

CHAPTER 4

ANALYSIS AND DESIGN

4.1 Analysis

4.1.1. Creating a prototype that consists of several sensors

1. Gas sensor have a three voltage outputs consisting of VCC, GND and A0 for Input.

VCC → Pin 5V Arduino

GND → Pin GND Arduino

A0 → Pin A0 Arduino

2. Buzzer have a two voltage outputs consisting of VCC and GND. This VCC is not directly to the 5V pin, but it connected to digital pin. It because the authors will programming the input of digital pin buzzer.

VCC → pin D10 Arduino

GND → pin GND Arduino

3. Two LED lights are also connected to digital pin because it will be programmed.

4. Mini-Fan 5V DC is connected to 5v pin and GND pin because it constantly on.

5. Wemos D1 R1 could be said is like Arduino Uno, but it is have a Wifi connection called esp8266 module. Wemos D1 R1 could be said the Processor or the brain of all sensor to run all sensors that mentioned above so that they become a unitary tool.

4.1.2. Creating a Server in Thingspeak

1. Create New Channel

If you not have an account for thingspeak, you can Sign Up first in thingspeak. If done, create new channel like above

ThingSpeak™ Channels Apps Support

Percentage complete 30%

Channel ID 1078326

Name Gas MQ-5 Monitoring

Description

Field 1 Percentage Gas

Field 2 Gas PPM

Field 3

Field 4

Field 5

Field 6

Image 1. Thingspeak New Channel

Name : Gas MQ-5 Monitoring

Field 1 : Persentase Gas

Field 2 : Gas PPM

And then click save channel. Then this channel is available for input the Gas Sensor Data. Then it will be directly directed to the Dashboard.

2. Make Write API Key Settings

How to get the API key that is still the same on the dashboard like the picture above, choose “API Keys”. And select the API keys on the Write API keys and then copy it into temporary notepad to be included in the program Arduino IDE

