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Drainage level alerting system using IoT

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Abstract- *We all know, in today's developing era safety of human beings plays a most vital role. The paper is going to mainly focus on safety of human beings. Everyone is society mainly focus on the cleanliness of dustbins at their home, but in our project we are going to focus on one of the reason that contributes to human diseases that is the cleanliness of drainage. Most of the drainage and unused wells are forming toxic gases. The main objective of this work is designing microcontroller based toxic gas detecting, alerting system and gas purification. The hazardous gases like H2S, CO and Methane will be sensed and displayed each and every second in the LCD display. If the level of the gases goes beyond the normal level then the notification will be send to the authorized person of that area via GSM. Addition to that we are going to build a twitter account linked to that module by which society will also be aware.*

***Key Words*: Sensors, NodeMCU ESP32, IOT, Arduino IDE, Blynk**

1. INTRODUCTION

In today's era we human beings fail to take care of the surrounding in which we live. In the increasing development of technology, we have polluted the environment thereby reducing the quality of air. One of the systems that is responsible for many diseases is the improper drainage system. Everyone is looking only for the cleanliness of the dustbins and the area surrounding to their home, but no one is aware of one of the major reason that is responsible for many diseases.. If the drainage maintenance is not proper the pure water gets contaminate with drainage water and infectious diseases may get spread. The drainage gets blocked during rainy season, it will create problem for routine life. The traffic may get jammed, the environment becomes dirty, and totally it upsets the public. Suppose if there should be a facility which would be there in Municipal Corporation that the officials come to know immediately after blocking of drainage in which area and the exact place where it is blocked.. The hazardous gases like Hydrogen Sulfide, Carbon monoxide and Methane were considered here. If these hazardous gases level exceeds normal level that is H2S>1000ppm or Methane>10000ppm then an alarm is generated immediately, and a SMS is sent to the authorized user as an alert message, which leads to faster diffusion of emergency situation. A drainage monitoring system will not only help in maintaining the proper health and safety of the city but also in reducing the work of government personnel. Flow sensors are interfaced with Arduino in order to make the system smart. When the respective sensors reach the threshold level, the indication of that respective value and sensor is being sent to the microcontroller.

So we have proposed an IOT based system that acts as an electronic nose which can be used for the purpose of characterizing sewage odors and also monitoring and alerting for drainage systems, garbage and wells and thus maintaining human safety further.

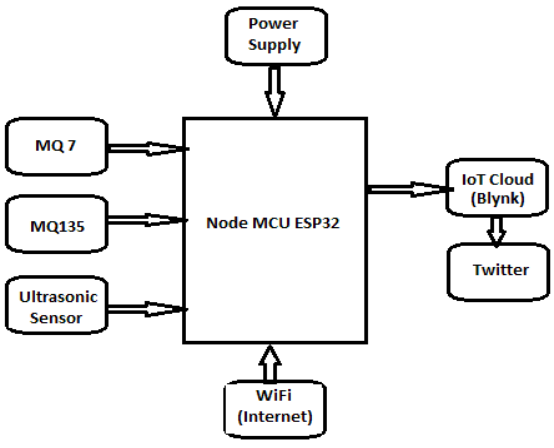
1.1 Objective of study

We know that drainage can be one of the reasons that can harm the life of human being. To have a continuous eye on the drainage or to check its level is not possible. There are many drainage even if we consider a single city. For that purpose, we have proposed a system, which will sense different parameters and will give us a notification of the present state of drainage. This will reduce the time and cost. With the help of this system human can do their own work and they need not to check the condition of drainage continuously, whenever the amount of harmful gases will be in excess the system will automatically send a notification to the nearby corporation to clean that drainage.

2. DESIGINING OF THE SYSTEM

The designing of system contains the components such as MQ7,MQ135, ultrasonic sensor, Node MCU ESP32,Blynk software and power supply.

