

Drainage Monitoring System using IoT

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Abstract - Drainage system observation takes a vital job to stay town clean. In actual, few area have evacuation observation team work. It results in inconsistency observation of the evacuation condition. The irregular observation results in intervention of evacuation which implies to the salutation that cause flood water flow level. Human observation is additionally inadequate. It needs a professional however they will solely monitor terribly limited and keep maintaining less precision. Conjointly generally thanks to lack of information the employee might meets to Associate in Nursing accident as they need no concept however the condition in those hole. This research work shows the appliance and style operates of a wise and period of time evacuation and whole observation System with support of web of Things. The manhole gift within the evacuation can have a module that has Node MCU interfaced with gas detector, Flow detector, Solenoid Valve, Gas Sensor, inaudible detector. The system can detect in case any obstruction happened in 2 manholes and conjointly it'll recognize the increase in quantity of assorted gases that area unit maleficent to the folks, and conjointly a device of observation the water level, indicates blockage, leakage indication on output show can offer those information to department of health care, from where the actual action are followed. Such node system able to track of all these things in period of real-time state of affairs that is able to permit U.S.A. to require correct actions

Keywords - Internet of Things (IoT), Smart Drainage Monitoring, Node MCU, Gas Sensor, Blockage, Flow Sensor, Solenoide Valve, Ultrasonic Sensor.

I. INTRODUCTION

Drainage Monitoring system job is a really important for huge cities wherever many folks live, system is thought because the platform for xerotes where the surplus and unused water. Waste water (from rain) evacuation level got to be tracked thus on support its correct solution. In actual, not in all areas have evacuation look work as team. It ends up in irregular look of the evacuation condition. The inconsistency in result contributes on the obstruction can say clog of the evacuation that imply to situation of that flooding. Human intervention keep tracking is additionally inefficient. It desires loads of dedicated persons UN agency square measure solely able to track restricted information with less precision. Increase in such emptying space line results problem in regular working of cities. Issues like blockage thanks to waste product, boost within the water level similarly as numerous harmful gases are often produces if the correct cleansing actions don't seem to be taken time to time. Today's system isn't processed thanks to that it's laborious to understand in case of block or clog observed on particular location additionally generally due to deposit of waste products on free lines will produce numerous gases carbon monoxide (CO), alkane series (CH₄) etc. that square measure harmful and will and may and might] cause significant issue if indrawn by humans in great deal and these issues square measure usually Janus-faced by the emptying staff thanks to that death can happens. Not only this, we decided to get early alerts means before problem arises like in case of blockage before rise in quantity of these gases or in water flow so that detect and mending the damage of the blockage becomes time intense feverish.

The smart system will observe if the clog found in between manhole pairs and to boot it will identify the increase in quantity of many gases that square measure toxic to the origin, and to boot a system of observance of flow of water level, indicates blockage, leakage indication on output show.

II. RELATED WORK

Intelligent traffic signals, monitors, active roads, connectivity and so on may be modern town infrastructure. Thus, sensible devices once integrated with buildings of cities through the effective result values of ICT, will create life during a town tons simple.

In this research work, we have a tendency to style sensible period of time evacuation observation system mistreatment numerous sensors like water level, blockage and gas sensing element. We measure the distance of water flow using ultrasonic sensor and display the related information on output display. The gas sensors live accustomed live the quantity of assorted venturous gases by that evacuation staff will take precautions whereas getting into in manholes. The blockage detection sensor components can discover the clog within the sewer lines and show connected info in order that we are able to clean it as early as doable. What is requirement of Smart Drainage System?

Objectives: Intelligent sensors in system that can predict and recognize the drain clogged spot the can provide all the information with recommend actions, all these in in as a Predictive Drainage Clogging System. All modules of such system can communicate to share information as completely connected System. Main motive of this system is instead of manual work by human, all these monitoring of drainage is done by system itself to keep our cities safe by cleaning on time to time. It will help contractors and works to prevent from poison gases generated in drainages.