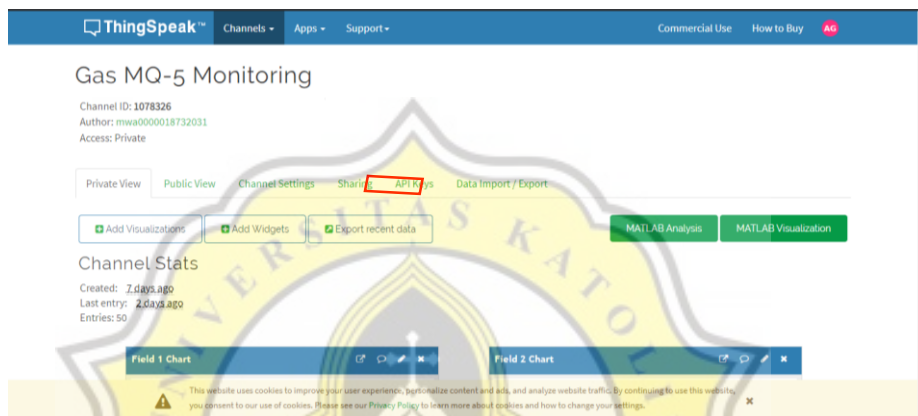


Image 2. Select API Keys

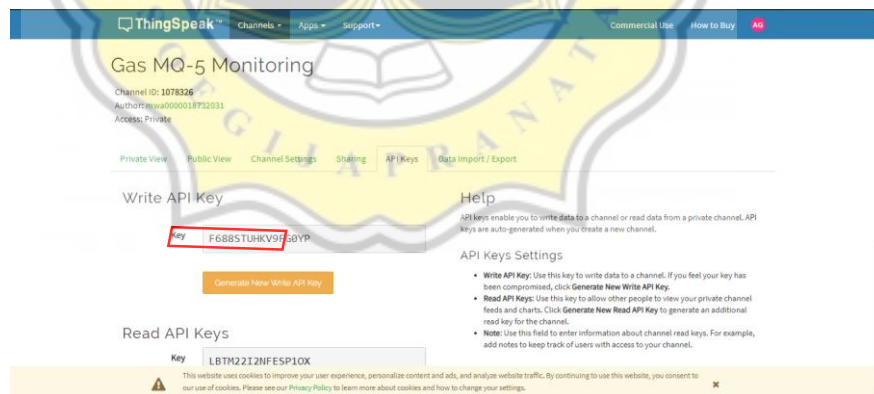


Image 3. Show API Keys

4.1.3. Creating a Bot in Telegram

The simplest process is :

1. Add @BotFather. And then type “/newbot”, then follow the instructions in this message to create a new bot. After Creating a new bot, @BotFather will send to you API / bot Token which you use later in the Arduino IDE program

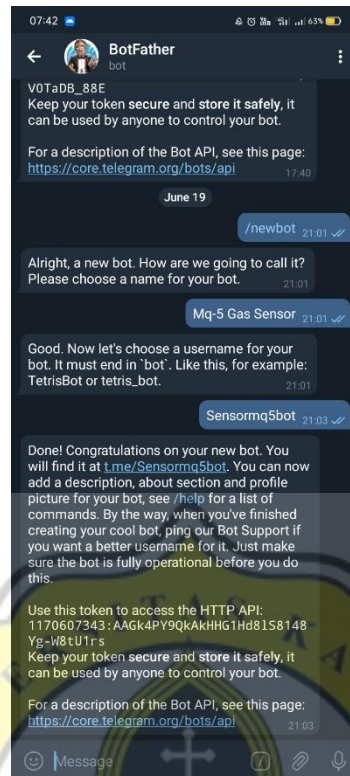


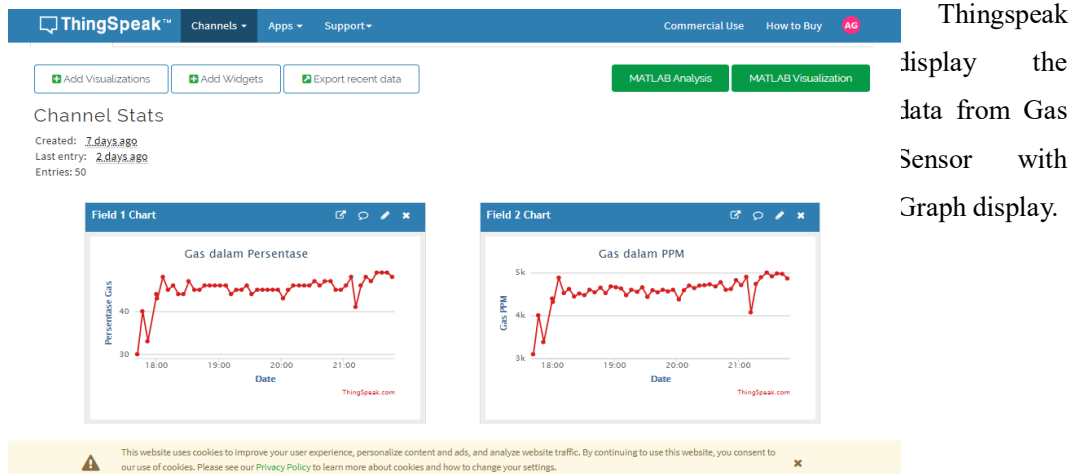
Image 4. Creating New bot

2. Collect the ID bot from @IDBot. Type a “/getid” to collect the ID of Bot that you created before. It also which you use later in the Arduino Program IDE.

4.1.4. Creating a Program in Arduino IDE

Create a Program in Arduino IDE to run the sensor. If gas_ppm exceed the specified number limit, the Buzzer and LED (Blinking) will turning on and GSM SIM800L will send the SMS Notification for alerts. And then input data to server IoT Thingspeak every 5 Minutes.

