

Project Design Phase-II Technology Stack (Architecture & Stack)

Date	15 October 2022
Team ID	PNT2022TMID16964
Project Name	Project - Gas Leakage Monitoring and Alerting System for Industries.
Maximum Marks	4 Marks

Technical Architecture:

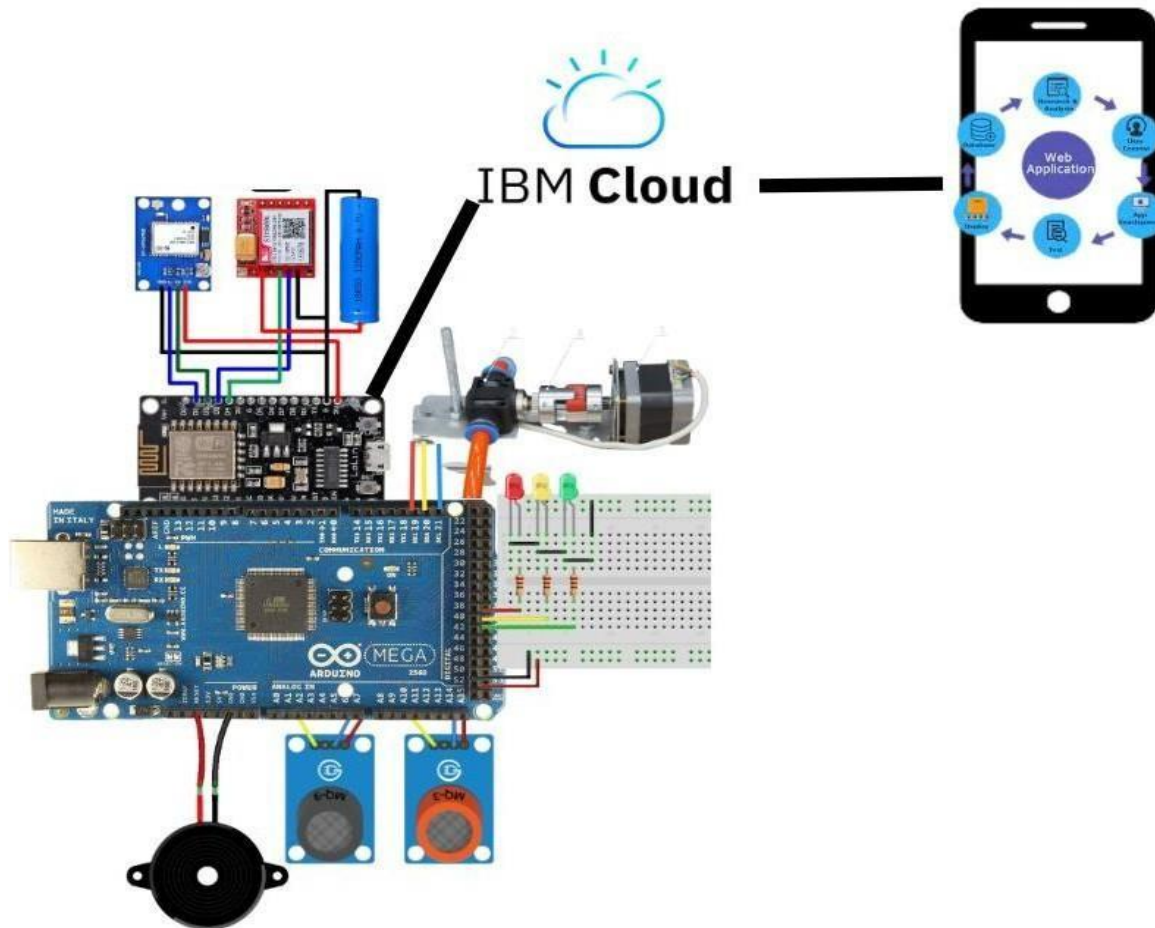


Table-1: Components & Technologies:

