Underground Drainage Monitoring System

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Abstract- *This project emphasis of drainage blockage in pipes. Drainage leads to overflow of sewage water on roads and it is been a severe problem due to inappropriate monitoring of the Drainage system. Excess water from the leakages is wastewater. Monitoring the Drainage system manually is not an efficient method and the delay in monitoring may lead to bigger problems.*

The paper discusses a system of Drainage monitoring System which monitors the drainage pipelines using wireless RF Node networks. The nodes will be mounted on predetermined locations to be connected. If drainage blockage or clogging detected the data will be sent to the master node. From the master node, an alert message will be sent to the authority office or the Maintenance employee through GSM. The parameters to be monitored are the level of the water, flow rates of the water. The design will provide continuous monitoring of the drainage conditions and send data accurately.

Keywords- Gateway, Microcontroller (ATMEGA328P), NRF RF module (24L01), Powersupply, Sensors.

I. INTRODUCTION

Drainage water mostly consists of wastewater from household sinks, rainwater and sometimes also wastewater with detergents, etc. Drainage systems are built to prevent these waters from overflowing on the surface. Sewage water flow should be monitored so that the proper functionality of drainage is obtained.

All the areas generally do not have a team for monitoring the drainage. The unreliable monitoring leads to the drainage blocking and clogging due to which the sewage water starts to flow over the surface. Monitoring manually needs a dedicated team of experts to locate the blockage which is a very tedious job. This flaw leads to inconsistent supervision for the troubles in drainage

II. LITERATURE REVIEW

Drainage blockage is an excessive issue of our society. Unutilized water, rainwater, wastewater flowing through the pipes this may hazardous to our health. Drainage monitoring, as well as drainage blockage technique, should not accomplish. Manual monitoring is also an inefficient lot of manual work required with full of dedication. It not possible for monitoring of major drainage blockage with less manual work. A wireless sensor network consists of a sensor unit, a communication unit, and a power unit. Between all the component Sensor nodes important it also includes temporary data storage and power supply. The sensors must be protected that means it does not affect to the performance and energy consumption. It depends on the type of topology that can be used as a star, ring, bus, tree, mesh, and fully connected topology. Design of Layout for sensor nodes and Layout must consider to important thing just like location sensor nodes had been represented drainage conditions, the distance between two sensor nodes.[1].

Generally, overflow can be reduced by sensing of increase in its level. Just simply checking its level and act according to it. Our system provides to the solution of blockages, as it increases its level anyway it can be detected by sensors and act according to it. It also determines the level of blockages and if it's fully blocked then it can send the message to require departments or the centre where the location can be fulfilled.

It also is used in big pipes that can fill with savage water, drainage or west water also the rainwater, etc. if there are any changes in parameter the system takes action according to at it. Flow sensors and level sensors to detect the variations in the flow. Thus to solve these problems, the water flow monitoring system helps in detecting the water level and flow of water. Aim of this paper is used to design the smart as well as real-time drainage system for monitoring and troubleshooting purpose[2]

A drainage monitoring system was developed where the paper discusses about sewage level monitoring using a magnetic-floating sensor. The level of the sewage can be continuously monitored as the maximum and minimum levels are set. As the maximum level is detected the float level sensor responds and a signal is sent to the controller where the commands are given by the controller to the IoT network which will generate alerts to the authority.

The paper suggests about the drainage monitoring system using ARM7. In the case of drainage blockage and water overflow, it will be instinctively sensed by the sensors. As the threshold level will be reached the problem will be alerted and displayed on the LCD screen and the alert is sent through a GSM to the nearest municipal authority from where further action would be taken. The sensors do not give accurate values[3]..

III. PROPOSED SYSTEM

A. BLOCK DIAGRAM

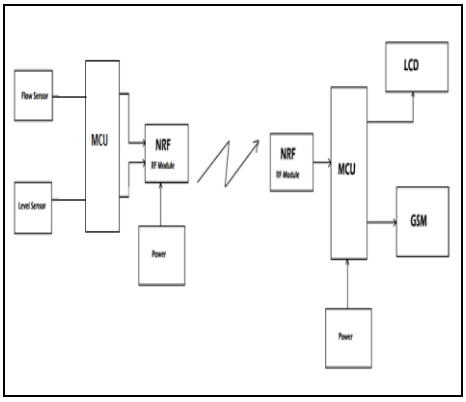

Figure 1-Block diagram Of Drainage Monitoring System.

