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IOT Based Smart Safety Monitoring System for Sewage

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ABSTRACT: Most of the cities adopted the underground drainage system and it's the duty of Municipal Corporation to maintain cleanliness, healthy and safety of cities. If the drainage system is not properly managed then pure water gets contaminate with drainage water and infectious diseases may getsread. Drainage cleaning people are not aware of risk by sudden attack of poisonous gas since the gases are odorless if exposed for long time which may cause serious health problems. Due to the lack of using proper gas leakage detection system, a number of dangerous accidents occurred during the last few decades.

To overcome all these problems effective monitoring system is needed in the drainage channels. The detected system is proposed with gas sensors like Carbon Monoxide, Hydrogen sulphide sensors and Methane, one Heart Beat sensor used to Calculate the pulse rate of Human. Carbon Monoxide, Hydrogen sulphide, Methane gases are highly toxic to human hence the proposed system will gives alert through the LCD Display after reaching the threshold level of each gas sensors then people gets alerts Heart Beat sensor will calculate the range of the Pulse rate then output at the abnormal range will give alert through notification through an IOT

KEYWORDS: Carbon Monoxide sensor, Hydrogen sulphide sensor, Methane gas sensor, IOT, Heart Beat sensor, LCD, Drainage Channel, Thershold Limit.

I. INTRODUCTION

Sanitation workers continue to lose their lives due to the inhalation of toxic gases inside the drainage. Also, leaks and bursts are unavoidable aspects that account for significant loss if left undetected for long period. This proves inadequacy of proper drainage monitoring system. It is very important that drainage system should work in a proper manner to keep the city clean, safe and healthy. So different kind of work has been done to detect, maintain and manage this drainage system.

The objective of this system is to obtain an effective low-cost and flexible solution for checking water level and sensing the toxicity of gas and updating it in real time through IoT. In this system, level of drainage is continuously monitored. It also senses the toxicity of gas, as well as sending automatic SMS, if the toxicity of the gas measured is above an expected normal range. Since the output of level and gas sensors are interfaced with microcontroller, it checks the threshold level and sends an alert message through GSM and monitored using IoT.

The main advantage of this system is to avoid deaths due to exposure of harmful sewage gas. In this paper, level sensor is used to detect the water level in the drainage. It also displays the level. It does not detect the level continuously. If the water level in drainage exceeds above the normal range, it causes leakage and affects the environment. Sensor is used to detect the clog. When the drain is clogged, water will have a difficult time passing through the time, causing drainage to be slower than usual. Often times, more severe clogs will even cause water to travel back up to drain and bubble up. In the existing method, sensor is used to detect the flow rate.

It also displays the flowrate. As a result of rain, flow rates are high than the daily averages. To overcome the above drawbacks, the proposed system uses level and gas sensor with WEMOS D1. In this method, a sensor node containing

two gas sensors and a level sensor that transfers the appropriate sensed information about the harmful gases and water levels of drainage system. The WEMOS D1 checks for the specific conditions and it sends automatic SMS through GSM and update it in real time through IoT.

II. PROBLEM DEFINITION

Sudden attack of poisonous gas since the gases are odorless if. exposed for long time which may cause serious health problems. Due to the lack of using proper gas leakage. detection system, a number of dangerous accidents occurred.

III. HARDWARE IMPLEMENTATION

A. Gas Sensor

Gas sensors (also known as gas detectors) are electronic devices that detect and identify different types of gasses. They are commonly used to detect toxic or explosive gasses and measure gas concentration. Gas sensors are employed in factories and manufacturing facilities to identify gas leaks, and to detect smoke and carbon monoxide in homes. Gas sensors vary widely in size (portable and fixed), range, and sensing ability. They are often part of a larger embedded system, such as hazmat and security systems, and they are normally connected to an audible alarm or interface. Because gas sensors are constantly interacting with air and other gasses, they have to be calibrated more often than many other types of sensors.



Fig -1: Gas Sensor

B. DHT11 Temperature Sensor

The DHT11 is a basic, ultra low-cost digital temperature and humidity sensor. It uses a capacitive humidity sensor and a thermistor to measure the surrounding air, and spits out a digital signal on the data pin (no analog input pins needed). It is fairly simple to use, but requires careful timing to grab data. The DHT11 calculates relative humidity by measuring the electrical resistance between two electrodes. The humidity sensing component of the DHT11 is a moisture holding substrate with the electrodes applied to the surface.

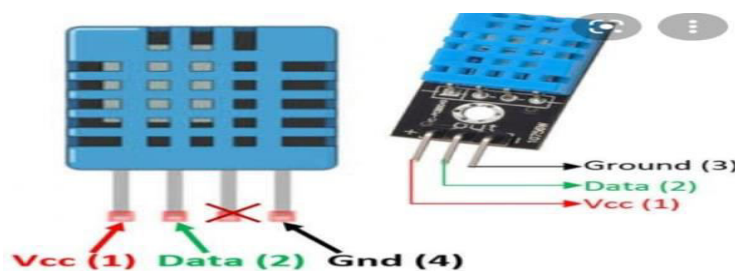


Fig -2: Temperature Sensor

C. Heart Beat Sensor

Heart Beat Sensor is designed to give digital output of heart beat when a finger is placed on it. When the heart beat detector is working, the beat LED flashes in unison with each heart beat. This digital output can be connected to microcontroller directly to measure the Beats Per Minute (BPM) rate. It works on the principle of light modulation by blood flow through finger at each pulse.

