JURNAL RISET INFORMATIKA **P-ISSN: 2656-1743 |E-ISSN: 2656-1735**
Vol. 7, No. 3. Juni 2025 DOI: https://doi.org/10.34288/jri.v7i3.381
Accredited rank 4 (SINTA 4), excerpts from the decision of the DITJEN DIKTIRISTEK No. 230/E/KPT/2023

COMPARISON OF THE USE OF TELEGRAM AND BLYNK PLATFORMS IN IOT-BASED GAS LEAK DETECTION

Anggie Apriliana-1, Afu Ichsan Pradana-2, Dwi Hartanti-3

Informatics Engineering
Duta Bangsa University of Surakarta

210103003@mhs.udb.ac.id-1, afu_ichsan@udb.ac.id-2, dwihartanti@udb.ac.id-3

ABSTRACT

This study discusses the comparison between two Internet of Things (IoT)-based communication platforms, namely Telegram and Blynk, in a gas leak detection this system utilizes the NodeMCU ESP8266 microcontroller to detect hazardous functions to detect gas via the MQ-2 sensor, and measures temperature and humidity using the DHT11 sensor. Additional components such as buzzers, LEDs, relays, and exhaust fans are used as markers and early response when a leak occurs. The development of this system applies This study applies Waterfall method, which consists of planning, needs analysis, design, and implementation stages. This study then focuses on evaluating the effectiveness of both platforms, especially in the aspect. terms of notification speed, ease of integration, and data visualization. Testing is carried out by comparing the response system when detecting a gas leak and sending warning notifications via the Telegram and Blynk applications. This study concluded that Telegram is superior in sending notifications in real time, while Blynk provides advantages in visualizing sensor data and remote device control. In conclusion, the combination of using Telegram and Blynk in one system provides more optimal results than using one platform alone. This system has been proven to increase the effectiveness and efficiency in detecting gas leaks and providing early warnings to users quickly and interactively.

Keywords: IoT, Telegram, Blynk, Gas Leak Detection, ESP8266, MQ-2 Sensor, DHT11, Waterfall

Abstrak

Penelitian ini membahas tentang perbandingan dua platform komunikasi berbasis Internet of Things (IoT) yaitu Telegram dan Blynk, dalam pendeteksian kebocoran gas sistem ini memanfaatkan mikrokontroler NodeMCU ESP8266 untuk mendeteksi bahaya berfungsi untuk mendeteksi gas melalui sensor MQ-2, dan mengukur suhu dan kelembaban menggunakan sensor DHT11. Komponen tambahan seperti buzzer, LED, relay, dan exhaust fan digunakan sebagai penanda dan respon awal ketika terjadi kebocoran. Pengembangan sistem ini menggunakan metode Waterfall yang terdiri dari tahap perencanaan, analisis kebutuhan, perancangan, dan implementasi. Penelitian ini kemudian berfokus pada evaluasi efektivitas kedua platform terutama dalam aspek kecepatan notifikasi, kemudahan integrasi, dan visualisasi data. Pengujian dilakukan dengan membandingkan respon sistem ketika mendeteksi kebocoran gas dan mengirimkan notifikasi peringatan melalui aplikasi Telegram dan Blynk. Penelitian ini menyimpulkan bahwa Telegram lebih unggul dalam mengirimkan notifikasi secara real time, sedangkan Blynk memberikan kelebihan dalam visualisasi data sensor dan kendali perangkat jarak jauh. Kesimpulannya, kombinasi penggunaan Telegram dan Blynk dalam satu sistem memberikan hasil yang lebih optimal dibandingkan dengan hanya menggunakan satu platform saja. Sistem ini terbukti meningkatkan efektivitas dan efisiensi dalam mendeteksi kebocoran gas dan memberikan peringatan dini kepada pengguna secara cepat dan interaktif.

Keywords: IoT, Telegram, Blynk, Gas Leak Detection, ESP8266, MQ-2 Sensor, DHT11, Waterfall

INTRODUCTION

Technological advances have led to an increase in human needs for natural resources and energy, which are essential to meet daily needs as well as other needs. The planet has abundant natural resources, some of which are renewable, while others are non-renewable. One form of resource, specifically LPG (Liquefied Petroleum Gas), is one that humans use for daily needs. Liquified Petroleum Gas (LPG) is one of the main household needs that is most widely used by the public as fuel, besides petroleum. Now, LPG is no longer seen as a luxury item, but has become a basic need for all levels of society. Gas plays an important role in human life and is used by various people. In addition to being used in gas, it is not only used in households, but also has wide use in industry as well as the medical field (Fevriera and Hartatdji 2023) (Firmansyah and Alfredo Ahwiddhana 2024) (Lukman Hakim Sidik 2023) (Darnoto et al. 2023) (Ekonomi et al. 2023) (Stuart and Stuart 2021) (Fadia Karunia Utami et al. 2025) **.**

