IOT BASED COAL MINE MONITORING SYSTEM

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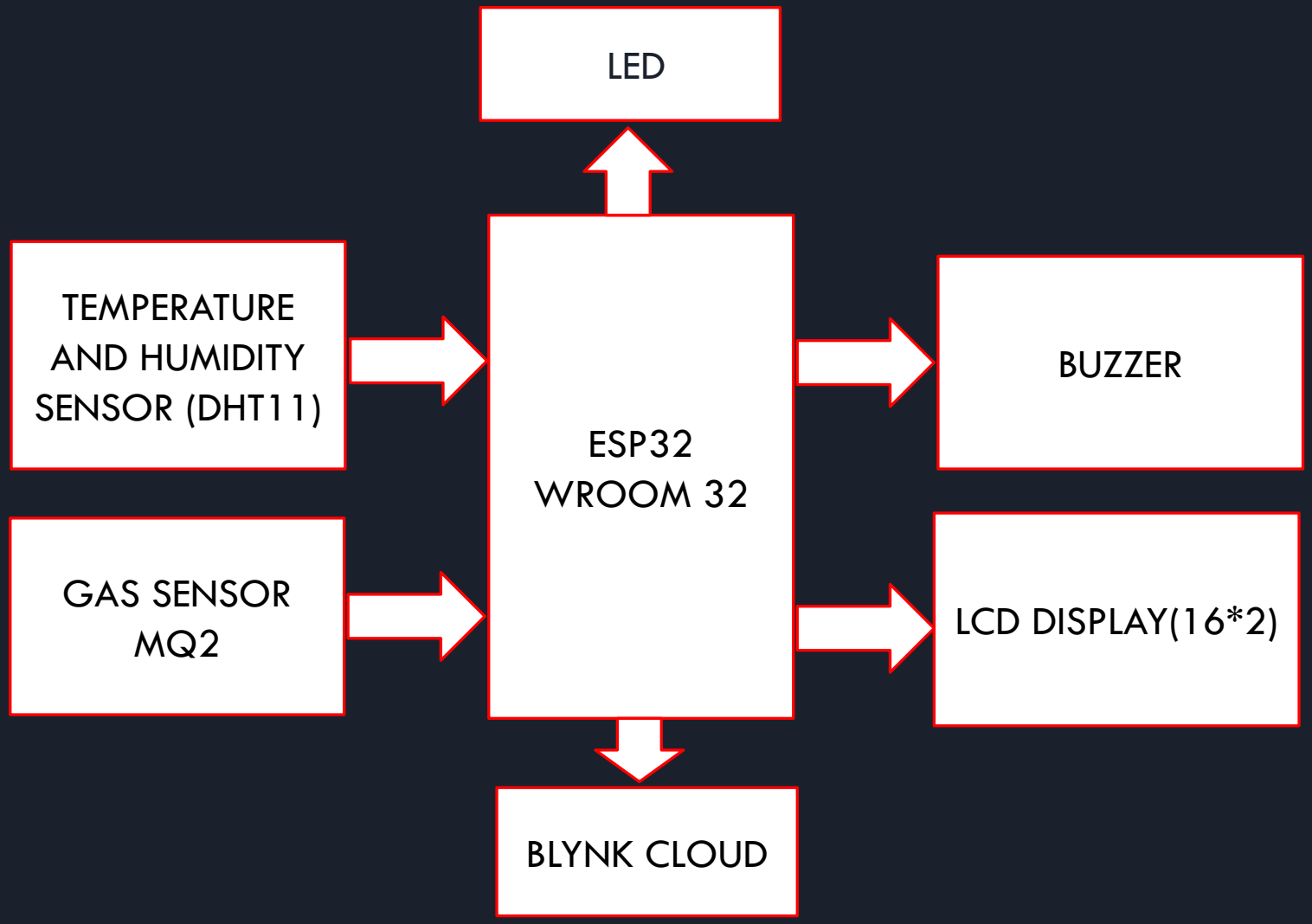
INTRODUCTION

- Coal mining is one of the most dangerous industries in the world
- Accidents in coal mines can happen at any time, and they can be caused by a variety of factors, such as explosions, fires, and roof collapses.
- IoT-based coal mine monitoring systems can help to improve safety
- The system you have described uses a variety of sensors.
- The system can send alerts if a problem is detected.