B. WORKING

The working principle is very straight forward of this system. Let's take a look towards the sensor node, in the sensor node, there are two sensors one is flow sensor and the second one is a level sensor, both sensors connected with NRF24L01 through the Arduino Nano. Data collected by the sensors such as the flow rate of the water through the pipe and the water level inside of the pipe is sent to the monitoring system. Through the NRF24L01 module. The data sent by the sensor node is received at the receiving end (monitoring system) the NRF 24L01 module at the receiving end receives data sent by another nrf24l01 module at the sensor node. This data then feeds to the microcontroller which further processed according to the program. In the monitoring system, an LCD is connected which shows all parameters and status of the pipeline. Also, there is a GSM module for sending the important notification to the authority.

C. LAYOUT OF SENSOR NOD

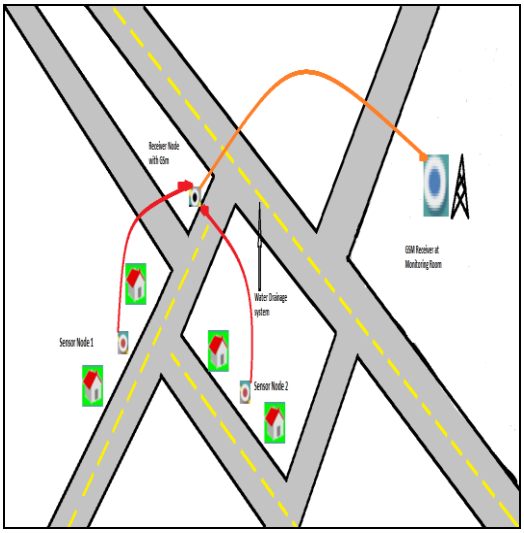

Figure 2- Layout of sensor node deployed in areas.

D. PCB LAYOUT

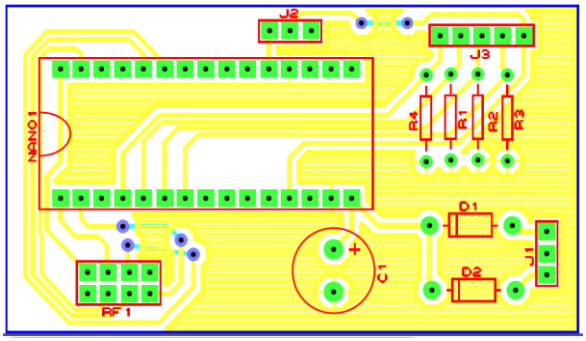

Figure 1- PCB layout of Sensor Node.

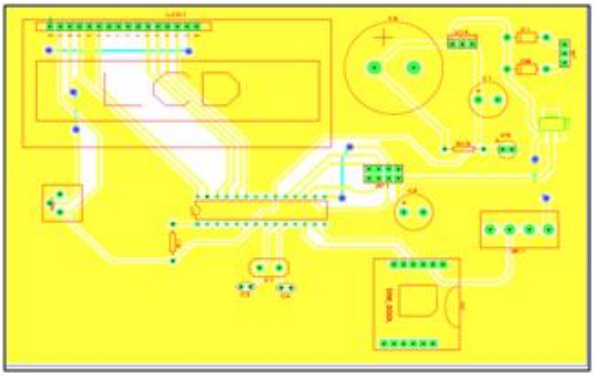

Figure 2- PCB layout of Gateway Node.

IV. FUTURE SCOPE

After having implemented this sewage monitoring system, what remains is the scope for improvements. Firstly, the clog can be removed by increasing the pressure of the sewage water once the development of the clog is identified.

In addition to this system, the Wi-Fi module can be used instead of the Zigbee module for long-distance communication between Nodes.

The data collected can be stored in cloud space using IOT application and alerts can be sent over email Drainage Blockages can be removed by adding a Cleaning bot which will act with the proposed system.

V. CONCLUSION

By this design, the tedious job of manually detecting drainage blockage will be solved. It is a simpler solution which helps the municipal authority to work more smartly in this faster-growing world. A network of sensor nodes can be increased easily as installing is easier and less expensive.

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