LPG (Liquefied Petroleum Gas) is one of the main sources of energy used in daily life, both in households and in the industrial sector. LPG is used as a fuel for cooking, heating, and as an energy source in the food and manufacturing industries. The main advantage of LPG is its high efficiency in producing heat and cleaner emissions than other fossil fuels. However, its highly flammable nature makes it high risk in the event of a leak. Gases leaking in enclosed spaces can trigger fatal explosions, as widely reported in household and restaurant incidents. Based on data from the journal, gas leaks are one of the main causes of domestic fires that often occur due to delays in early detection. (Meilinda Suriani Harefa et al. 2024) (Sutrio Yatmoko et al. 2024) (Iklil, Irgian, and Rozi 2022) (Sahara, Pamungkas, and Firdaus 2024) (Tambunan and Stefanie 2023)

Conventional methods for detecting LPG gas leaks usually rely on the human sense of smell against the pungent aroma of the additive (mercaptan) mixed in LPG. While quite helpful, this method is not reliable in all conditions, especially when the user is away from home or when a leak occurs on a small, hard-to-smell scale. According to , the need for an early warning system for LPG gas and its devices in order to overcome gas leaks that can result in fatalities. (Fauzi and Sukarno 2025) (Pratiwi and Nurhastuti 2023) (Soesilo and Fayuza 2023)

Internet of Things (IoT) technology is present as an effective solution in automatically detecting gas leaks and providing real-time notifications. IoT-based systems utilize gas sensors such as the MQ-2 or MQ-6 to detect gas concentrations in the air and transmit information directly to users over an internet connection. According to research by , the use of IoT allows precautions to be taken faster, as well as improves the safety and reliability of smart home systems. The system can also be integrated with other support devices such as buzzers, relays, and exhaust fans to provide automatic response in emergency situations. (Purnamawati, Pradana, and Maulindar 2024) (Syuja Rifka Khairyansyah et al. 2024) (Laughs) Suprianto 2023)

In IoT systems, notification platforms play a crucial role in conveying information to users. The two most widely used platforms are Telegram and Blynk. Telegram is an instant messaging application that supports bot creation and API integration, making it flexible in sending automated messages from IoT devices. While Blynk offers the ease of data visualization and device control through a graphical interface-based application. This study focuses on comparing the use of the two platforms, assessing in terms of messaging effectiveness, user convenience, system integration, and response speed. The reference from shows that both platforms have their own advantages, but there has been no comprehensive study that compares the two directly in the context of gas leak detection. (Aji Pangestu and Yusuf Asyhari 2024) (Aji Pangestu and Yusuf Asyhari 2024) (Ratmini, Atina, and Purwanto 2025) (Ario et al. 2024)

This study is an enhancement of a previous work titled ‘Development of an IoT-Based LPG Gas Leak Detection System,’ aiming to compare the effectiveness of two notification platforms: Telegram and Blynk. In this study, the experimental method was used by utilizing the NodeMCU ESP8266 as a microcontroller and the MQ-2 sensor as a gas detection device. The system is able to send real-time notifications to users through the Blynk platform when a gas leak occurs. The focus of this research is on the implementation of Blynk as a notification medium, without any integration or comparison with other notification platforms. In this case, my research has a more significant advantage because it not only uses Blynk, but also compares it to the Telegram platform from various aspects, such as the effectiveness of messaging, system integration, as well as the user's convenience in receiving notifications. This comparative approach provides a broader picture of the performance of two different platforms in the context of IoT-based security systems. (Fauzi and Sukarno 2025)

Furthermore, a study by Ananda Zaky (Caesario, 2023) entitled "IoT-Based Automatic Gas Leak Detection Tool" uses a Wemos D1 Mini microcontroller to detect the presence of hazardous gases. The system not only provides notifications via SMS, but is also capable of automatically closing the gas valve when a leak is detected, thus providing additional preventive measures. However, this study has limitations in terms of data accuracy because the sensors used have not been converted to Parts Per Million (PPM), so they do not provide quantitative information about the level of gas concentration. In contrast, my research uses MQ-2 sensors that are calibrated and converted to PPM units to produce more precise data. In addition, my system is enriched with various components such as a temperature and humidity (DHT) sensor, a relay for device control, a buzzer as a sound alarm,

P-ISSN: 2656-1743 |E-ISSN: 2656-1735
DOI: https://doi.org/10.34288/jri.v7i3.381
Accredited rank 4 (SINTA 4), excerpts from the decision of the DITJEN DIKTIRISTEK No. 230/E/KPT/2023

and an automatic exhaust fan that actively removes gas from the room. My system also integrates two communication platforms, namely Telegram and Blynk, creating a more sophisticated, responsive, and informative system for users.