4.1.5. Displaying data on PHP and graphs on Thingspeak Server IoT



Thingspeak display the data from Gas Sensor with Graph display.

Image 5. Show Graph thingspeak

No	Date/Time	Persentase Gas	Gas PPM
1	2020-06-14 18:11:52 WIB	30.00	3088.00
2	2020-06-14 18:16:53 WIB	40.00	3998.00
3	2020-06-14 18:21:55 WIB	33.00	3372.00
4	2020-06-14 18:30:18 WIB	44.00	4389.00
5	2020-06-14 18:31:11 WIB	43.00	4310.00
6	2020-06-14 18:36:13 WIB	48.00	4877.00
7	2020-06-14 18:41:14 WIB	45.00	4516.00
8	2020-06-14 18:46:16 WIB	46.00	4613.00
9	2020-06-14 18:51:18 WIB	44.00	4437.00
10	2020-06-14 18:56:21 WIB	44.00	4506.00
11	2020-06-14 19:01:22 WIB	47.00	4467.00
12	2020-06-14 19:06:24 WIB	45.00	4594.00
13	2020-06-14 19:11:26 WIB	45.00	4533.00
14	2020-06-14 19:16:29 WIB	46.00	4643.00

Displaying table of Sensor data on PHP.

Image 6. Display Data PHP

4.1.6. Fuzzy Logic Tsukamoto Algorithm

Fuzzy logic is an approach to computing based on "degrees of truth" rather than the usual "true or false" (1 or 0). Boolean logic on which the modern computer is based.

The idea of fuzzy logic was first advanced by Dr. Lotfi Zadeh of the University of California at Berkeley in the 1960s. Dr. Zadeh was working on the problem of computer understanding of Natural Language. Natural language (like most other activities in life and indeed the universe) is not easily translated into the absolute terms of 0 and 1. (Whether everything is ultimately describable in binary terms is a philosophical question worth pursuing, but in practice much data we might want to feed a computer is in some state in between and so, frequently, are the results of computing.) It may help to see fuzzy logic as the way reasoning really works and binary or Boolean logic is simply a special case of it.

Fuzzy logic includes 0 and 1 as extreme cases of truth (or "the state of matters" or "fact") but also includes the various states of truth in between so that, for example, the result of a comparison between two things could be not "tall" or "short" but ".38 of tallness."

Fuzzy logic seems closer to the way our brains work. We aggregate data and form a number of partial truths which we aggregate further into higher truths which in turn, when certain thresholds are exceeded, cause certain further results such as motor reaction. A similar kind of process is used in neural networks, expert systems and other Artificial Intelligence applications. Fuzzy logic is essential to the development of human-like capabilities for AI, sometimes referred to as artificial general intelligence: the representation of generalized human cognitive abilities in software so that, faced with an unfamiliar task, the AI system could find a solution.

4.2 Desain

4.2.1. A tools to be used

1. Gas sensor (MQ5)



Image 7. Gas Sensor mq-5

The Grove - Gas Sensor(MQ5) module is useful for gas leakage detection (in home and industry). It is suitable for detecting H₂, LPG, CH₄, CO, Alcohol. Due to its high sensitivity and fast response time, measurements can be taken as soon as possible. The sensitivity of the sensor can be adjusted by using the potentiometer.

2. Mini-fan DC 5V



Image 8. Mini fan 5V DC

Mini-fan DC 5V is used to minimize the leakage LPG gas.