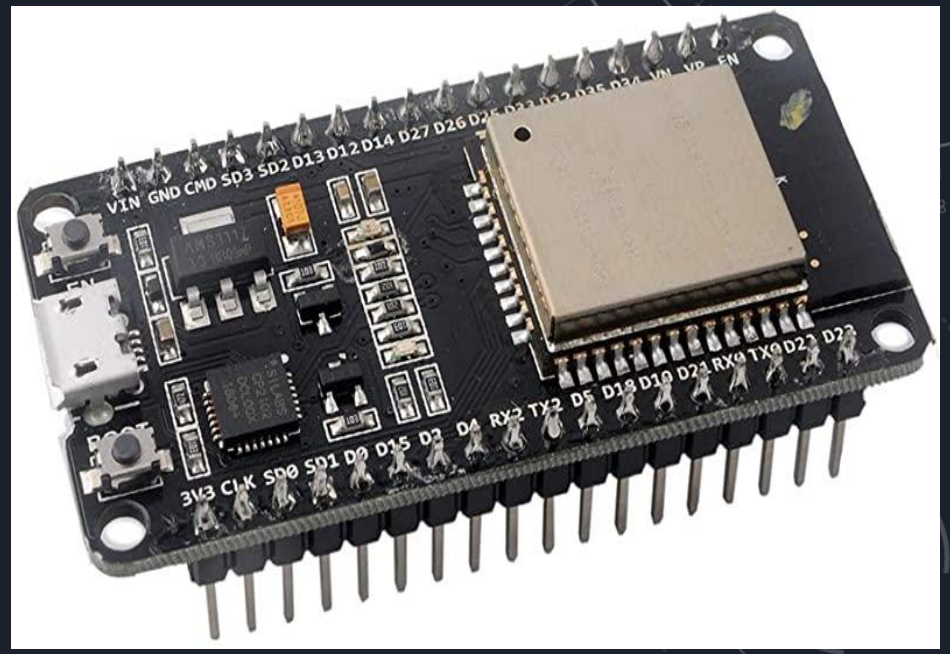
BLOCK DIAGRAM



COMPONENTS

ESP32

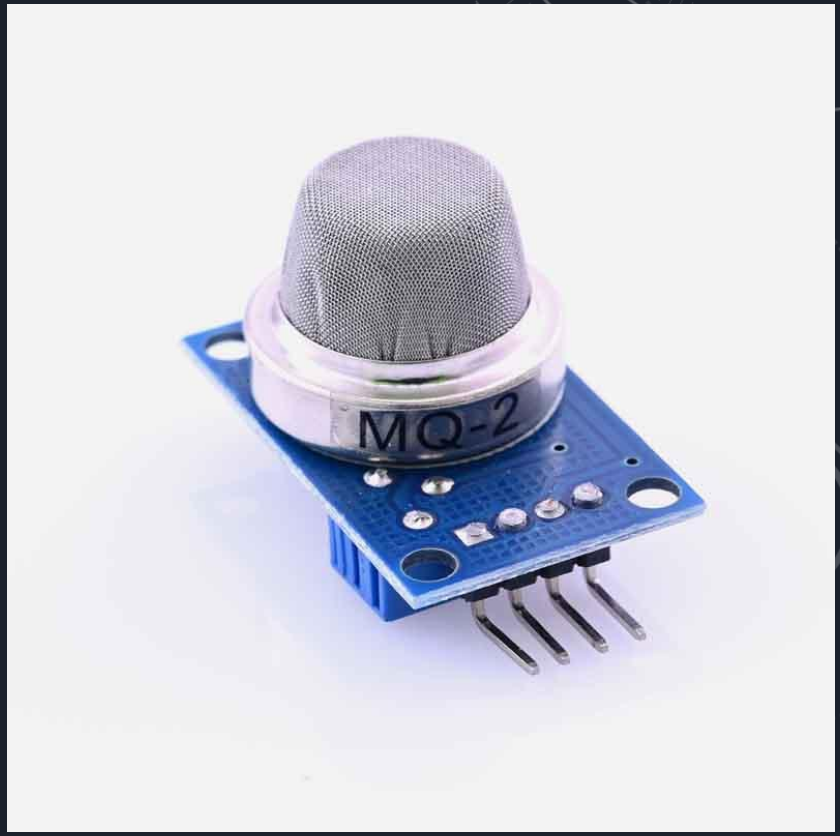
- Dual-core processor is clocked at up to 240 MHz.
- ESP 32 has 520 KB of RAM and 448 KB of ROM
- ESP32 has a wide range of peripherals, including 34 GPIOs, 12-bit ADCs, 2 DACs, and 10 touch sensors.
- ESP32 has low cost.
- ESP32 can reduce power consumption