The third research by Naufal Fajar (Septian, 2022) is entitled "Design and Build a Gas Leak Detection Device Using an IoT-Based MQ-2 Sensor". This study uses an experimental method with NodeMCU, MQ-2 sensors, and LCD displays as part of the monitoring system. This system provides gas leak information through notifications on the Blynk app, as well as using LEDs, buzzers, and LCDs as local warning tools. However, the system is completely dependent on an internet connection, which is a major drawback in the event of a network outage. In comparison, the system I designed is more flexible because it is still able to perform critical functions, such as activating the buzzer alarm and activating the exhaust fan automatically, even without an internet connection. This study further contributes by comparing the effectiveness of Telegram and Blynk, an aspect not previously addressed in similar research. Thus, the system is not only more resilient in emergency conditions but also provides new insights into multi-platform utilization for IoT-based emergency communications.

The goal of this study is to design an IoT-based gas leak detection system that is capable of providing real-time notifications to users through two different platforms: Telegram and Blynk. The system uses MQ-2 sensors converted to PPM units, equipped with DHT sensors for temperature and humidity monitoring, as well as automatic buzzer, relay, and exhaust fan components to respond to emergencies. One of the main advantages of this system is its ability to remain operational locally even if the internet connection is lost. This research is expected to contribute to the development of a more efficient, adaptive, and easily accessible home and industrial security system for the wider community.

RESEARCH METHODS

TYPES AND DATA SOURCES

Data collection is a systematic process to obtain relevant information to support the implementation of projects. The methods applied in this process include:

1. Identification

   At this stage, it helps the researcher to determine the research objectives, problem limitations, and relevance of the topic to the chosen field of study. This stage also aims to find ideas for the system to be designed.

2. Studi Literature

   This stage involves the search and analysis of library sources that are related to the research focus. At this stage, it helps in understanding the background of the research, relevant theories, and previous related studies so that the researcher can learn the basic concepts and materials of technology related to the title of the research, namely "Comparison of the Use of Telegram and Blynk Platforms in the Detection of Gas Leak Detection using the Internet of Things".

SYSTEM DEVELOPMENT METHODS

The system development methodology includes a set of techniques, procedures, and working principles designed to support the process of designing and building information systems. (Naufal Faruq 2023)

This method refers to the development of an SDLC (System Development Life Cycle)-based system that is implemented through the Waterfall approach, as shown in Figure 1 below: (Rainfall 2022)

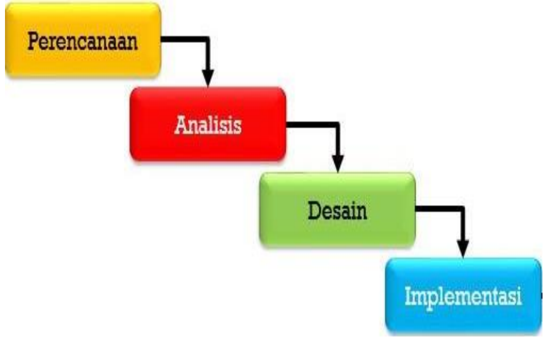


Figure 1. Stages of the Waterfall Method

1. Planning

   This stage involves the process of collecting accurate data and determining the variables needed to support the system design process.

2. Analysis

   This stage aims to evaluate the existing system in order to design a new system, identify existing weaknesses, and collect and analyze needs thoroughly so that they can be defined appropriately.

3. Design

   The design of the system at this stage is a representation or visualization of the system that will be implemented later.

4. Implementation

The process of translating a system design into program code using the relevant programming language.

RESULTS AND DISCUSSION

PLANNING

Through comparison efforts and the development of IoT gas leak detection technology, which is connected in an integrated manner, the available information system can be further refined through the addition of gas condition monitoring features and automatic notification delivery to users. In the development of this system, the Telegram and Blynk platforms are two alternative means of communication used as intermediaries in the delivery of information. Real-time. To ensure that development runs in a structured and systematic manner, the Waterfall Methodology consists of structured phases which include identification of needs, design, implementation, and evaluation through testing to implementation. Through this approach, a comparison is made between the two platforms to find out which one is more effective and efficient in supporting the gas leak detection system optimally.

SYSTEM ANALYSIS

System needs analysis includes the identification of required hardware and software. Through this analysis, the planned system is expected to be comprehensively broken down into its basic elements. The goal is to recognize and assess the problems and desired needs, so as to ensure that the developed system is truly aligned with existing needs, seen from the object of research.