III. PROPOSED SYSTEM

The Advance Drainage system will have:

1. Sensors for detection of clogs, gas and water leakage.
2. After detection it can provide all the information about blockage detection like where the exact location, it's mild or sever and also recommend the action can be possible to solve problem.
3. A more feature should be there to sense gases like Sulphur dioxide (SO₂), Methane (CH₄), Carbon monoxide (CO) etc. to make sure that the particular area or surrounding is safe.
4. In case of damaging gases are crossing the threshold, the system can trigger an alarm or any indication to health department to take proper action or just to aware the humans living nearby.
5. The information detected accessed on live situation to track and like on apps on our phone and send us notification on any new detection which is not normal that's crossing its decidable limit value.

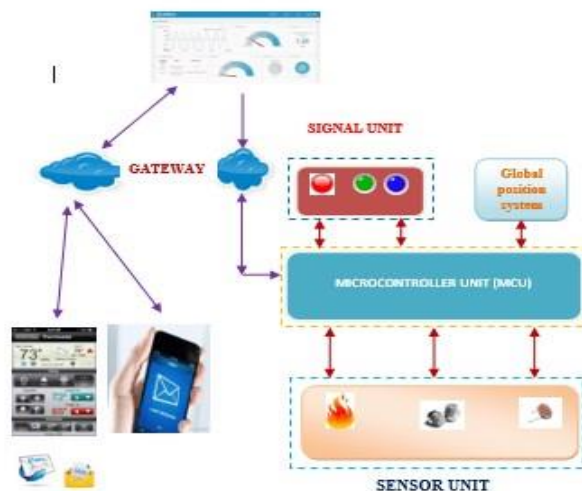


Figure 1: Proposed System

IV. WORKING PRINCIPLE

The drainage smart system wrapped with manhole to handle and remove the block detected in a particular channel. With encoding the sensor module of manhole can recognize and share the appropriate observed data about clod, sever gases and mode to find flow control of drainage system. With this connected component modules they can communicate to share data with other sensor nodes located nearby manholes.

Sensors system keep checking the flow of water, leakage and clogging in drainage not only this it is also going to monitor the level of toxic gases released. After gathering this type of information by drainage system, the information which displayed on output display indicates the information of blockage, Leakage and harmful gases so concerned people will be alerted.

V. SENSOR UNIT

On the basis of above mentioned guidelines these parameters are monitored.

1. Detection of hazardous gases.
2. Blockage in channels.
3. Water leakage detection in pipes
4. Measure and control the flow of water Distance.

The purpose of Water Flow sensor is to identify the distance of water flow. Same as the gas sensor measure the existence of particular harmful gases with quantity of existence. Many gases which are further helped in detection of hazardous are Sulphur dioxide (SO₂), methane (CH₄), carbon monoxide (CO). Below diagram depicts the modules of a single system node for sensors.