2.1 Block diagram



2.2 Working

The maintenance of drainage system time to time is one of the difficult things. So for that purpose we have proposed an system that is going to alert us time to time about the drainage and its maintance. For that we are going to use various sensors in our system that are going sense different parameters and tell us about the present state of any particular drainage. Sensor MQ-7 is going to sense the amount of CO2 in atmosphere, whereas the sensor MQ-135 will sense the NO2, NOx and smoke present in atmosphere. MQ135 gas sensor has high sensitivity to Ammonia, Sulfide and Benze steam, also sensitive to smoke and other harmful gases Node MCU is the main heart of the system. This is going to act as the main controller of the system. The Node MCU is going to control all the action performed by the system. NodeMCU is implemented in C. Ultrasonic sensor is used to predict the level of water of canals. After that cloud server helps to analyze where the management need to be improved or what can be done to overcome its hazards. The **platform** is built to take in the massive volumes of data generated by devices, sensors, websites, applications, customers and partners and initiate actions for real-time responses. The system also supports to provide real-time monitoring of concentration of the gases which presents in the air. As this method is automatic the information can be given in time such that the endangering of human lives can be avoided. If drainage system gets blocked and water overflows it can be identified by the sensor system. And that sensor sends information via the transmitter which is located in that area to the corresponding managing station. The message to nearby co-corporation system will be send with the help of this cloud.

One more new thing that we have added to our system is the twitter. With the help of twitter, by twitting about the present condition of any particular area we will also alert the peoples living in that area, as well if the nearby co-corporation is not doing its work on time, that thing also we can tell to the society. Power is given to the system by power supply.

2.3 Component specification

2.3.1MQ-7

This is a simple-to-use Carbon Monoxide (CO) sensor, suitable for sensing CO concentrations in the air. The MQ-7 can detect CO-gas concentrations anywhere from 20 to 2000ppm.

This sensor has a high sensitivity and fast response time. The sensor's output is an analog resistance. The drive circuit is very simple; all you need to do is power the heater coil with 5V, add a load resistance, and connect the output to an ADC.

2.3.2MQ-135

Air quality sensor for detecting a wide range of gases, including NH3, NOx, alcohol, benzene, smoke and CO2. Ideal for use in office or factory. MQ135 gas sensor has high sensitivity to Ammonia, Sulfide and Benze steam, also sensitive to smoke and other harmful gases. It is with low cost and particularly suitable for Air quality monitoring application. The operating voltage of this gas sensor is from 2.5V to 5.0V. The MQ-135 gas sensor has a lower conductivity to clean the air as a gas sensing material. MQ-135 gas sensor can be implementation to detect the smoke, benzene, steam and other harmful gases.

2.3.3Ultrasonic Sensor

This sensor is a very popular sensor used in many applications where measuring distance or sensing objects are required. The module has two eyes like projects in the front which forms the Ultrasonic transmitter and Receiver. The sensor works with the simple high school formula that

Distance = Speed ⁄ Time

The Ultrasonic transmitter transmits an ultrasonic wave, this wave travels in air and when it gets objected by any material it gets reected back toward the sensor this reected wave is observed by the Ultrasonic receiver module.

2.3.4Node MCU-32 ESP32

NodeMCU is an open source Lua based firmware for the ESP32 and ESP8266 Wi-Fi SOC from Espressif and uses an on-module flash-based SPIFFS file system. NodeMCU is implemented in C and is layered on the Espress if ESP-IDF. NodeMCU ESP32 is one of the most popular ESP32 development boards for IOT developers and makers. Designed to fit breadboard in compact from factor.ESP32 is a single 2.4 GHz Wi-Fi-and-Bluetooth combo chip designed with the TSMC ultra-low-power 40 nm technology. It is designed to achieve the best power and RF performance, showing robustness, versatility and reliability in a wide variety of applications and power scenarios.

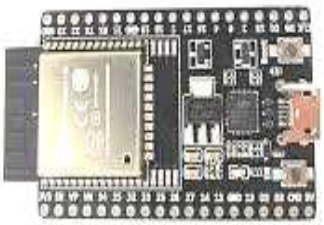


Fig- 1: NodeMCU-32 ESP32

2.3.5 Blynk

Blynk is a Platform with IOS and Android apps to control Arduino, Raspberry Pi and the likes over the Internet. It's a digital dashboard where you can build a graphic interface for your project by simply dragging and dropping widgets. It is a new platform that allows you to quickly build interfaces for controlling and monitoring your hardware projects from your iOS and Android device. Blynk Server is an Open-Source Netty based Java server, responsible for forwarding messages between Blynk mobile applications and various microcontroller boards and SBCs (i.e. Arduino, Raspberry Pi. Etc.