1) Hardware Analysis

The analysis of the hardware used in the study entitled Comparison of the Use of Telegram and Blynk Platforms in Detection Detection Gas leak detection systems integrated with the Internet of Things (IoT) is explained as follows:

a. Laptop
b. Kabel Male – Male
c. Kabel Female – Female
d. Kabel Male Female
e. ESP-8266
f. Sensor MQ-4
g. DHT 22
h. Buzzer
i. Relay
j. Exhaust Fan 5 Volt
k. Adaptor Power Supply 5 Volt
l. Cable Micro
m. Plywood
n. Smartphone Android

2) Software Analysis

The software used in the creation of this web-based administration system includes:

a. Windows Operating System
b. Arduino IDE
c. Library Telegram Bot
d. Telegram Bot Account
e. Library Blynk
f. Blynk Mobile App
g. Blynk Auth Token

SYSTEM DESIGN

The product is designed to simplify the design and manufacturing process of gas leak detection devices. Through this design, the necessary components can be identified, and help facilitate the manufacturing process of the tool. A more detailed design of the microcontroller can be seen in Figure 2.

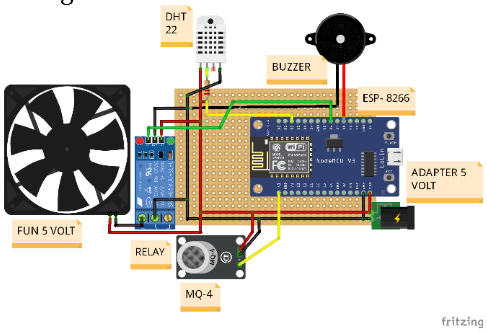


Figure 2. Fritzing Application System Design

Information:

a. The DHT 22 sensor is connected to gpio 4 on pin D2 on the NodeMCU ESP8266.
b. The MQ-2 sensor is connected to the ADC0 pin via the A0 pin on the ESP8266 NodeMCU.
c. Buzzer =connected to gpio 15 on the D8 pin of the NodeMCU ESP8266.
d. The relay is connected to gpio 12 on the D6 pin of the ESP8266 NodeMCU.
e.

SYSTEM IMPLEMENTATION

A. Program Code Source

P-ISSN: 2656-1743 |E-ISSN: 2656-1735
DOI: https://doi.org/10.34288/jri.v7i3.381
Accredited rank 4 (SINTA 4), excerpts from the decision of the DITJEN DIKTIRISTEK No. 230/E/KPT/2023

Figure 3. Program View

The Arduino IDE display makes it easy to write and upload programs to the Arduino board. In gas leak programs, features such as a code editor and Serial Monitor are used to read sensor data and monitor system performance directly, making the programming process easier and more effective.

B. WiFi Configuration

The configuration of hotspots in IoT programs aims to connect devices such as ESP8266 or ESP32 to WiFi networks, so that devices can send data to the internet or to applications such as Telegram, Blynk, or other IoT servers.

a) Activate Hotspot on Smartphone

Figure 4. WiFi Configuration

The image above shows the creation of a hotspot configuration on a smartphone.

b) Hotspot Name and Password

```
const char* ssid = "anggie99";
const char* password = "bismillah'
```

Figure 5. Hotspot SSID Code

In the Arduino program code, an SSID (hotspot name) and password are specified so that the microcontroller can connect to the WiFi network.

c) Ensuring an Active Connection

```
int retryCount = 0;
while (WiFi.status() != WL_CONNECTED && retryCount < 20) {
  delay(500);
  retryCount++;
}
if (WiFi.status() == WL_CONNECTED) {
  configTime(0, 0, "pool.ntp.org");
  client.setTrustAnchors(&cert);
  bot.sendMessage(CHAT_ID, "✅ Terhubung ke WiFi. Alat siap digunakan!", "");
}
```

Figure 6. WiFi Connection Code

The image above is used over and over again to wait for a successful connection.

C. Hardware

Figure 7. Hardware

The image shows that the blue LED on the NodeMCu ESP8266 indicates that the system has been successful and connected to the internet via WiFi Smartphone.

D. Tool Working System

Figure 8. Work System

The system is designed using several main components, namely:

a) NodeMCU ESP8266: Acts as the primary microcontroller that controls the entire process circuit, from reading sensor data, sending data to the internet, to controlling output devices.

b) MQ-6 Sensor: This sensor is capable of detecting highly flammable gases, including LPG and butane. Thanks to its high sensitivity to gases in minimal concentrations, these sensors are highly effective in detecting potential gas leaks.

c) Matches: Placed near the MQ-6 sensor in the image serves as a gas source simulator during system testing. The match is lit briefly without igniting the flame to release butane gas, to test whether the system is able to detect the presence of gas responsively.

d) Relay: Serves as an automatic switch that will turn on the exhaust fan when gas is detected, to remove polluted air and prevent the accumulation of harmful gases in the room.

e) Buzzer and red LED: Used as hazard indicators. If gas is detected exceeding the threshold, the buzzer will sound as a sound alarm and the LED will illuminate as a visual sign.

f) DHT11: Commonly used to monitor ambient temperature and humidity, supporting the monitoring of room conditions.

g) Exhaust fan: Located on the left side of the image. Will automatically activate to accelerate outward air circulation when the system detects a gas leak.

h) Power supply: The system is connected to a power source via a USB cable and an adapter to provide power to all components.