COMPONENTS

MQ2 (SMOKE SENSOR)

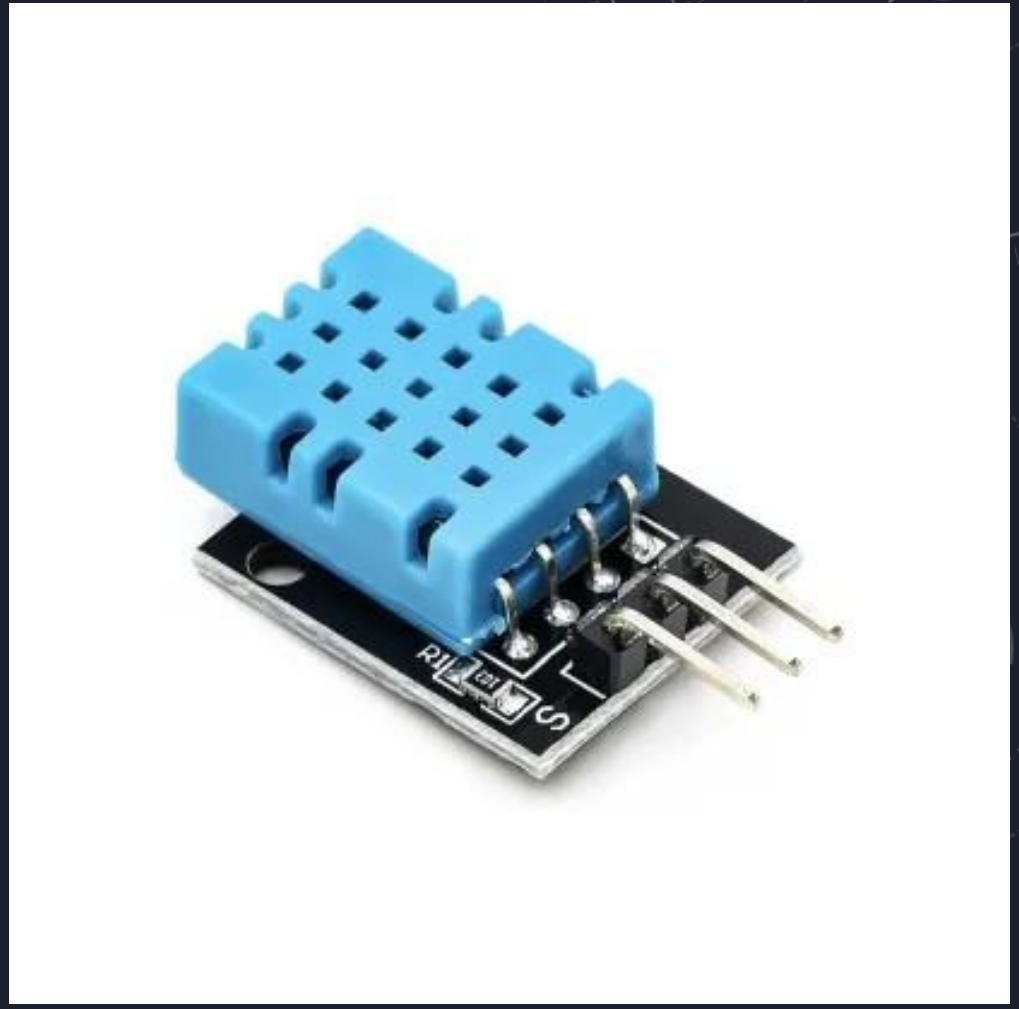
- MQ2 gas sensor is detect a variety of gases including LPG, propane, methane, hydrogen, alcohol, smoke and carbon monoxide.
- MQ-2 has four output pins.
- Concentration ranging from 200-10000 ppm.
- Analog output voltage range 0-5V.
- Digital output voltage range 0 or 5V(TTL logic).
- Can be used as a digital or analog sensor.