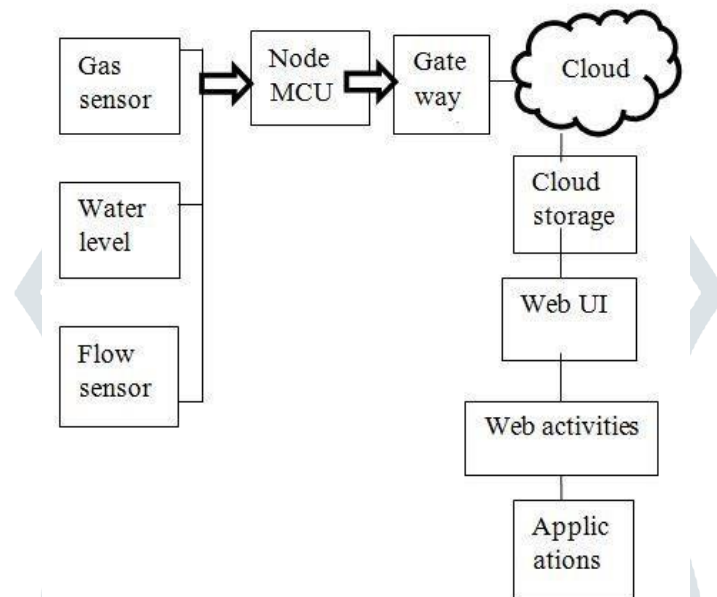


Figure 2: Component diagram for sensors

VI. HARDWARE OF SENSORS

Equipment used on the system node consists of sensors, signal triggering, and alter on gases, the value of water level, blockage sensor threshold is consider as standard input for microcontroller. Output of signal conditioning will be input to the internal ADC (Analog to Digital Converter) of Microcontroller. RTC module used for setting the time of information collected and further RF Module (NRF) transfer the collected information to other sensor pointed nodes. Power supply to the sensor node is by using battery or solar cells.

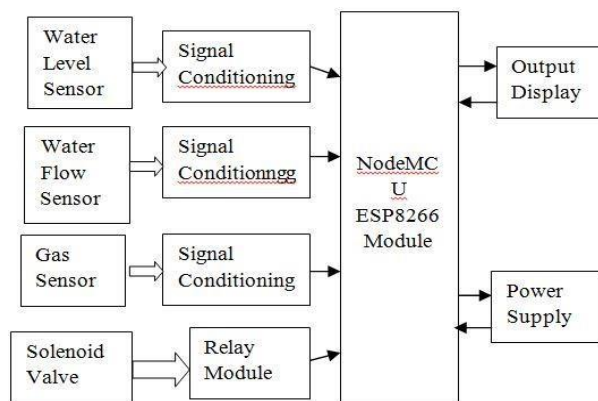


Figure 3: Sensor Node Block Diagram

Sensor node is gateway to send information to server by GSM/Wi-Fi communication connection. This module is useful to share entire collected details of detected failure either in case of blockage or crossing the threshold by amount of gases to cloud where we can use any time, from anywhere for future use.

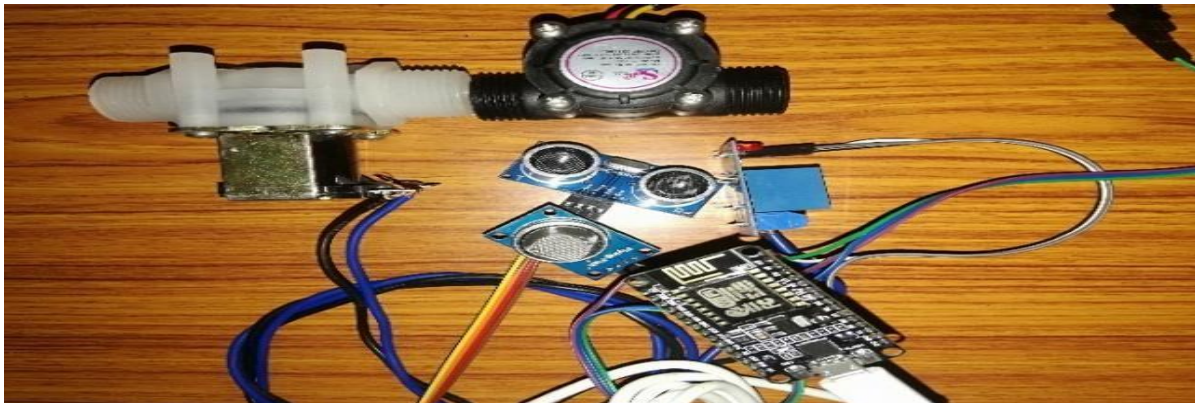
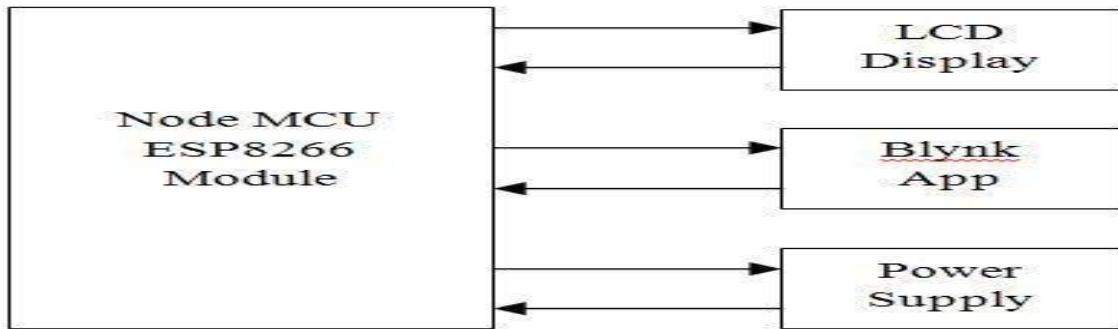