In its implementation, when a lighter is used near the MQ-6 sensor (without igniting), the butane gas from the lighter will be detected. The nodeMCU will read the increased gas levels, then turn on the buzzer, red LEDs, and fans through the relay, as well as send the data to the Blynk platform for visual monitoring and Telegram for real-time emergency notifications.

E. Telegram Bot Display

Figure 9. Bot Telegram

The process of creating a Telegram bot starts with opening the Telegram app and searching for @BotFather account. Through this account, users can run the /newbot command to create a new bot, then assign the bot name and username. Once the process is complete, BotFather will provide an API token, which is a unique code that serves as a link between the bot and the developed program.

These API tokens are then fed into the program's code, usually through a microcontroller that has an internet connection such as ESP8266 or ESP32. In the gas leak detection system, once the sensor detects the gas, the program will utilize the token to automatically forward alert notifications to the Telegram app. This way, users can receive alerts directly from the bot when a gas leak occurs.

P-ISSN: 2656-1743 |E-ISSN: 2656-1735
DOI: https://doi.org/10.34288/jri.v7i3.381
Accredited rank 4 (SINTA 4), excerpts from the decision of the DITJEN DIKTIRISTEK No. 230/E/KPT/2023

F. A Portrait of a Man

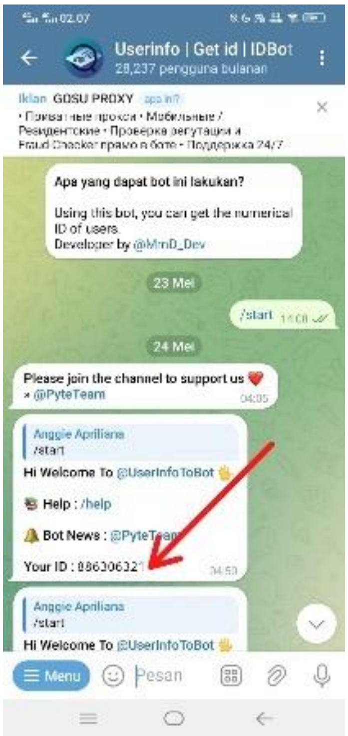
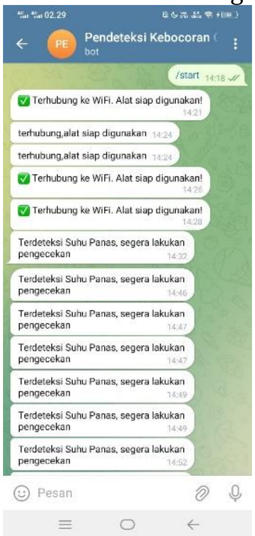


Figure 10. ID Telegram

To obtain a Telegram ID using the Get ID Bot, the first step users take is to open the Telegram app on their device. Next, type @get_id_bot or @userinfobot in the search field, and then select the appropriate bot from the search results. Once logged in to the bot's page, users can tap the Start button or type the /start command to get started. The bot will provide an automated reply containing account information, including Telegram User ID in the form of a unique number. This ID can be copied and used on IoT programs as a destination address to send notifications, for example when the system detects a gas leak.

G. Telegram Notification Checking



` Figure 11. Telegram Notifications

The image shows a notification from an IoT-based gas leak detection program integrated with a temperature monitoring system. In this program, if the temperature exceeds 27°C, the system will automatically carry out several important safety actions.

First, the buzzer will sound as an alarm to warn the user that the temperature in the environment is abnormal and potentially dangerous. Furthermore, the exhaust fan will turn on automatically to regulate air circulation again, helping to reduce gas and heat concentrations in the area.

In addition, the system also sends notifications via Telegram with messages such as "Hot Temperature Detected, check immediately." These notifications allow users to receive information in real time, even if they are away from the device's location.

With a combination of audible alarms, automatic ventilation settings, and digital notifications, the system provides effective protection against the risk of gas leakage and dangerous temperature increases.

H. Blynk Display

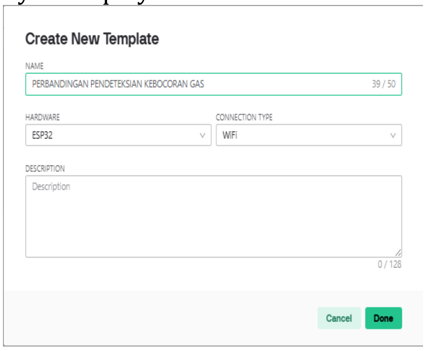


Figure 12. Blynk Account

The image shows the interface of an app that is used to create a new template. The title at the top is "Create New Template", which means "Create New Template". In the Name field, the user has filled in with "Gas Leak Detection Comparison", which indicates that this template is concerned with the analysis or comparison of gas leak detection methods. In the Hardware section, the type of device ESP32 was selected, a microcontroller that is often used in Internet of Things (IoT) projects. For Connection Type, the WiFi option is selected, indicating that the device will be connected via a wireless network. There is also a Description field that is still blank and can be filled in to provide additional explanations about the template. At the bottom, there are two buttons, namely Cancel to cancel the creation of the template and Done to save and complete the process of creating the template.