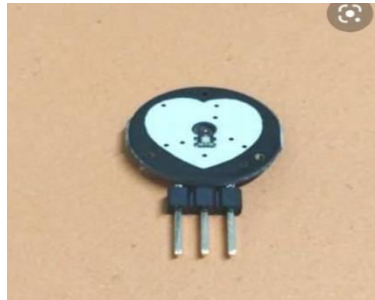
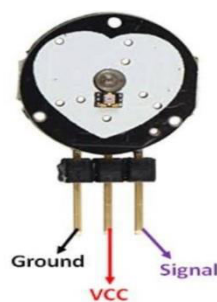


Fig -3: Heart Beat Sensor

D. Arduino Uno

Arduino board is being used here. It also referred as brain which means act as a main part in the project. It is connected with GSM which sends message to the user. Also an application 'Ubidots' being implied here which used as conversion. Wifi modules.

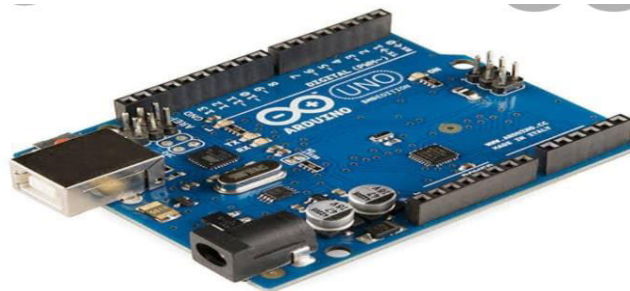


Fig- 4.Arduino Uno

E. ESP8266 -WIFI Module

The ESP8266 is a very user friendly and low cost device to provide internet connectivity to your projects. The module can work both as a Accesspoint (can create hotspot) and as a station (can connect to Wi-Fi), hence it can easily fetch data and upload it to the internet making Internet ofThings as easy as possible. It can also fetch data from internet using API's hence your project could access any information that is available in the internet, thus making it smarter. Another exciting feature of this module is that it can be programmed using the Arduino IDE more user Friendly

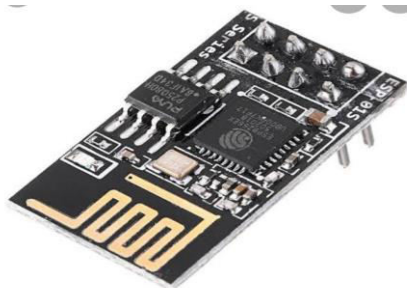


Fig-5 ESP8266 WIFI module

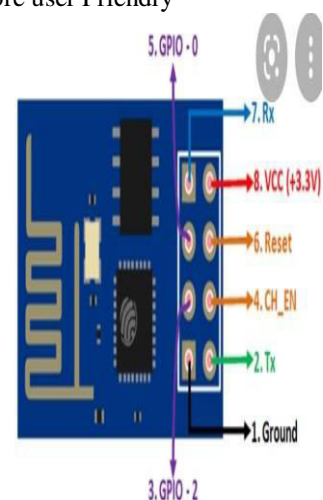


Fig-6 WIFI module Pinout

IV. SOFTWARE IMPLEMENTATION

Arduino IDE

Arduino IDE is an open source software that is mainly used for writing and compiling the code into the Arduino Module. It is an official Arduino software, making code compilation too easy that even a common person with no prior technical knowledge can get their feet wet with the learning process. It is easily available for operating systems like MAC, Windows, Linux and runs on the Java Platform that comes with inbuilt functions and commands that play a vital role for debugging, editing and compiling the code in the environment. A range of Arduino modules available including Arduino Uno, Arduino Mega, Arduino Leonardo, Arduino Micro and many more.

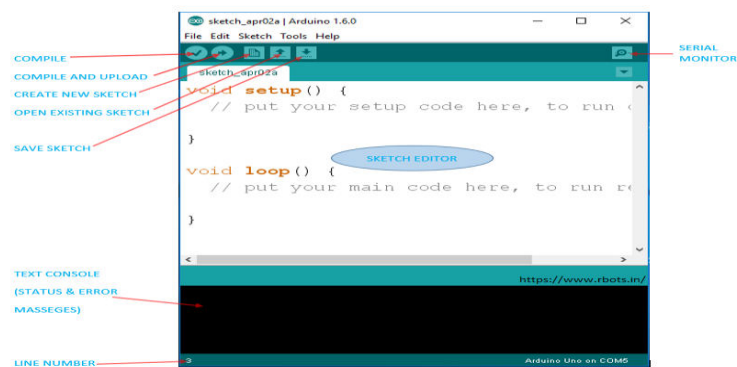


Fig -7 Arduino IDE

IOT(Internet Of Thing)

The internet of things, or IoT, is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers (UIDs) and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction.

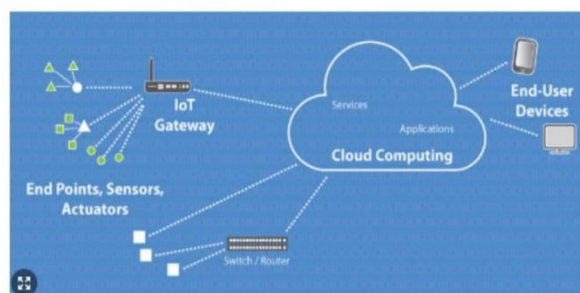


Fig-8 . Internet of Things General Block Diagram

V. CONCLUSION

Internet of Things has gained its wide popularity in recent days due to its various streams of applications which has paved way for smooth, safe and easier mode of living style for human beings. Though, several techniques are existing for the same, yet sewage cleaning is one major concern and a challenge always. This paper thus put forth a new proposed system which is microcontroller based application of sewage workers health monitoring systems using IOT.

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