IOT Based Underground Drainage and Manhole Monitoring System for Cities

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ABSTRACT

The Internet of Things (IoT) consists of real life objects, communication devices attached to sensor networks in order to provide communication and automated actions between real world and information world.IoT came into existence because, without human interaction computers were able to access data from objects and devices, but it was aimed at, to overcome the limiting factors of human entered data, and to achieve cost, accuracy and generality factors. Sensor Network is a key enabler for IoT paradigm. This paper represents the implementation and design function of an Underground Drainage and Manhole Monitoring System (UDMS) for IoT applications. The vital considerations of this design are low cost, low maintenance, fast deployment, and high number of sensors, long life-time and high quality of service. The proposed model provides a system of monitoring the water level and atmospheric temperature and pressure inside a manhole and to check whether a manhole lid is open. It also monitors underground installed electric power lines. In real time, UDMS can remotely monitor current states of the manholes.

Keywords: IOT, Manhole Monitoring, Underground Drainage and Manhole Monitoring System

1 INTRODUCTION

Many cities in India have an underground drainage system and Municipal Corporation manages the sewage system for clean and healthy climate. The water in the drainage system is sometimes mixed with pure water, due to poor maintenance. The drainage system can spread to the atmosphere and diseases that caused by pathogens. Drainage is disrupted over various seasons due to change in climate, and the environment is volatile and disturbs people and disturbs their daily lives. To solve all the problems of the drainage system and to inform the municipal corporation by sending Blynk notification of the state of the drainage system, so that the officials can take the necessary steps to repair drainage system. The gas itself formed inside the bio-waste drainage system was also detected using a gas sensor to prevent explosion by the pressure inside the drainage system. So our aim of this idea is to track the drainage system using the sensor. When the sewage system is blocked or wateroverflows or the drainage lid is removed, the drainage is monitored using sensor and sensed information is transmitted via Blynk to the nearby municipal corporation official using integrated Wi-Fi, and the water overflow and gas value is displayed live in the cloud for later analysis. And the particular drainage's GPS location is also sent via Blynk Server.

2 Objective

- The main objective of this project is to keep the city clean, safety and healthy.
- If the drainage maintenance is not proper it will create problem for routine life, traffic may get jammed infectious disease may get spread and there is a chance of occurrence of accidents
- The vital consideration of this design are low cost, low maintenance, fast development, and high number ofsensors, long life time and high quality of services.

3 Motivation

If the drainage maintenance is not proper the pure water gets contaminate with drainage water and infection diseases may get spread. It will create problem for routine life. The traffic may get jammed, the environment becomes dirty and totally it upsets the public. If the manhole lid is not closed properly there is a chance of occurrence of accidents and also people or animals may get fall into the drainage. This problems is very interesting suppose imagine if we should have a remote monitoring system to monitor the internal states of the manhole and then we can solve this problem efficiently. These problems occur due to environmental changes like rainy season.

4 Proposed Work

ATmega328P Microcontroller receives live data collected from different sensors. The different sensors are Water level detection sensor and Gas sensors. The water level detection sensor and gas detection sensor sense the current states of the manholes. Sensors send sensed data to microcontroller. The output obtained from controller is sent to mobile device or computer using Blynk server. Blynk server is responsible for all interactions between smartphones and equipment.

5 System Architecture
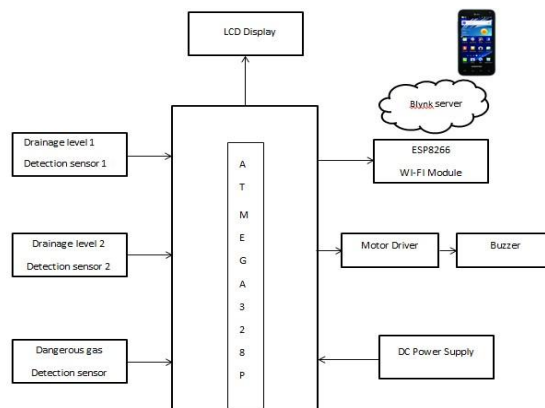
6 Circuit Diagram
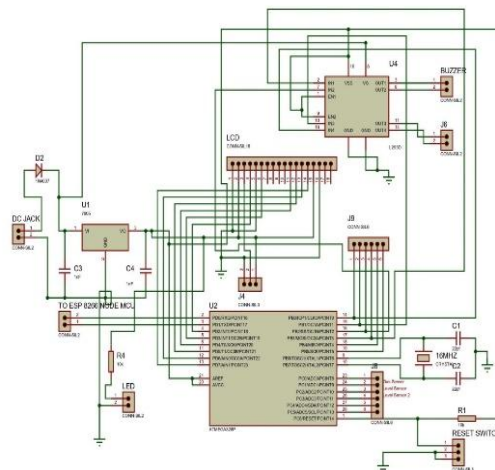
Circuit Diagram Description
- In above the circuit diagram of IoT based underground drainage and manhole monitoring system for cities.
- In that we connect gas detection sensor, water level1 detection sensor1 and water level2 detection sensor2 to ATmega328p microcontroller.
- The microcontroller is connect to the ESP8266 wifi module.
- We get output on blynk application by blynk server.