I. Blynk Configuration

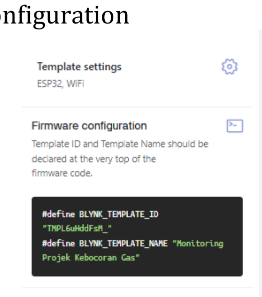


Figure 13. Configuration Code

The image shows the template settings page on the Blynk IoT app, which serves to connect devices like the ESP32 with an internet-based monitoring system. Inside are three important lines of code that need to be entered into the device program. The first line, #define BLYNK_TEMPLATE_ID "TMPL6uHddFsM_", is the unique ID of the template being used. The second line, #define BLYNK_TEMPLATE_NAME "Gas Leak Project Monitoring", shows the name of the template indicating that this project is concerned with gas leak monitoring. The third line, #define BLYNK_AUTH_TOKEN "Your Auth Token", is used to enter the authentication token provided by Blynk in order for the device to connect to the user's server. These tokens are confidential and must be replaced with the original token before use. Below the code snippet, there are two buttons, namely Share to share the template information and Copy to copy the code directly. This display is an important part of the device integration process with the Blynk platform for the monitoring system to run properly.

J. Setting Widge Box Blynk

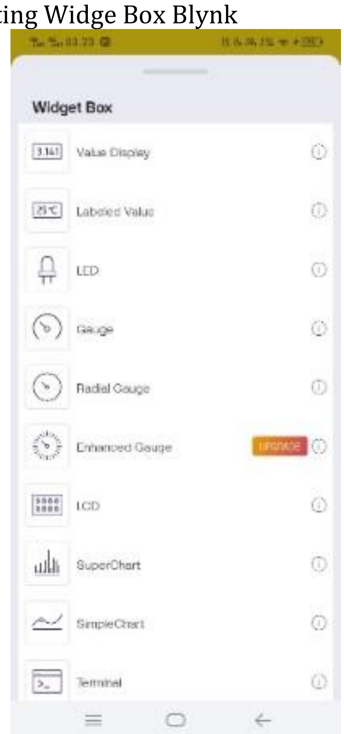


Figure 14. Setting Widge

The image shows the Widget Box on the Blynk app, which provides different types of widgets to display data from IoT devices. Some of them such as Value Display, Labeled Value, LED, Gauge, Chart, and Terminal function to present data directly and in real-time. There are also widgets like Enhanced Gauge that can only be used after upgrading to the paid version. These entire widgets are designed to help users create an attractive and easy-to-understand monitoring interface in their IoT projects.

K. Data Real Time Blynk

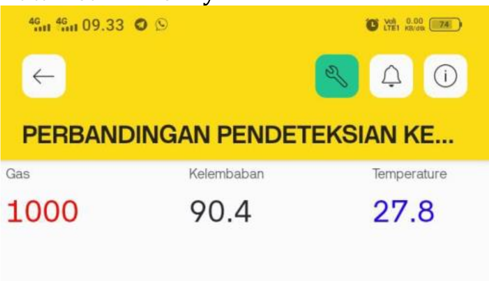


Figure 15. Data Blynk

The image displays three main parameters monitored by the system, namely gas concentration, air humidity, and temperature (temperature). The detected gas concentration value is 1000 and is displayed in red, which generally indicates a dangerous condition or being at an alert level. This value is relatively high and can indicate the presence of hazardous gases or significant levels of air pollution. Meanwhile, the humidity level is at 90.4%, which is very high and reflects a very humid environment, likely to occur in rainy conditions or enclosed rooms without adequate ventilation. For temperature parameters, it was recorded at 27.8°C. If the normal temperature limit is set at 27°C, this temperature can be considered abnormal, as it has exceeded that threshold. This condition needs to be watched out for so that the environment remains stable and safe.

CONCLUSIONS AND SUGGESTIONS

CONCLUSION

This study examines the comparison of the effectiveness between the Blynk and Telegram platforms in the implementation of the detection system The IoT gas leak detection system is built with a ESP8266 NodeMCU microcontroller. The system combines an MQ-2 sensor for hazardous gas detection and a DHT11 sensor for air temperature and humidity measurement. In addition, the buzzer is embedded as an output component that issues a sound warning when a hazardous condition is identified. The system will respond when the detected gas level exceeds a preset threshold limit (e.g. above 400 ppm), the system automatically activates a buzzer to provide a sound alarm, turns on a red LED as a visual indicator, and turns on the exhaust fan to remove polluted air. Reading data from the sensor is also transmitted in real-time to two digital platforms, namely Blynk as a visual interface and Telegram as a medium for sending quick alerts.