COMPONENTS

TEMPERATURE AND HUMIDITY SENSOR (DHT11)

- DHT11 is a digital temperature and humidity sensor .
- It measuring the temperature and humidity of the surrounding environment.
- DHT11 is a low-cost sensor
- It operates on a voltage range of 3.3V to 5V.
- Temperature range 0-50°C
- Humidity range 20-90%



COMPONENTS

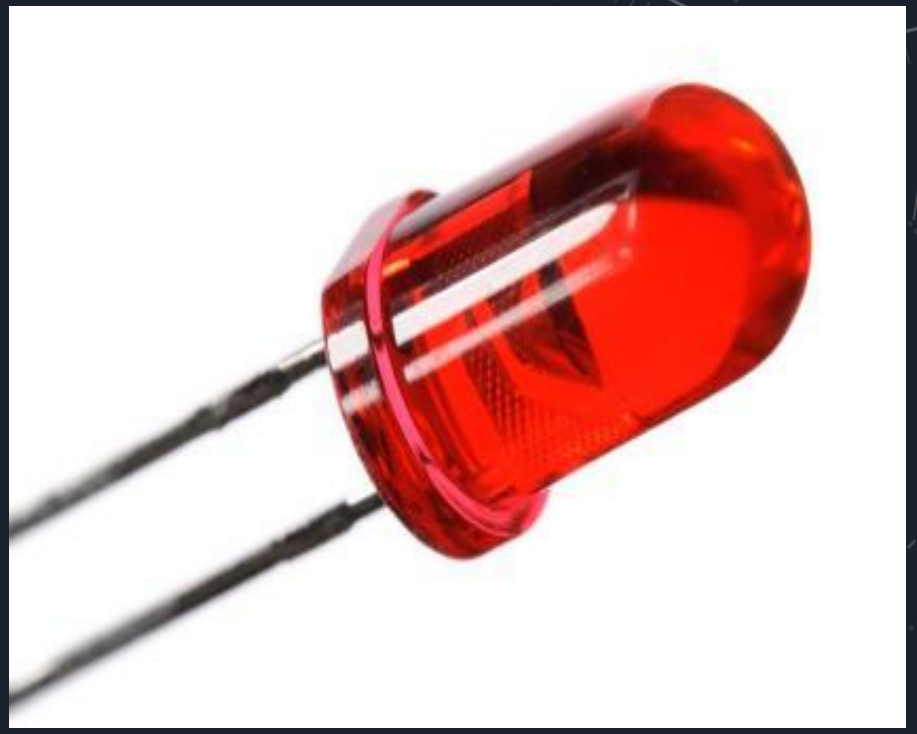
I2C LCD DISPLAY (16*2)

- I2C LCD Display is a type of LCD display that uses the I2C communication protocol.
- I2C, or Inter Integrated Circuit only requires two wires to connect ,one clock (SCL) and one data (SDA) line
- It can display 16 characters per line and there are 2 such lines
- Each character is displayed in 5*7 pixel matrix
- It is capable of displaying 224 different characters and symbols.
- Supply voltage 5V.

COMPONENTS

LED

- components stands for Light Emitting Diode, which is a type of electronic device that emits light when an electrical current is passed through it.
- LEDs are very efficient.
- LEDs are very long-lasting.

