JSS MAHAVIDYAPEETHA

JSS SCIENCE AND TECHNOLOGY UNIVERSITY

SRI JAYACHAMARAJENDRA COLLEGE OF ENGINEERING
CONSTITUENT COLLEGE OF JSS SCIENCE AND TECHNOLOGY UNIVERSITY
JSS TECHNICAL INSTITUTIONS CAMPUS
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Manhole Monitoring System

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INTRODUCTION

Most of the cities adopted the Underground drainage system and it is the duty of Municipal Corporation to maintain cleanliness of the cities. If the Drainage maintenance is not proper or the drainage gets blocked, then it will create many problems. Problems such as the pure water gets contaminated with drainage water and infectious diseases may get spread, traffic jam may happen, the environment becomes dirty. This Manhole maintenance by human control is very difficult because environment is poor, and it is difficult to go inside the manhole for inspecting states of the manholes. 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, and it also informs if the manhole lid is open. The above facilities can be provided by monitoring manholes using sensors. These sensors send information via transmitter which is located in that area to the corresponding managing station. Also, this model identifies the poisonous gas in the manhole that effect the Manhole Cleaner.

The sewage system has the instability and uncertainty with the features of multi variable, nonlinear, time variant and random treatment process. The objective of this model is to obtain a cost effective, economical and flexible solution for detection of clog and stink or bad odor gases. Two ultrasonic sensors are used to detect the water level and if the difference between the water level is greater than the threshold value, the alert message is transmitted to the person in charge. Output of the sensors is interfaced with the microcontroller i.e., Arduino. It checks the threshold level which is already set and sends an alert message through GSM to the person in charge and this is monitored using IoT.

The best outcome of this system is that it can avoid deaths of sewage workers due to the exposure of harmful gases

PROBLEM STATEMENT

Today's drainage system is not computerized, So whenever there is blockage it is difficult to figure out exact location of the blockage. Also, we don't get early alerts of the blockage. Hence detection and repairing of the blockage becomes so time consuming. It becomes very inconvenient to handle the situation when pipes are blocked completely. Due to such failures of drainage line people face a lot of problems

OBJECTIVE

1. The main objective of this project is to keep the city clean, safety and healthy.

2. If the drainage maintenance is not proper it will create problem for routine life, traffic may get jammed infectious diseases may get spread and there is a chance of occurrence of accidents.

3. The vital consideration of this design are low cost, low maintenance, fast development, and high number of sensors, long life time and high quality of services

METHODOLOGY

An underground 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. Various types of sensors (flow, level, temperature and gas sensors) are interfaced with microcontroller Node MCU ESP8266 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. Furthermore, Node MCU then sends the signal and location of the manhole to the municipal corporation through GSM and GPS incorporating Wi-Fi communication and the officials could easily locate which manhole is having the problem and could take appropriate steps. Also, Node-MCU updates the live values of all the sensors in the manholes falling under the respective area using IoT.

The traditional Drainage Monitoring System failed to acknowledge in the field of alerting the people about the gas explosion, increase in the water level. Therefore, we have used the IoT technology to make Drainage Monitoring System in a highly automated by using sensor for detecting and sending alert messages to the authorities, storing the data in the cloud and displaying the details in the web browser. Thus, the proposed system helps in predicting the dangerous situations in Drainage system. Further we used Wi-Fi module to establish connection between more than one manhole to a single GSM module to send alert messages

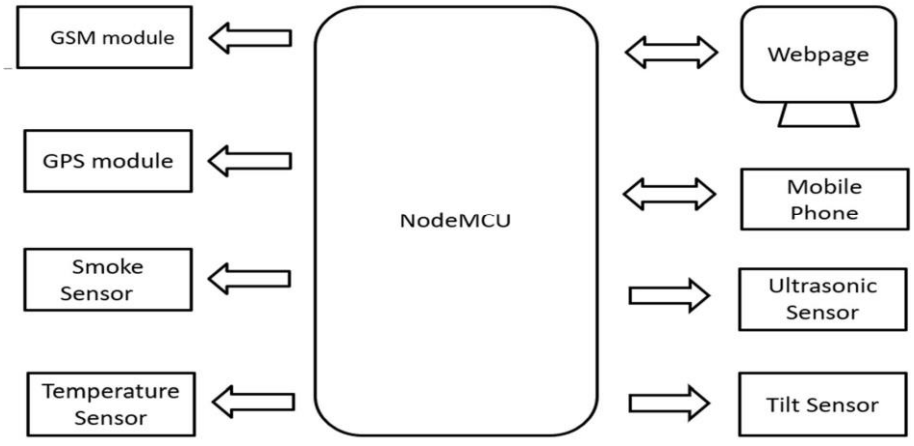

Fig 1 Block Diagram

RESULTS AND CONCLUSION

The data from the sensor is sent to the microcontroller and to the cloud for graphical representation through Wi-Fi. It is also transferred to the registered mobile number via GSM module and Gmail via BLYNK. The data from the Wi-Fi is cloud interacted by BLYNK. This is how the whole system works and can be operated easily by anyone.