The Blynk platform has a major advantage when it comes to interactive visualization of sensor data. Users can monitor gas levels, temperature, and humidity through graphs, gauges, and value displays in real-time. Blynk also allows manual control of devices, such as buzzers or fans, via virtual buttons. However, the downside of Blynk is the limited features of the free version, including a limited number of widgets and the absence of push notifications. Blynk is also highly dependent on a stable internet connection, so there is a risk of delays in data transmission.

On the other hand, Telegram has the advantage of sending notifications quickly and directly to the user's device through bots. Alerts can be received within seconds when a gas leak occurs, even without opening a dedicated app. This makes Telegram effective as an early warning system. However, Telegram's downside is that the unavailability of user data visualization only receives text messages without graphs or sensor history, making it less ideal for long-term data monitoring.

NodeMCU ESP8266 be the top choice in these systems because it supports WiFi connections, is power-saving, and is compatible with a wide range of sensors as well as cloud services. The NodeMCU functions to collect data from MQ-2 and DHT11 sensors, then transmit the data to the Blynk and Telegram platforms, as well as control output devices such as buzzers, LEDs, and exhaust fans. The presence of a buzzer in this system is very important as a live voice alarm that can speed up the user's response in emergency situations, especially when the user is not monitoring the device through the app.

Based on the test results, the system that integrates Blynk and Telegram simultaneously has been proven to provide the most optimal results. Blynk strongly supports data visualization for periodic monitoring, while Telegram allows the system to provide instant alerts efficiently. Therefore, users are advised to use both platforms in an integrated manner to improve safety and comfort in using IoT systems.

SUGGESTION

The system can be extended by adding data logging features to the cloud such as Firebase or Google Sheets for data history analysis purposes. It is also recommended to add additional sensors, such as fire or carbon monoxide (CO) sensors, to make the detection coverage wider and more accurate. Using the paid version of Blynk is also a viable option so that users can take advantage of the automatic notification feature and add more interface elements. In terms of hardware, the use of NodeMCU ESP8266, MQ-2 sensors, DHT11 sensors, buzzers, and the use of the Blynk and Telegram platforms make this system suitable for use in households, schools, laboratories, public kitchens, and small-medium industries, which require an early warning system for gas leaks quickly, efficiently, and can be accessed remotely.

REFERENCE

Aji Pangestu, Galuh, and Moch Yusuf Asyhari. 2024. "Internet of Things (IoT)-Based Home Security System Using Telegram Bot Notifications for Motion Detection." Journal of Smart Systems (JSS) 4(1).

Ario, Dimas, Tri Kusumo, Muhammad Imam Fernandi, and Mia Rosmiati. 2024. "Development of an IOT-Based LPG Gas Leak Detection System." Journal of Applied Engineering and Social Science (JAESS) 2(2): 8–13. doi:10.25124/jaess.v2i2.8378.

Darnoto, Sri, Dwi Astuti, Rika Putri Kinasih, Latifa Putri Cindana, and Keywords. 2023. "Safety Education on the Use of LPG Gas Cylinders in Households." Journal of Innovation and Community Service Indonesia 2(2). https://jurnalnew.unimus.ac.id/index.php/jipmi.

Economics, Journals, and Business, Reni Helvira, Syamratun Nurjannah, and Ari Widiati. 2023. "Analysis of Consumer Behavior in the Use of 3 Kilogram Liquified Peteoleum Gas (LPG) Subsidy According to the Islamic Economic Perspective." Adz Dzahab Journal of Islamic Economics and Business 8(1): 2023. http://journal.iaimsinjai.ac.id/index.php/adz-dzahab.

Fadia Karunia Utami, Zaenudin, Muhamad Masjun Efendi, and Lalu Delsi Samsumar. 2025. "Design of an IOT-Based Gas and Fire Leak Detection System in North Lombok." Journal Of Computer Science And Technology (JOCSTEC) 3(1): 9–16. doi:10.59435/jocstec.v3i1.426.

Fauzi, Muhammad Arkan, and Setyawan Ajie Sukarno. 2025. "DEVELOPMENT OF IOT-BASED LPG GAS LEAK DETECTION SYSTEMS: INTEGRATION OF MQ-02 AND DHT11 SENSORS FOR REAL-TIME MONITORING." Journal of Informatics and Applied Electrical Engineering 13(1). doi:10.23960/jitet.v13i1.5980.

Fevriera, Sotya, and Sheilla Hartatdji. 2023. "The Influence of Energy Consumption and Technological Progress on Indonesia's Economic Growth." JAE (JOURNAL OF ACCOUNTING AND ECONOMICS) 8(3): 102–11. doi:10.29407/jae.v8i3.19826.