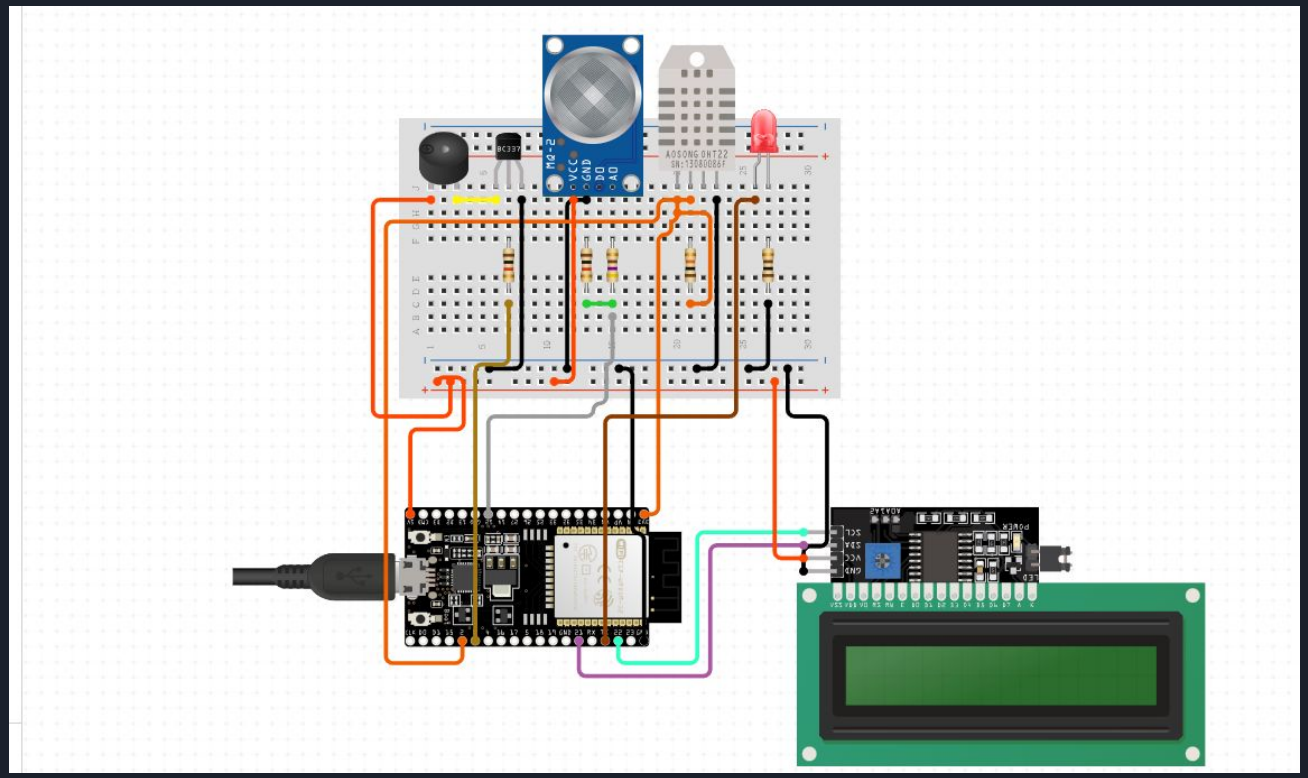


COMPONENTS

BUZZER

- A magnetic **buzzer** is a current driven device, but the power source is typically a voltage. The current through the coil is determined by the applied voltage.
- The sound is produced by a vibrating metal diaphragm.
- Operating voltage range 3-24V DC.
- Frequency range 3300 Hz.
- Sound pressure level 85 dBA or 10cm.
- Supply current below 15 mA.

