

Case Study of Smart Real Time Drainage Monitoring System

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Abstract: Now a days, drainage is one of the major problem in big cities. system monitoring plays a very important role to keep city clean. The irregular monitoring leads to the blocking of the manhole that imply to the salutation which trigger flood [1]. It requires a professional worker but they will only monitor very finite and maintain low accuracy. Also sometimes due to lack of data the worker may meets to an accident as they have no idea how are going to be the conditions in those manhole. This paper represents the application and design function of drainage monitoring system [1]. The manholes present in the drainage will have a module which is having Arduino as a microcontroller interfaced with gas sensor, flow sensor, NRF. This system will monitor if the blockage is occurred in between two manholes and also it will sense the harmful gases which are dangerous to the human beings, and also a system of monitoring the water level then it will provide that information to the concerned authority from which the particular action will be taken. The system will able to monitor all this thing in real time [1].

Keywords: Smart real-time, Drainage Monitoring, Wireless Sensor Networks (WSN), NRF, Gas Sensor, Blockage, WSN platform.

1. Introduction

Drainage system plays a really important role in big cities. Drainage system helps to secure the life of workers. Drainage conditions should be monitored in order to maintain its proper function. In fact, not all areas have drainage monitoring team or workers. The irregular monitoring leads to the flooding, sudden increase in the water level and harmful gases. Manual monitoring is also incompetent and not secure. It needs a professional person who are only ready to record limited report with low accuracy. The problem arises in such drainage lines can cause serious issue. Problems such as blockage due to waste material, sudden increase within the water level also as various harmful gases are often produces if the right cleaning actions are not taken time to time. Also sometimes due the waste in those drainage lines can produce various gases like methane, carbon monoxide, etc. which are harmful and can cause serious problems and these problems are generally faced by the drainage workers to which death can occurs. Also we don't get early alerts of the blockage or rise in amount of those gases or the increase in water level. Hence detection and repairing of the blockage becomes time consuming and hectic [1].

WSN is a monitoring technology which inhere of node sensors that expanse and integrate use of a wireless network system. Every node consist of microcontroller, NRF transceiver, power supply system and involves one or more sensors. WSN systems have a better level of precision than wired network system with respect to cost.

2. Working principle

A. Sensor node

Sensors will monitor the water levels, blockage in drainage as well as amount of hazardous gases. Based upon the information given by the sensors in drainage system the information along with location ID will send to the Gateway which sends to concerned authority or health department. parameters are monitored

1. Blockage in between two manholes.
2. Detection of hazardous gases.
3. Detection of increase in the water level.

So the sensor that we need is flow sensor for blockage detection and gas detection sensor. Flow sensor is used to determine the water level and blockage between two manholes. If the water level increases while the rainfall and water discharge normal it means occurs salutation within the channel. Similarly, the gas sensor is used to measure the presence of various gases as well as amount of those gases. Various gas sensors are MQ3, MQ6 etc; which are used to sense the gases such as carbon monoxide (CO), sulfur dioxide (SO₂), methane (CH₄).

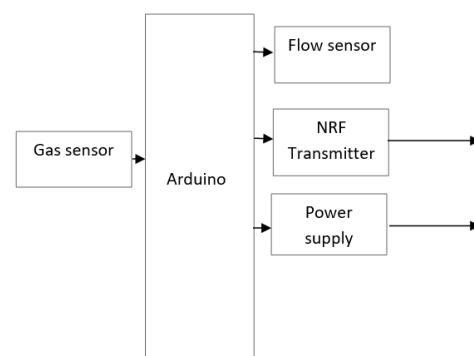


Fig. 1. Block diagram of sensor node

B. Gateway node

The gateway node is the node in which we can connect 5 or 6 sensor node at a time. So that we can get information from all that sensor node. This is the main advantage of a gateway node. Hardware on the node includes Arduino, GSM module, RF (Radio Frequency) modules and supply units. The RF module that used is NRF. This module requires minimal power. Here NRF acts as a receiver. The modules operate within 2.4GHz frequency band. Supply unit can be either battery or photovoltaic cell give the facility to the sensor node. The gateway is sensor node that has additional functions to send data to the server. The communication mode that used in this design is GSM connection. Gateway node receive the data from sensor node and this data then send to the concerned authority by using GSM module used in the gateway. So that particular action will take by the authority.

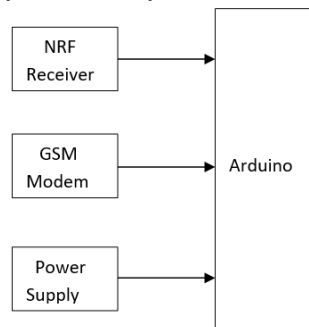


Fig. 2. Block diagram of Gateway node

3. Conclusion

Sensor networks are considered because the key enablers for smart Drainage monitoring system through WSN platform for big and smart cities. By using various sensors such as gas sensor, and flow sensor we can monitor the drainage system by for detecting the problems in drainage system. By doing this we can able to take particular action on the issues as we will receive the early alerts of various gases as well as blockages in the drainage. This system will save the life of workers.

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