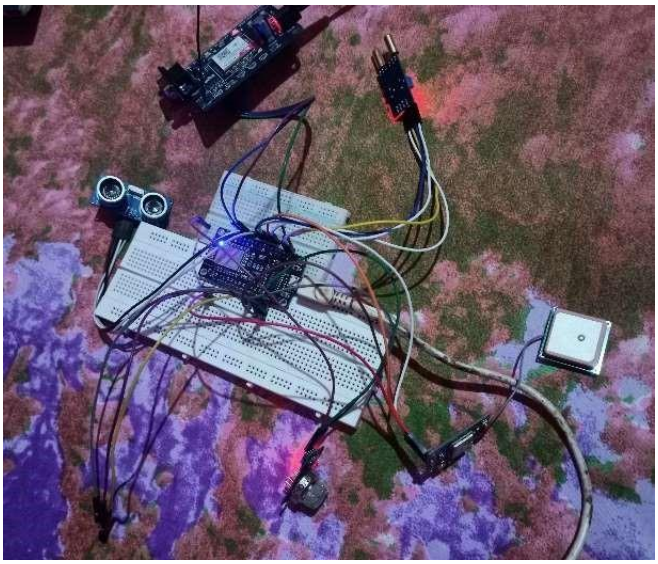

Fig 2: Circuit connection of the proposed solution

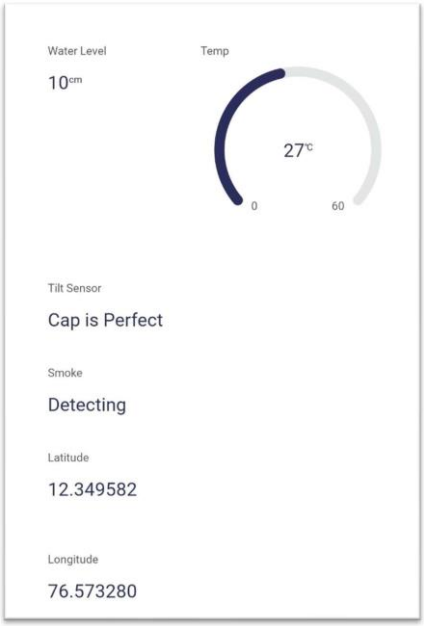

Fig 3 Blynk Mobile application set-up result

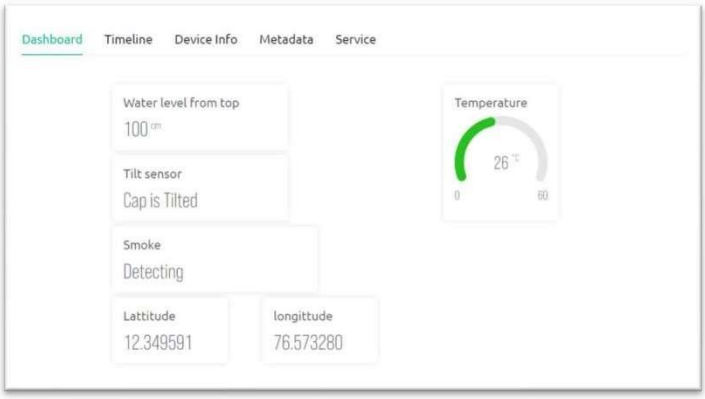

Fig Blynk Web application Set-up Result

Underground monitoring is challenging problem. This project proposes different methods for monitoring and managing underground drainage system. It explains various applications like underground drainage and manhole identification in real time. Various parameters like temperature, toxic gases, flow and level of water are being monitored and updated on the internet using the Internet of Things. This enables the person in-charge to take the necessary actions regarding the same. In this way the unnecessary trips on the manholes are saved and can only be conducted as and when required. Also, real time update on the internet helps in maintaining the regularity in drainage check thus avoid the hazards.

INNOVATION IN THE PROJECT

As we have gone through various research papers we found that either their project is less effective or weren't cost-effective.. They have used more expensive Raspberry Pi or less effective Arduino Uno. In order to incorporate both high efficiency and cost effectiveness we have used Node-MCU which basically has inbuilt Wi-Fi in it. Also all the necessary parameters for monitoring the Manhole could be incorporated in single unit. We are also going to incorporate GPS module in our system to get to know about the location of Manhole and also monitoring multiple manholes under the same Wi-Fi.

SCOPE FOR THE FUTURE WORK

Our project can be implemented used in smart cities like Dholera which is a newly built Smart City by the government, where Wi-Fi is completely blanketed across the entire city. This very beneficial in monitoring manholes in Smart Cities by controlling and fixing the system at the earliest. Water flow sensor can also be implemented in the future so that the blockage detection becomes efficient.