CIRCUIT DIAGRAM

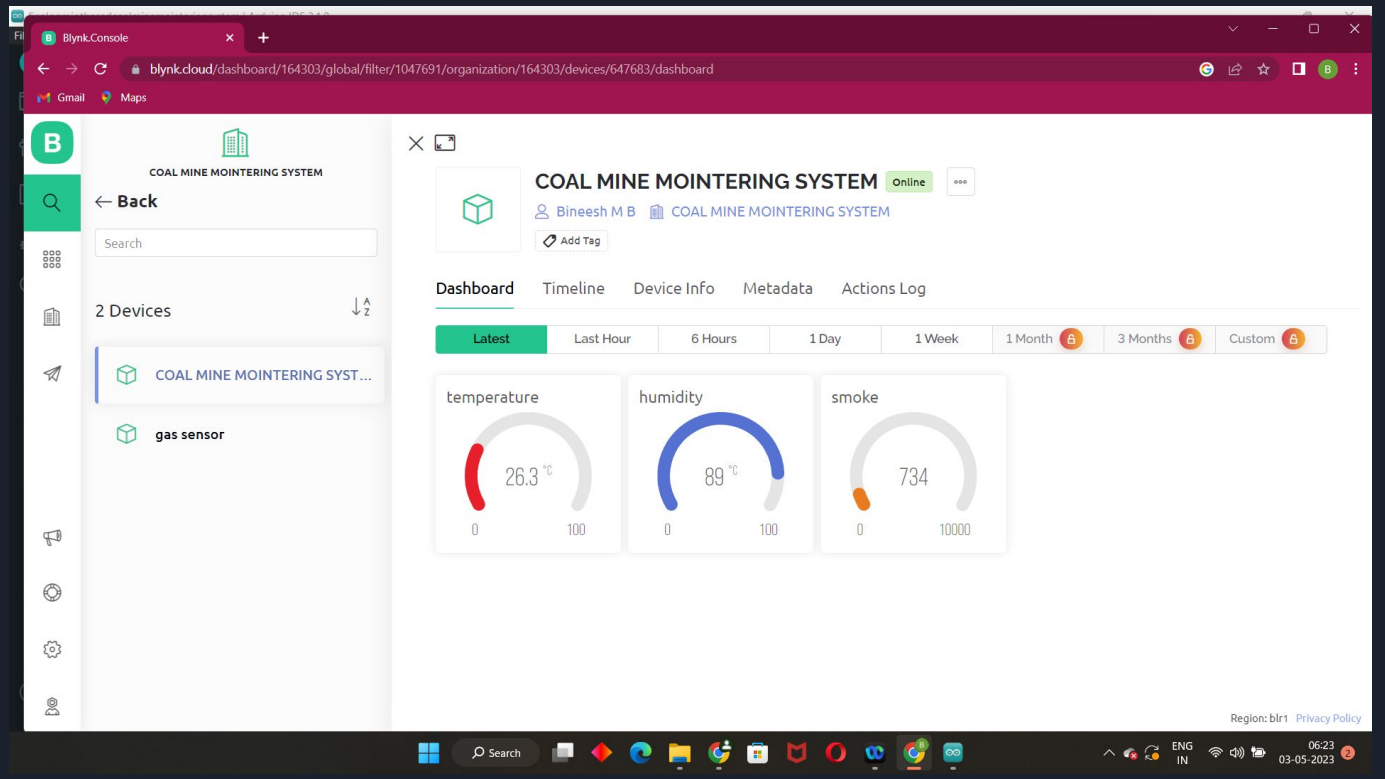


WORKING

- The ESP32 microcontroller is used to collect data from the MQ2 gas sensor, DHT11 temperature and humidity sensor and display I2C LCD display.
- The data is then sent to the Blynk cloud platform, where it is stored and displayed.
- If the smoke level is greater than a certain threshold, the LED will blink and the buzzer will sound.
- An alert will also be sent to the owner of the system, including the GPS location of the mine.
- The system can be accessed and monitored remotely from anywhere in the world.