Firmansyah, Dimas, and Farrel Alfredo Ahwiddhana. 2024. "ECONOMIC ANALYSIS OF THE USE OF RENEWABLE ENERGY IN INDONESIA FOR SUSTAINABLE DEVELOPMENT." JMA) 2: 3031–5220. doi:10.62281.

Gaguk Suprianto, 2Alya Rizky Natasya, 3Arfi Indra Riskiawan. 2023. "System+Detection+Leak+Gas+Based+IoT+As+Tools+Help+In+MSMEs."

Iklil, Moch, Putra Irgian, and Fahrur Rozi. 2022. DESIGN AND BUILD AN INTERNET OF THINGS (IOT)-BASED GAS LEAK DETECTION SYSTEM USING TELEGRAM BOT.

Lukman Hakim Sidik. 2023. "DESIGN AND BUILD AN LPG GAS LEAK EARLY DETECTION TOOL USING AN MQ-6 SENSOR INTEGRATED WITH THE TELEGRAM APPLICATION IN THE KITCHEN ROOM AT HOME."

Inspired by Triple. 2022. "APPLICATION OF THE SDLC (SYSTEM DEVELOPMENT LIFE CYCLE) WATERFALL METHOD ON SMARTPHONE E-COMMERCE." Scientific Journal of Information Systems and Computer Science 2(2): 1–6. https://journal.sinov.id/index.php/juisik.

Meilinda Suriani Harefa, Syukri Hidayat, Grace Mercy Epsilon Hia, Sabda Yanti Pasaribu, Natasya Kaila Putri, and Mhd Asa Arzaki Muis. 2024. "Analysis of Natural Gas Utilization as a Substitute for LPG Gas." SOCIAL : Scientific Journal of Social Studies Education 2(4): 179–82. doi:10.62383/social.v2i4.516.

Naufal Faruq, Muhammad. 2023. 7 Journal of Informatics Engineering Students IMPLEMENTATION OF AGILE METHOD IN THE DEVELOPMENT OF WIFI SERVICE MANAGEMENT MANAGEMENT APPLICATIONS.

Pratiwi, Sabila Putri, and Tiwi Nurhastuti. 2023. "Design and Build LPG Gas Leak Detection Device Using Wemos D1 R1 with IoT-Based Whatsapp and Telegram Alert Notifications." Journal of Information Technology 9. https://ejournal.urindo.ac.id/index.php/TI/index.

Purnamawati, Tri Endah, Afu Ichsan Pradana, and Joni Maulindar. 2024. "LPG Gas Leak Detection Tool at Grilled and Fried Chicken Restaurant Kremes Tata Based on the Internet of

Things." G-Tech: Journal of Applied Technology 8(1): 480–89. doi:10.33379/gtech.v8i1.3815.

Ratmini, Yuli, Vihi Atina, and Eko Purwanto. 2025. "Internet of Things (IoT)-based flood monitoring and early warning systems." Asian Scientific Journal of Information Technology 19(1): 1–7. doi:10.32815/jitika.v19i1.1103.

Sahara, Siti, Bagas Pragat Pamungkas, and Ikram Maulana Firdaus. 2024. "Development of LPG Gas Leak Detection Device Using MQ-2 Sensor as an Early Prevention Effort to Fire Risk." Scientific Journal of Global Education 5(2): 1260–73. doi:10.55681/jige.v5i2.2736.

Soesilo, Eddy, and Isriwan Fayuza. 2023. "Prototype of an IOT-Based LPG Gas Leak Detection Device." Journal of Integrated Industrial Engineering 6(3): 862–79. doi:10.31004/jutin.v6i3.17664.

Sutrio Yatmoko, Bambang, Erzeddin Alwi, Andrizal, and Milana. 2024. "Comparison of Exhaust Gas Emission Levels to the Use of Pertalite Fuel and LPG Gas Fuel." JTPVI: Indonesian Journal of Vocational Technology and Education 2(4): 411–18. doi:10.24036/jtpvi.v2i4.212.

Syuja Rifka Khairyansyah, Kalika Khaldan Nurshofa, Della Saskia Amelia, Aulivia Widya Putti, Muhammad Taufiq Hidayatullah Syari, and Didik Aribowo. 2024. "Gas Leak Detection Using WeMos D1 Mini-Based MQ2 Sensor." Journal of Mechanical, Industrial, Electrical and Informatics Engineering 3(4): 248–58. doi:10.55606/jtmei.v3i4.4552.

Tambunan, Samuel, and Arnisa Stefanie. 2023. 7 Journal of Informatics Engineering Students LPG GAS LEAK MONITORING USING MQ-2 SENSORS AT HOME WITH TELEGRAM BOT NOTIFICATIONS.

Tampubolon, Aron Pangihutan Christian, and Berber Fajar Dawn Tamtomo Kiono. 2021. "Overview of the Development of Natural Gas Primary Energy Utilization in Indonesia." Journal of New and Renewable Energy 2(1): 36–52. doi:10.14710/jebt.2021.10049.