Design and Implementation of Air Quality Monitoring System using Blynk App

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Abstract: Today, air pollution is one of the significant environmental issues that causes adverse health effects in human bodies such as cancer, cardiologic disease and, high mortality rate resulting in damaging effects on the welfare of humans, animals and other living organisms of the environment. According to the recent research survey from WHO, India was the third most polluted country globally in 2020. Every year, about 2.5 million Indians, almost 30%, die from air pollution caused by burning fossil fuels. Given this, our group has developed a project based on an air quality monitoring system used to detect the various parameters of air that are perilous to human beings and society. An IoT-based system was developed that detected the various parameters with the help of different sensors such as PM2.5, DHT11, LDR sensor, MQ-135, and the rain sensor. These sensors continuously sense the air quality index, rain, humidity, temperature, and smoke, finally providing all the information on the smart phone. In addition, it also helps us to fetch the data from any location where the device is installed. In this project, the Blynk app is implemented, a platform with IOS and android app to dominate and equate with Arduino Uno using ESP8266wifi controller. This app continuously monitors the value, throws an alert to the user with the help of a buzzer whenever the threshold value is exceeded.

Keywords - Arduino Uno, Blynk App, ESP8266, IoT, Sensors.

1. Introduction

Air is a life sustaining energy for humans, animals and, other living beings. So if the air is hazardous, it will affect all the living organisms. It is clear that air is a crucial part of life to beformed. But in the last few decades, the air is so cruelly contaminated that this problem has become a major concern globally. One of the major reasons for global warming is carbon dioxide emission into the atmosphere. Air pollution causes huge damage to human welfare, theatmosphere, and the biological society. It can lead to unhealthy concentrations, both indoors and outdoors. Its impact may range from elevated disease risk to heightened temperature. Harmful gases like nitrogen oxides, carbon monoxides, sulphur oxides, etc. are liberated into the environment through the ignition of fossil fuels. There are various conventional techniquesadopted for monitoring emissions. This paper leads you to take an approach to monitor important natural parameters, with the help of sensor indication. The project aims to design a cost-effective solution that will provide detection of polluted gases which are highly hazardousand alert the user using audible alarm and send a notification to the user on the application. InAndroid Application, the measured air quality level is also displayed with Humidity, Temp., Rain which helps the user get updates about the current air quality and atmosphere.

Low oxygen, high carbon monoxide and carbon dioxide fixations can commonly exist inside a vehicle lodge. Such helpless air quality might cause laziness, exhaustion, hindrance of judgment, and helpless coordination to vehicle tenants. Additionally, numerous passing's are brought about by engine vehicle fumes gas suicides from carbon monoxide harming [1]. The persistent observing of oxygen and carbon monoxide gives added vehicle wellbeing as cautions could be set off when risky gas focuses are reached, forestalling driver weariness, sleepiness, and fumes gas suicides. CO centralizations of 30 ppm and oxygen levels lower than 19.5% were capable while driving [2]. Air quality observing System (AQMS) for checking the groupings of air poison gases has been created in consistence with IEEE1451.2 standard [3]. An organization for indoor and outside air quality is discussed [4]. Every hub is introduced in an alternate room and incorporates tin dioxide sensor clusters associated with a securing and control framework. A structure for small size air quality observing using sensors

is shown [5]. The experimental outcome shows that it is attainable to take on sensor networks for small size observing.

2. Methodology

The technique for this undertaking contains the stream graph and outline, that clarifies the philosophy taken during the venture. Other than that, this furthermore presents programming improvement and equipment advancement. Planning the framework finishes up naturally with the adequate part. Regardless, the component has been recorded, the subsequent stage is to make up all components. This can have practical experience in coding abuse IDE programming framework. The program will end and finish once the framework had been coordinated.