RESULT

RESULT


Blynk.Console
blynk.cloud/dashboard/164303/global/filter/1047691/organization/164303/devices/647683/dashboard
Gmail
Maps
COAL MINE MOINTERING SYSTEM
Back
Search
2 Devices
COAL MINE MOINTERING SYST...
gas sensor
COAL MINE MOINTERING SYSTEM
Online
Bineesh M B
COAL MINE MOINTERING SYSTEM
Add Tag
Dashboard
Timeline
Device Info
Metadata
Actions Log
Latest
Last Hour
6 Hours
1 Day
1 Week
1 Month
3 Months
Custom
temperature
26.3 °C
0
100
humidity
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100
smoke
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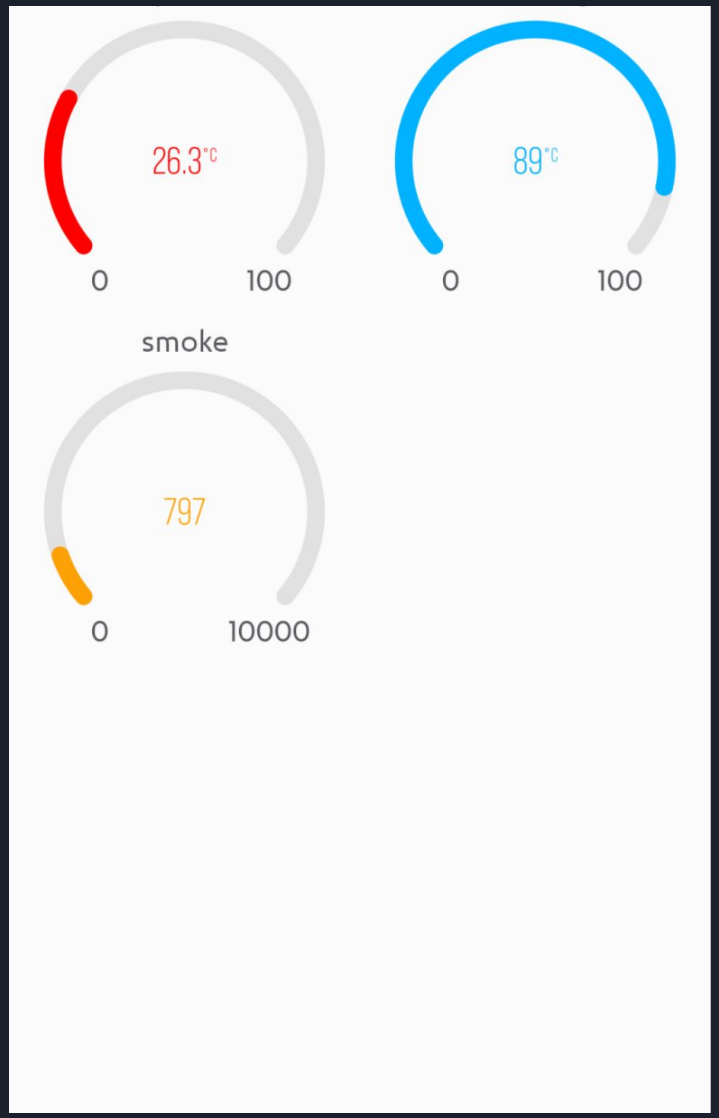
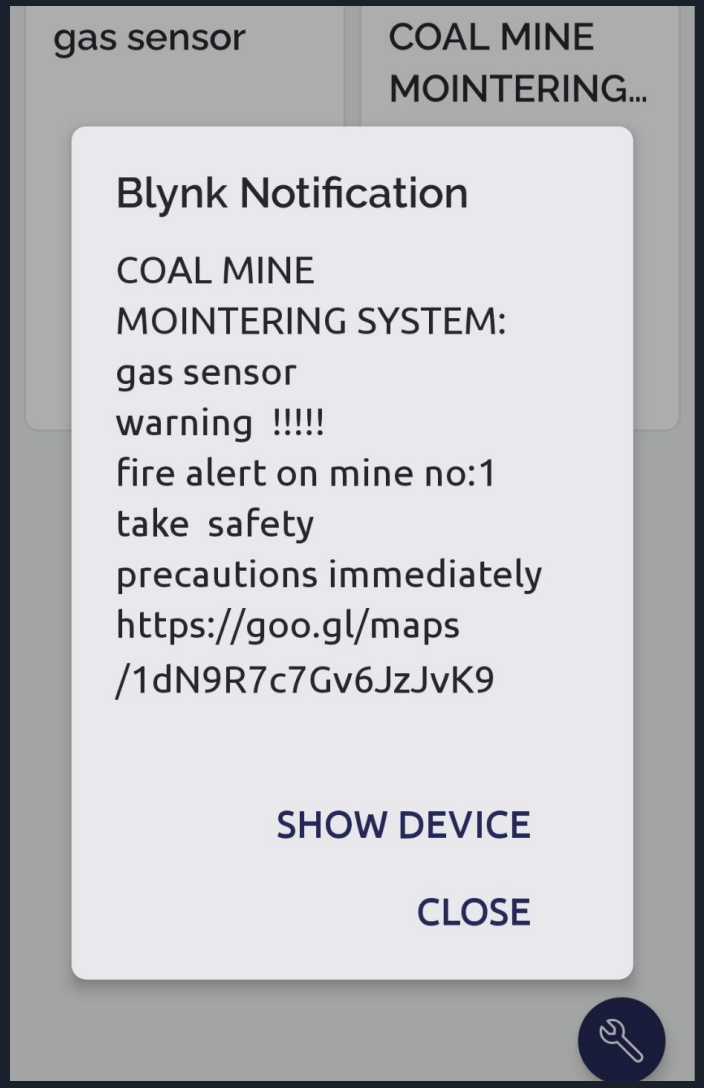
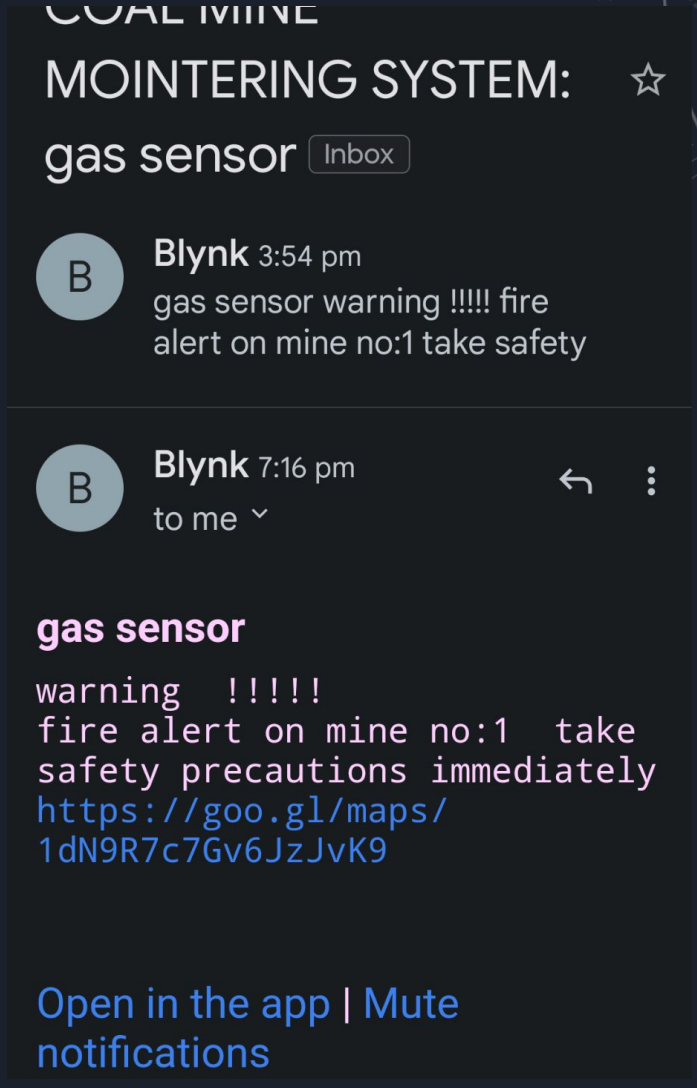
Privacy Policy
Search
ENG
IN
06:23
03-05-2023