S.No	Component	Description	Technology
1.	Arduino MEGA	The Arduino Mega 2560 is a microcontroller board based on the ATmega2560 (datasheet). It has 54 digital input/output pins (of which 14 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button.	Basically, the processor of the Arduino board uses the Harvard architecture where the program code and program data have separate memory. It consists of two memories such as program memory and data memory. Wherein the data is stored in data memory and the code is stored in the flash program memory.
2.	LED-Red,Yellow,Green	LED, in full light-emitting diode, in electronics, a semiconductor device that emits infrared or visible light when charged with an electric current.	LEDs operate by electroluminescence, a phenomenon in which the emission of photons is caused by electronic excitation of a material.
3.	ESP8266 WiFi Module	The ESP8266 WiFi Module is a self-contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your WiFi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor.	The ESP8266 is a low-cost Wi-Fi microchip, with built-in TCP/IP networking software, and microcontroller capability
4.	Siren	A siren is a loud noise-making device . Civil defense sirens are mounted in fixed locations and used to warn of natural disasters or attacks. Sirens are used on emergency service vehicles such as ambulances, police cars, and fire trucks. There are two general types: mechanical and electronic.	Mechanical sirens blow air through a slotted disk or rotor . The cyclic waves of air pressure are the physical form of sound. In many sirens, a centrifugal blower and rotor are integrated into a single piece of material, spun by an electric motor.
5.	MQ5,9,135 gas sensor	The Grove - Gas Sensor (MQ5,9,135) module is useful for gasleakage detection and for monitoring the air quality	A gas sensor is a device which detects the presence or concentration of gases in the atmosphere. Based on the concentration of the gas the sensor produces a corresponding potential difference by changing the resistance of the material inside the sensor, which can be measured as output voltage. Based on this voltage value the type and concentration of the gas can be estimated.

6.	Valve or Knob with stepper motor	Self-closing Sampling Valves are safety valves designed to allow safe and quick sampling of volatile gases under pressure on process lines, storage tanks or pressure vessels.	The Self Closing Valve is opened by means of a lever lifting up the disc from the seat in the valve body. Spring force will automatically close the valve when the hand lever is unengaged. The valve is permanently closed using the hand wheel Automatic control valves are specialty valves fitted with actuators that can be controlled by temperature or flow sensors.
7.	GPS module	The NEO-6M GPS module is a well-performing complete GPS receiver with a built-in 25 x 25 x 4mm ceramic antenna, which provides a strong satellite search capability	It can track up to 22 satellites on 50 channels and achieves the industry's highest level of sensitivity i.e. -161 dB tracking, while consuming only 45mA supply current.
8.	GSM and Fast SMS	GSM (Global System for Mobile communication) is a digital mobile network that is widely used by mobile phone users in Europe and other parts of the world.Fast2SMS provide API for bulk SMS, which ensures security and it is a very reliable source of sending data	When you send an SMS message, the message gets transmitted from the sending device to the nearest cell tower. That cell tower passes the message to an SMS center (SMSC). Then the SMSC forwards the SMS message to a cell tower near the receiving device. Lastly, that tower sends the message to the recipient's device
9.	Mobile Phone	Whenever the excess gas is detected SMS will be sent to a particular phone number. Smoke and gas leakage detectors are very useful in detecting smoke or fire in buildings, and so are the important safety parameters in order to prevent disasters.	The system alerts notifications to the end-user - who responds accordingly with the help of connected devices such as a smartphone on the go.

10.	Web App	An application that is used to see the gas level, gps location and see the total overview of the system	an app is a type of software that allows you to perform specific tasks. Applications for desktop or laptop computers are sometimes called desktop applications, while those for mobile devices are called mobile apps. When you open an application, it runs inside the operating system until you close it.
11.	IBM Cloud	The IBM Cloud platform combines platform as a service (PaaS) with infrastructure as a service (IaaS) to provide an integrated experience. The platform scales and supports both small development teams and organizations, and large enterprise businesses.	Platform as a Service (PaaS) is a cloud computing solution that provides developers with an easy-to-use platform to create their own software, web applications, or other programming projects.

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	MQ5,9,135 gas sensor, WiFi, Arduino processor chips.	Internet of Things.
2.	Security Implementations	MQ5,9,135 gas sensor, Alerting device which consists of siren and LED light.	Internet of Things.
3.	Scalable Architecture	Detecting room temperature, if temperature is above specified temperature, it will alert workers.	Python
4.	Availability	Use of WiFi IP address	Wireless Network
5.	Performance	Performance is efficient	Internet of Things