Overview

The Arduino Uno is the fundamental piece of the framework that is associated with all sensors. Every one of the sensors of the framework are unit associated with the simple contribution of the Arduino microcontroller. The Arduino Uno is also associated with the wifi ESP8266 model. All the gathered information on sensors will be shipped off the Blynk application through wireless association.
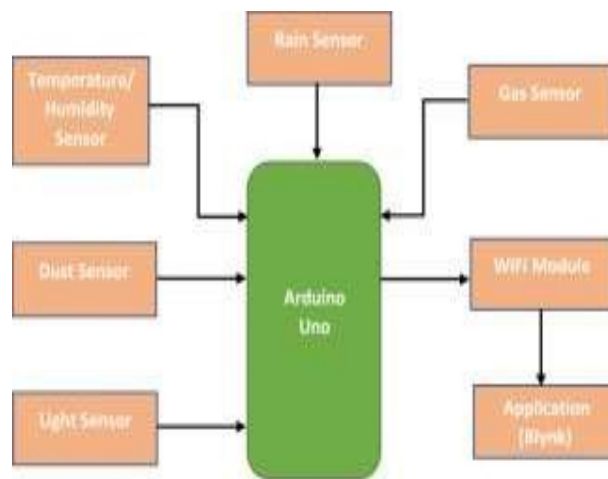
Fig 1 : Block Diagram Of Air Quality Monitoring System Using Blynk App

Software Development

This product is an open-source Arduino Uno Software. The code is composed on the stage Arduino IDE (Integrated Development Environment) rendition 1.8.15 and it'll be moved to an Arduino board. The Arduino board is ceaselessly consistently changing to adjust to new needs and difficulties and it is given direct 8-cycle sheets to stock for IoT applications, wearable, 3D printing, and installed setting. Blynk might be a stage with IOS and Android applications to oversee Arduino, Raspberry Pi, and the others over the wifi.
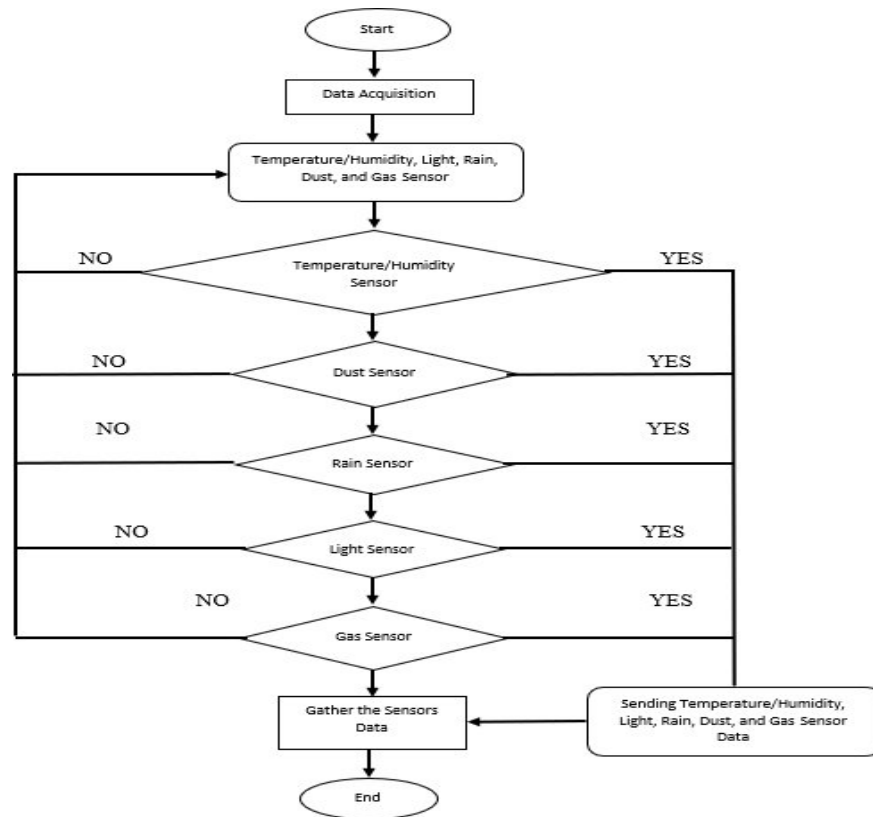
Fig 2:- Flow chart of Air Quality Monitoring System process

Harware Implementaion

Various hardware components are used for implementing the project. Such as- ESP8266WiFi, Temperature & Humidity, Sensor (DHT 11), Rain Sensor, PM2.5 Air Quality Sensor (SDS 011), Light Sensor, MQ135 Sensor, 2x16 LCD Device.
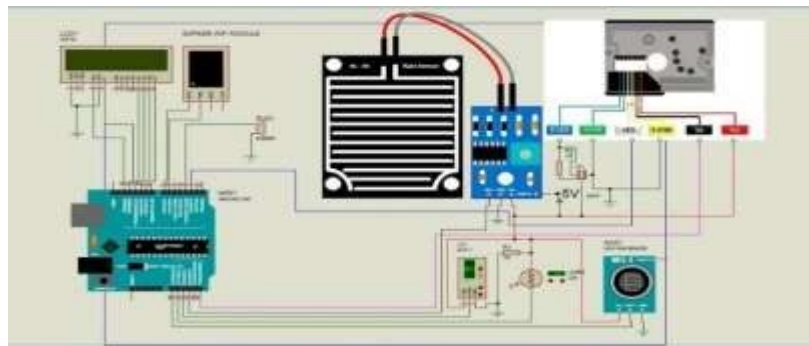