RESULT



RESULT


gas sensor
COAL MINE MOINTERING...
Blynk Notification
COAL MINE
MOINTERING SYSTEM:
gas sensor
warning !!!!!
fire alert on mine no:1
take safety
precautions immediately
https://goo.gl/maps
/1dN9R7c7Gv6JzJvK9
SHOW DEVICE
CLOSE


MOINTERING SYSTEM:
gas sensor
Inbox
Blynk 3:54 pm
gas sensor warning !!!!! fire alert on mine no:1 take safety
Blynk 7:16 pm
to me
gas sensor
warning !!!!!
fire alert on mine no:1 take safety precautions immediately
https://goo.gl/maps/1dN9R7c7Gv6JzJvK9
Open in the app | Mute notifications

ADVANTAGES

- Real-time monitoring
- Remote monitoring
- safety alerts
- improved efficiency
- Cost-effectiveness
- Improved decision-making

FUTURE SCOPE AND ENHANCEMENTS

- Improved sensor technology.
- Advanced data analytics.
- More user-friendly interfaces
- Scalability and expansion possibilities.
- Integration with advanced technologies(AI , machine learning).
- Potential benefits for mine productivity and safety.

CONCLUSION

- IoT-based coal mine monitoring systems are a promising new technology that has the potential to improve safety in coal mines.
- These systems can monitor a variety of environmental factors, including smoke, temperature, and humidity.
- They can also send alerts if any of these factors exceed a certain threshold.
- The systems can be controlled remotely, which allows mine management teams to respond to hazards more quickly and effectively.
- The system you sent is a good example of the future of IoT-based coal mine monitoring systems.

REFERENCE

- https://nevonprojects.com/iot-based-coal-mine-safety-monitoring-and-alerting-system/
- https://ieeexplore.ieee.org/document/10074169/
- https://ieeexplore.ieee.org/document/10074169/

THANK YOU