3. Buzzer

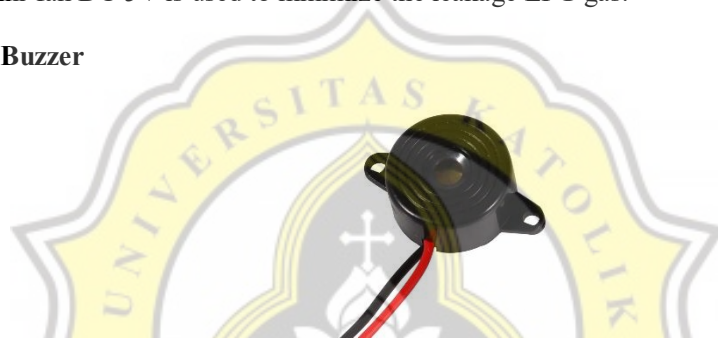


Image 9. Buzzer

A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric. Typical uses of buzzers and beepers include alarm devices, timers and confirmation of user input such as a mouse click or keystroke. Buzzer is an integrated structure of electronic transducers, DC power supply, widely used in computers, printers, copiers, alarms, electronic toys, automotive electronic equipment, telephones, timers and other electronic products for sound devices. Active buzzer 5V Rated power can be directly connected to a continuous sound, this section dedicated sensor expansion module and the board in combination, can complete a simple circuit design, to "plug and play."

4. Wemos D1



Image 11. Wemos D1

WEMOS D1 is a WIFI development board based on ESP8266 12E. The functioning is similar to that of NODEMCU , except that the hardware is built resembling Arduino UNO. The D1 board can be configured to work on Arduino environment using BOARDS MANAGER. So,its not necessary to use a separate Arduino board , the D1 itself can be programmed on Arduino IDE.This is handy in using with IOT projects. Further many Arduino SHIELDS are compatible with the D1 board.

5. Prototype

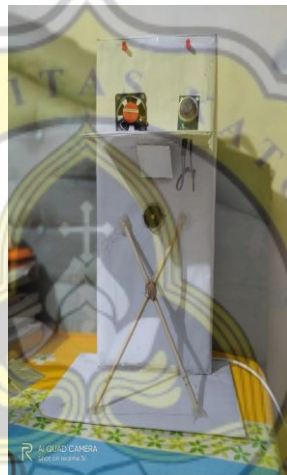


Image 12. Prototype

Prototype is the combination of several sensor that have been designed and programmed into a tool used for this project.

6. FlowChart

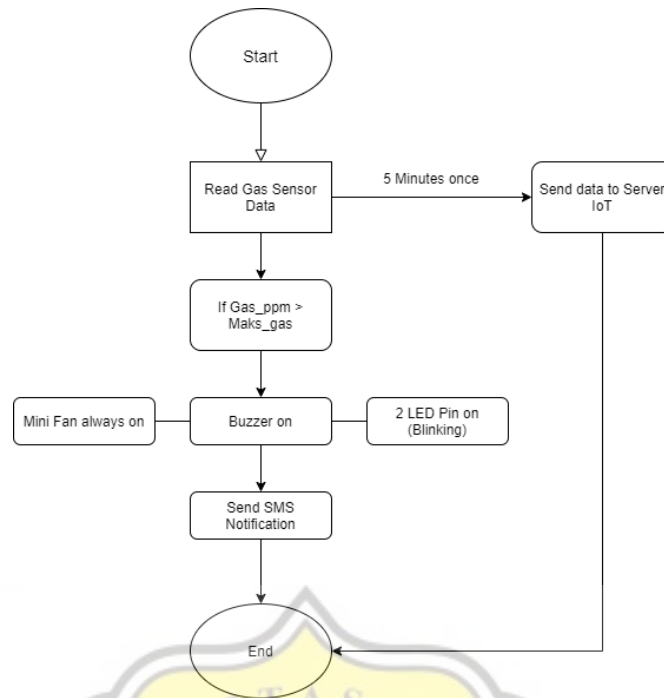


Diagram 1. FlowChart

FlowChart is begin with Read Gas Sensor Data . If the data exceeds the specified limit the buzzer and led will turning on and the mini-fan will always turn on. An then send sms notification to alerting the people who use the gas LPG . Besides that, Data from Gas Sensor will input to server IoT called thingspeak every 5 Minutes .