1. Components
2. Hardware

* Nodemcu
* Power cable
* Temperature sensor
* Water sensor
* Methane gas sensor
* Wires and bread board
* Leds
* Buzzer

1. Software

* Blynk
* Arduino ide

1. Hardware specifications

* Nodemcu(ESP8266 NodeMCU CP2102 Board)

Data sheet <https://components101.com/sites/default/files/component_datasheet/ESP8266-NodeMCU-Datasheet.pdf>

For simplified information

<https://components101.com/development-boards/nodemcu-esp8266-pinout-features-and-datasheet>

* Temperature Sensor(DHT 11)

Data sheet <https://components101.com/sites/default/files/component_datasheet/DHT11-Temperature-Sensor.pdf>

For simplified information

<https://components101.com/sensors/dht11-temperature-sensor>

* Water sensor(Rain drop Sensor Module)

Data sheet

<https://components101.com/sites/default/files/component_datasheet/Rain-Sensor-Datasheet.pdf>

For simplified information

<https://components101.com/sensors/rain-drop-sensor-module>

* Methane gas sensor(MQ 4)

Data sheet

<https://components101.com/sites/default/files/component_datasheet/MQ-4%20Methane%20Gas%20Sensor%20Datasheet.pdf>

For simplified information

<https://components101.com/sensors/mq-4-methane-gas-sensor-pinout-datasheet>

1. Software specifications

* Blynk

Blynk is **a new platform that allows you to quickly build interfaces for controlling and monitoring your hardware projects from your iOS and Android device**. After downloading the Blynk app, you can create a project dashboard and arrange buttons, sliders, graphs, and other widgets onto the screen.

Blynk was designed for the Internet of Things. It can control hardware remotely, it can display sensor data, it can store data, vizualize it and do many other cool things.

There are three major components in the platform:

* **Blynk App** - allows to you create amazing interfaces for your projects using various widgets we provide.
* **Blynk Server** - responsible for all the communications between the smartphone and hardware. You can use our Blynk Cloud or run your [private Blynk server](https://docs.blynk.cc/#blynk-server) locally. It’s open-source, could easily handle thousands of devices and can even be launched on a Raspberry Pi.
* **Blynk Libraries** - for all the popular hardware platforms - enable communication with the server and process all the incoming and outcoming commands.
* Features
* Similar API & UI for all supported hardware & devices
* Connection to the cloud using:
* WiFi
* Bluetooth and BLE
* Ethernet
* USB (Serial)
* GSM
* Set of easy-to-use Widgets
* Direct pin manipulation with no code writing
* Easy to integrate and add new functionality using virtual pins
* History data monitoring via SuperChart widget
* Device-to-Device communication using Bridge Widget
* Sending emails, tweets, push notifications, etc.
* Arduino ide

The **Arduino Integrated Development Environment** - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino hardware to upload programs and communicate with them.

Programs written using Arduino Software (IDE) are called **sketches**. These sketches are written in the text editor and are saved with the file extension .ino. The editor has features for cutting/pasting and for searching/replacing text. The message area gives feedback while saving and exporting and also displays errors. The console displays text output by the Arduino Software (IDE), including complete error messages and other information. The bottom righthand corner of the window displays the configured board and serial port. The toolbar buttons allow you to verify and upload programs, create, open, and save sketches, and open the serial monitor.

FOR MORE INFORMATION

<https://docs.arduino.cc/software/ide-v1/tutorials/arduino-ide-v1-basics>

1. Working principle

Due to the accidents happening in coal mines this system is designed based on wireless sensor networks. The purpose of these sensors is to monitor the conditions down there and to report any anomalies. Observations have been conducted and they have resulted in a system consisting of good stability, great accuracy, and overall a helpful system to monitor the coal mines. Mines are the world’s most dangerous place to work because in the mines, explosion often happens and thousand people are dying. And a recent report states that in such mine accidents an average of around 12, 000 people have died. This plan will be useful to them in remote locations during the crisis. In this paper given an overview of IoT based coal mining safety for workers using IoT and Arduino. Apart from this, it consists of methane gas sensor, Temperature and Humidity sensor which are used to monitor the underground hazards. In this paper, we mainly focused on the hazards monitoring, all the sensor values compared with the received data from the sensor with safety limits and if any hazards detected, and the ground section will be given the necessary alert.

<https://paideumajournal.com/gallery/46-may2021.pdf>

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