Fig 3:- Circuit diagram of Air Quality Monitoring System using Blynk application
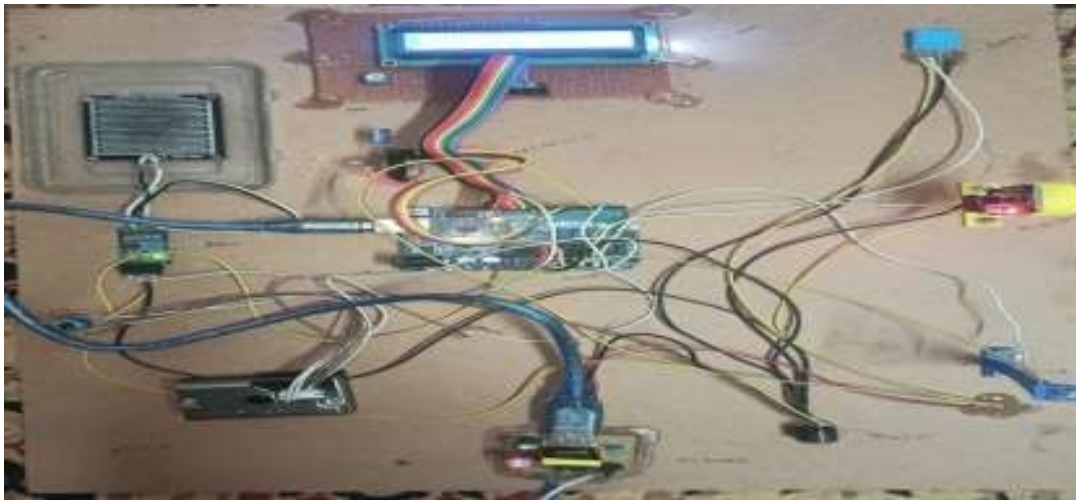
Fig 4:- Project implementation with connection

3. Result Analysis

All the hardware equipment is being assembled and analyzed to ensure that the performance ofthe systems is stable and in the desired condition. Supported the result and data analysis of thesystem will facilitate users to analyze the performance of the sensors. Thus, it ready to monitorthe different parameters of air within the out of doors environment. In this result, the Blynk application and LCDs help us to gather all the information and continuously monitoring the different environmental parameters, and delivering the resulted output where the system is installed. All the sensors are displaying adequate values in the Blynk app. Whenever the threshold values of any parameter such as temperature, Humidity, Acid rain, air quality index,Smoke exceeds, it will throw an alert to the user by alarming using a buzzer and a notificationwill be sent to their mobile app.

Fig 5 :- Project Implementation using Blynk application

4. Conclusion

The projected IoT-based air quality estimating framework utilizing Blynk application is a decent gadget to quantify the air quality outside and inside. This gadget might be useful to quantify the quantity of gases in a very thick region like business sectors, transport stands, rail line stations, and so on from the controller region. After every one of the information has been accumulated, investigated, and handled, The advocates come to the succeeding end result, that this exploration presumes that, "Air Quality Monitoring System utilizing Blynk App" will help a ton in estimating, forestalling any peril brought about by awful air quality. It is valuable as a piece of the security of people and society. Assuming information is put away, we can involve the data for additional trials that can close a major outcome. IoT can improve the man-made brainpower inside the world, that the framework might be utilized in programmed frameworks in manufacturing plants and businesses. Here abuse of the MQ135 gas finder offers the feeling of different styles of hazardous gas and Arduino is that the core of this project which controls the entire strategy. Sensors are sent in the Project model to continually screen the Temperature, Humidity, Carbon Monoxide, Smoke, LPG, PM2.5, Acidic Rain levels in the climate. Wi-Fi module interfaces the entire strategy to Blynk application and fluid gem show is utilized for the visual Output.

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