Figure 4: Gateway node and second is sensing and routing Node

VII. OPERATING SCENARIO AND THE NODE AND NETWORK ARCHITECTURES

The Sensors Gas Sensors, Water Flow Sensor, Ultrasonic Sensors are connected to Node MCU, Each Sensor Detects Accordingly like Gas sensor detects Harmful Gases , Water Flow Sensor Detects Leakage and Blockages of the Drain, Solenoid Valve Controls the Leakages and Blockages, a relay is used along with Solenoid Valve as a switch so that if there is more water flow level then it automatically turns Off the Water Flow.

All the above Sensors mentioned are connected Node MCU as inputs and the output will be seen on the Console Screen or Output Display. A Programming is done in C language accordingly so that all the sensors works and detects the blockages, leakages and hazardous gases.

VIII. ENERGY HARVESTING TECHNIQUES FOR SENSOR NODES

Most research work paper's target is on the use of renewable energy sources to power sensor nodes. Mechanical waves and radio frequency solutions are not good for environment on proposed scenarios. A 5v power supply is used to provide the power to NODE MCU.

IX. DATA ACQUISITION AND TRANSMISSION SYSTEMS

In this part, describing the sensor components in nodes used for monitoring and transmission. Our system consist 3 sensors. Ultrasonic sensor, Gas sensor and water level sensor. These sensors are going to identify the concentration of water flow, release of gases or smoke such as Hexane, CO, carbon monoxide CH₄. Ultrasonic Sensor measure the distance of water flow and provide the related information on the output display using Node MCU. Water Flow Sensor Detects Leakage and Blockages of the Drain, Solenoid Valve

Controls the Leakages and Blockages , a relay is used along with Solenoid Valve as a switch so that if there is more water flow level then it automatically turns Off the Water Flow.

X. RESULT ANALYSIS

Sensor unit recognize specifications like Gas potency, water-flow level, leakage of water and gases, clogged, obstructions in flow , smoke because of unleash of chemical and gases within the hole and convert these parameters into electrical output value, this electrical value further used as input value to NODE MCU and programmed in such how that everyone info knowledge |the data show all live monitoring result values of every node and warn by triggering alarm on the basis of data in graphical representation. Offline text show on LCD and Blynk also used for same purpose, forward to the predefined Mobile range with node data and alert them by notification.

XI. CONCLUSION AND FUTURE USE

Sensor networks are observed as the important enablers for the IoT paradigm. This research work consider most about advance and Drainage monitoring system in real time through IoT applications for metropolitan cities. With the help of different like detection of gases, to identify level of water flow as well as detection of blockage and leakage of water and gases. We can keep monitoring live scenario of drainage system in real time for detection of faults in drainage system. By performing in this method we can decide a particular action or we can follow solution like early warning of possibility of leakage or damage on channel. This will be helpful paper to design the smart and real time drainage system for monitoring as well as troubleshooting purpose which can trigger warning signal.

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