7 ARDUINO IDE Software
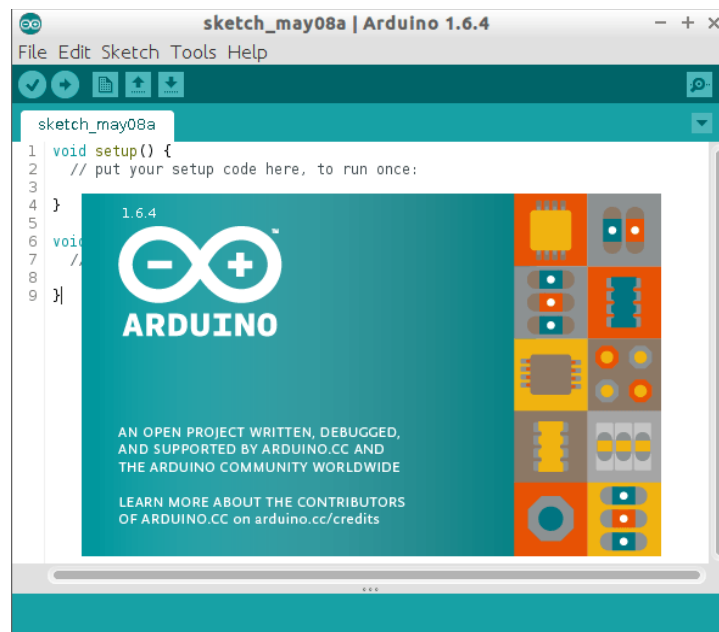
8 Software Module

The Arduino Integrated Development Environment (IDE) is a cross-platform application (for Windows, macOS, Linux) that is written in functions from C and C++. It is used to write and upload programs to Arduino compatible boards, but also, with the help of third-party cores, other vendor development boards.

The source code for the IDE is released under the GNU General Public License, version 2. The Arduino IDE supports the languages C and C++ using special rules of code structuring. The Arduino IDE supplies a software library fromthe Wiring project, which provides many common input and output procedures. User-written code only requires two basic functions, for starting the sketch and the main program loop, thatare compiled and linked with a programstub main() into an executable cyclicexecutive program with the GNU toolchain, also included with the IDE distribution. The Arduino IDE employs the program avrdude to convert the executable code into a text file in hexadecimal encoding that is loaded into the Arduino board by a loader program in the board's firmware. By default, avrdude is used as the uploading tool to flash the user code onto official Arduino boards.
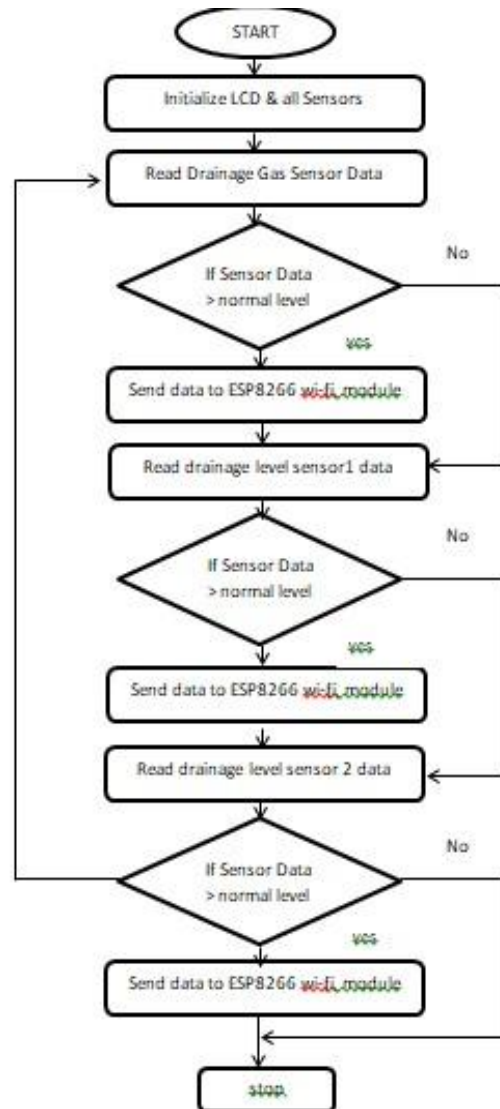
Figure Of Flowchart

Result

- When the system get started by taking power supply externally all the sensor will start working
- The gas sensor sense the harmful gases and report to microcontroller. The water level detection sensor check the flow of water and send value to microcontroller by using ATmega328P microcontroller and ESP 8266 Wi-Fi module output is shown on blynk application.

9 Conclusion

Our project helps to reduce the problem of drainage system with the help of sensors like water level detection sensor and gas sensor our mechanism helps to notify the connected network, when the harmful gases are detected to gas sensor and water level is detected by water level detection sensor with help of ATmega328P microcontroller and ESP8266 Wi- Fi module which is connected with the Blynk server. by this project the underground drainage system can be easily organized.

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