IOT-ENABLED UNDERGROUND DRAINAGE MONITORING SYSTEM USING WATER FLOW SENSOR

Dr. Gunasekaran M[1], Pavithra S[2], Priyanka R[2], Reeva M[2]

[1]Associate Professor, Department of Information Technology, Bannari Amman Institute of Technology, Sathyamangalam, Tamil Nadu, India.
[2]Student, Department of Information Technology, Bannari Amman Institute of Technology, Sathyamangalam, Tamil Nadu, India.

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Abstract - Water is most vital role within the regular life. The water metering system is employed to manage the water within the house in order to control the water wastage. Water use for a people can be measured by a municipal corporation. Any leak on your plumbing will be arduous to notice. Sewer leaks will typically be mistaken for a leak on a water line. A Sewer leak on your drain line can even injury your property. Standing or ponding water from a leaky sewer pipes also are a risk to you and to your entire family and often goes misdiagnosed. Leaky drain pipes can even undermine your drain system and cause sags and separations. Hence in order to solve this problem, the water flow monitoring sensor helps in detecting the water flow. By fitting this sensor at various places, area of water leakage can be identified and solved. In addition to this feature, the volume of water flow can also be calculated with the help of water flow sensors and arduino.

*Key Words***:** Arduino, Flow sensor, GSM Module.

1. INTRODUCTION

Water is incredibly necessary supply within the life. Healthy rivers carry water to homes, farms and colleges businesses. On the manner they nourish entire ecosystems and supply necessary home ground for native plants and animals.Water helps the surroundings to revive an additional natural flow regime to rivers,creeks and wetlands.Water for the environment is employed to focus on specific outcomes for plants or animals providing the proper quantity of water at the right time for them to feed, breed and grow. It is an essential tool to support the health of rivers and wetlands and in doing thus support the communities that depend on them.Water that supports the health of the water course in order   that will successively offer human wants.

Water for the surroundings is important important to maintain a healthy, productive and resilient stream system for the good thing about plants,animals and other people. Usable water includes underground aquifers and above-ground rivers, lakes, streams, marshes, comprising solely. 65% of the overall water present on the earth. The previous water that's here should regularly cleanse and renew itself. In nature, water movement is an associate indicator of energy and purity.Water that's moving is higher than the stagnant water found in reservoirs or from public water sources. Turbulent water contains considerable gas and minerals and it's extremely energized.Typically, once movement is formed, water becomes a supply of living energy. The irregular monitoring has contribution on the block of the drainage that imply to the salutation that trigger flooding within the neighborhood. Manual watching is also incompetent. It wants plenty of dedicated persons who are solely able to record restricted report with low accuracy. The problem arises in such drain lines can cause serious problems to the daily routine of town. Problems like blockage because of waste matter and sudden increase within the water level and if the correct improvement actions don't seem to be taken time to time result in producing huge harmful gases. Today's drainage system isn't computerized because of that it's exhausting to know if blockage is going on particularly location.

2. RELATED WORK:

Wemer-Allen,et.al…,[1] presented of WSN on varied applications areas like transference, logistics, environmental and surrounding watching, security and oversight, industrial, automation, military, agriculture and health related works has been reported.

Basha,et.al…,[2] analyze use of WSN to monitor volcanic activities.

Wirawam,et.al…,[3] papered predictive flood detection system mistreatment IoT are enforced in stream like Central American nation and different rivers.

Yuwat,et,al…,[4] represents WSN will be helpful in style of environmental watching systems in developing countries. Designed a prophetical disaster and alert generation system exploitation WSN to provide weather info and early alerts. Smart town infrastructure may well be in terms of intelligent traffic signals, sensors, active lanes, communication, and so on.

**Retno Tri Wahyuni1,et.al…,[5]** proposed sensible devices once integrated into the city's infrastructure through the effective preparation of ICT, will build life in a very town a lot easier. In this paper, we tend to style sensible period drain monitoring system mistreatment varied sensors like water level, blockage and gas detector. The water level can determine the extent of the flood as low, medium or high. this

can enhance early flood detection. The gas sensors are wont to live the number of varied hazardous gases by that drain employees will take precautions whereas coming into in manholes. The blockage sensors can notice the blockage within the sewer lines and provides the first alarms so we are able to clean it as early as attainable.

Prof. S A.Shaikh,et.al…,[6] the Smart city is the development goal to monitor the quality of resource in the city to improve good management and faster development of the city required necessity is to upgrade healthy and safe cities that delivering real time services and latest facility to implement the concept of smart city use IoT concept by which easy wireless communication is possible. The system consist of sensors, collect different types of data from sensors and transfer to the Raspberry Pi3 controller.The acquired output from the controller is sent to the control room through the E-mail and also display on the personal computer.

Muragesh,et.al…,[7] 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. It 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 a high number of sensors, long life-time and high quality of service. The proposed model provides a system for 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.