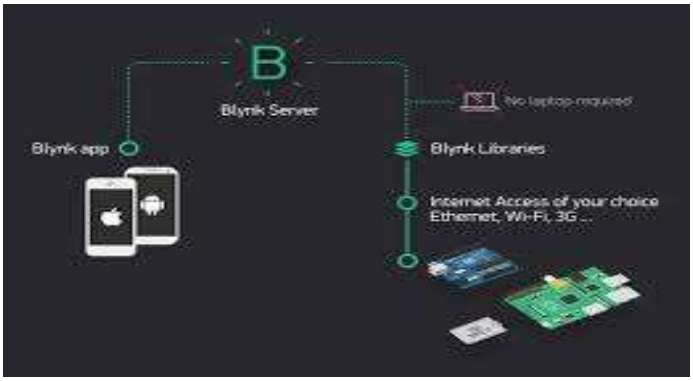


Fig-10: Blynk app

3. FLOWCHART

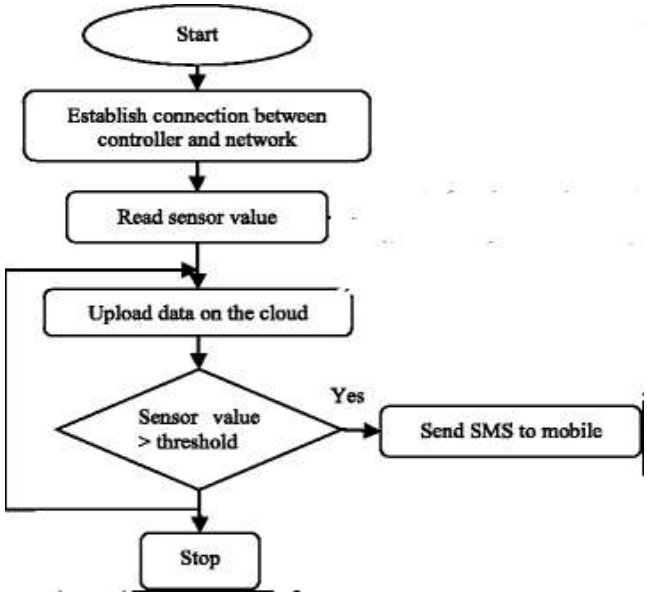


Fig- 1: flowchart

3.1 Working of flowchart

The above figure shows the flow chart of the working of the proposed system. Firstly when we supply the power to our system or to the circuit, it will start working. After that the various sensors that we have used will start its working. Suppose that the sensor MQ-7, that is used to detect the amount of CO2 present, as soon as the amount of CO2 present in the atmosphere of the drainage when we have fitted our circuitry increased the sensor and our controller that is node MCU will established a connection between them. The sensor will read the value of CO2 present and will display the value on LCD. Similarly MQ135 gas sensor has high sensitivity to Ammonia, Sulfide and Benze steam, also sensitive to smoke and other harmful gases.

After that with help of wifi module this same data will be uploaded to the cloud server. The platform is built to take in the massive volumes of data generated by devices, sensors, websites, applications, customers and partners and initiate actions for real-time responses. If this uploaded value increases beyond the limit then a message or notification will be send to the mobile phone. If the value doesn't exist the limit then again it will go back to the cloud content. As soon the value exit beyond the limit the nearby corporation will the message of alertness and now this will be the time to take action and clean that drainage. Here it will stop the flow.

4. CONCLUSION

Sensor networks are considered as the key enablers for the IoT paradigm. This paper addresses all about smart and real-time Drainage monitoring system through IOT applications for metropolitan cities. It explains varied applications like underground maintaining and monitoring in real time. By using various sensors such as gas detection, water level as well as blockage detection we can monitor the real time scenario of drainage system for detecting the problems in drainage system. By doing this we can able to take particular action on the problems as we will receive the early alerts of blockage as well as increase. This paper can be used to design the smart and real time drainage system for monitoring purpose.

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