8: Sensor circuit scheme

scheme above is a series of sensors connected to the Arduino Uno microcontroller. The temperature sensor uses PIN 8 and is rated at 5 volts, the sound sensor uses a PIN A0 and is rated at 5 volts, 2 proximity sensors using pins 11 and 12. Pin A0 is used for sound sensors to get the sound value detected in analog. Pin 11 used in proximity serves to count the number of people logged in and pin 12 to count the number of people out.

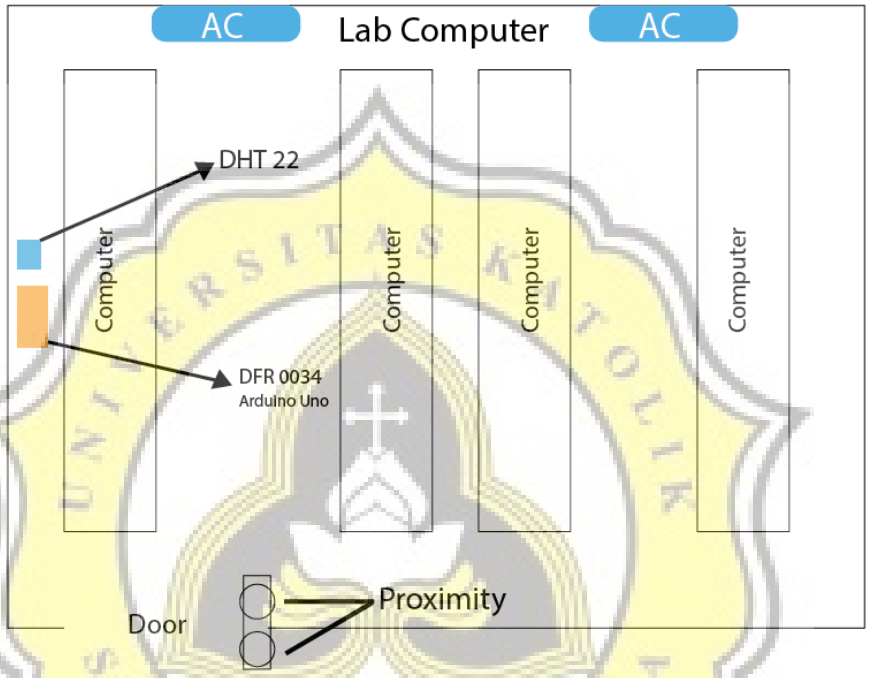

Illustration 4.9: Laboratorium scheme

The above scheme is where the sensors are located in the lab to collect the data used for the project, the proximity sensor is placed in the entry to calculate the number of people using the lab, the temperature sensor and the sound sensor are placed in Middle of lab.

#	Name	Type	Collation	Attributes	Null	Default
1	**suara**	float			No	*None*
2	**suhu**	float			No	*None*
3	**lembap**	float			No	*None*
4	**jumlah**	int(11)			No	*None*
5	**tanggal**	varchar(20)	latin1_swedish_ci		Yes	*NULL*
6	**jam**	varchar(20)	latin1_swedish_ci		Yes	*NULL*

Illustration 4.10: Database design

The image above is a database design created to store the value of the obtained sensor. The float-type suara field due to noise level data obtained from the sensor is decimal number. The same as the suhu column to store the temperature value of the temperature sensor and the lembap column to store the humidity value of the sensor which is a decimal number. The jumlah field is used to store the number of student data obtained from proximity sensors.