3. SYSTEM DESIGN
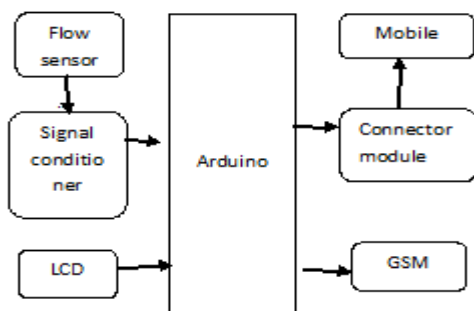
Fig1: Block Diagram of Underground Drainage Monitoring System

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. Flow sensors are interfaced with Arduino 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. Manhole to the municipal corporation through GSM and GPS and the officials could easily locate which manhole is having the problem and could take appropriate steps. It will calculate the water flow rate for every second through water flow sensor and the readings will display in the serial monitor.GSM will send a message to mobile phone. By this, officers can immediately check through the place where the water block is happened.

3.1Arduino:

Arduino is an open source, PC paraphernalia and programming organization, endeavour, and client group that plans and produce microcontroller packs for constructing programmed devices and intelligent object that can detect and control questions in the real world. The inception of the Arduino extend began at the Interaction Design Institute in Ivrea, Italy. The equipment reference plans are appropriated under a Creative Commons Attribution Share.

Fig2: Arduino

3.2Flow sensor:

Water flow sensor consists of a plastic valve body, a water rotor, and a hall-effect sensor. When water flows through the rotor, rotor rolls. Its speed changes with a different rate of flow. The hall-effect sensor outputs the corresponding pulse signal. This one is suitable to detect flow in water dispenser or coffee machine.

Features:

- Compact, Easy to Install

- High Sealing Performance

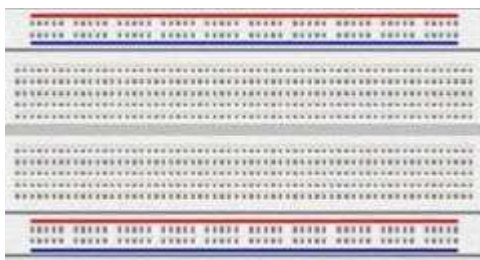- High Quality Hall Effect Sensor

- RoHS Compliant

Fig-3: Flow sensor

Fig-4:Bread board

3.3 Bread board and Jump wires:

A modern solderless breadboard consists of a perforated block of plastic with numerous tin plated phosphor bronze or nickel silver alloy spring clips under the perforations. The clips are often called tie points or contact points. The number of tie points is often given in the specification of the breadboard. The spacing between the clips (lead pitch) is typically 0.1 in(2.54 mm). Integrated circuits (ICs) in dual in-line packages (DIPs) can be inserted to straddle the centerline of the block.Interconnecting wires and the leads of discrete components (such as capacitors, resistors, and inductors) can be inserted into the remaining free holes to complete the circuit. Where ICs are not used, discrete components and connecting wires may use any of the holes. A breadboard is utilized to build and test circuits expeditiously afore finalizing any circuit design. The breadboard has many apertures into which route components like ICs and resistors can be connected. A typical breadboard that includes top and bottom power distribution rails is shown below figure 4. Jump wires are generally used to establish connectivity with bread board as shown in figure 5.

Fig-5:Jump wires

3.4 GSM:

GSM was meant to be a secure wireless system. It's thought – about the user authentication employing a pre-shared key and challenge response and over the air secret writing.GSM module is used to establish communication between a computer and a GSM-GPRS system. Global System for Mobile communication (GSM) is an architecture used for mobile communication in most of the countries. Global Packet Radio Service (GPRS) is an extension of GSM that enables higher data transmission rate. GSM/GPRS module consists of a GSM/GPRS modem assembled together with power supply circuit and communication interfaces for computer.

Fig-6:GSM

4. Experiment and Results:

The IoT based water monitoring data are analyzed to measure their performance metric in terms of accuracy as well as response time. For the system to be effective, the data readings are taken in the real time that is the readings are obtained for every seconds.It will calculate the water flow in milli liter for every seconds.

Fig-7:Code for water flow sensor

Fig-8:Code

Fig9:GSM result

The above result,how to communicate with the user that will used to identify the status of water flow through message. This will used to locate the place where the blockage of water happens. So its very easy to clear the water block in drainage. This helps the user in continuously knowing the status of the water level.

5. CONCLUSION

Underground observance is difficult nowdays. This project proposes totally different ways for observance and managing underground system. It explains varied applications like underground maintaining and monitoring in real time. Arduino, Water flow sensor and Global System for Mobile (GSM) are being monitored and updated on the Internet of Things. This permits the person inchange to require the actions concerning the identical web mistreatments. Also, in real time update on the web that helps in maintaining and checking that will reduce and avoid the hazards. The low price, efficient, time period water quality metering system has been enforced and tested. Through this method, the officers will keep track of the levels of pollution occurring within the drainage and send immediate message to the officers. This can help in preventing diseases caused to contaminated water. Fast actions may be taken to curb extreme levels of pollution. To fix this critical issues the system has been proposed for drainage monitoring using IoT, data acquisition can be done in the parallel way by detecting the Water flow sensor, Global System for Mobile. By this way it reduce the wastage of water and diseases.

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