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UNDERGROUNG WATER PIPE LEAKAGE SYSTEM

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ABSTRACT
Water supply and leak detection are the Water Supply Board's two main issues. the enormous volume of water that is lost owing to leaks when domestic water is supplied through pipelines. The majority of water lost due to pipeline leaks occurs underground, making it difficult to locate leaks in the pipeline system. Around 4000 drops, or one litre, of water were lost in the pipeline during a typical leak.This project's primary goal is to use the Internet of Things to identify water leaks in subterranean pipelines and track the water level in water tanks in smart cities (IOT). The system's purpose is to keep an eye on and find water leaks when water is distributed through underground pipelines in smart cities. The system will keep an eye on things, look for water leaks, and notify the appropriate person if one happens. The suggested system consists of three key components: monitoring the water pressure level in pipes, monitoring the water level in overhead tanks, and sending an alarm message to the user and Water Board when a pipeline leak occurs. The flow sensors built into the pipes collect information on pipeline discharge. A microcontroller named Arduino Uno processes the data gathered by sensors. Finally, cloud computing is used to monitor the processed data online.
Keywords:Leak detection; flow sensor; Arduino uno; IoT; pipeline.

INTRODUCTION
In India, more than 30% of the population resides in metropolitan regions, where the population is projected to double by 2050. The demand on water resources utilised for supply purposes is rising as a result of a growing economy and dynamic lifestyles. In most Indian cities, there is a water shortage; no city has a continuous supply of water. Water is crucial for human and animal life to maintain ecological harmony as well as for all types of economic and development activities. Every person has a fundamental need for water. The water must be conserved by everyone. Due to a shortage of rainfall and an increase in population, water management in cities has become a major problem. Due to a lack of water for dailynecessities, many individuals are experiencing water troubles. In India, water resource management is crucial for the country's population of more than a billion people. Water cannot be distributed properly in cities due to insufficient monitoring, therefore certain parts may receive a regular supply while others may not. Continuous monitoring, regulation, and adequate circulation of the water supply are required. Extreme usage, tank flooding, pipe spills, and interruptions in the city's water supply are just a few of the problems. There are numerous other procedures for preventing water pipeline leaks, and we also have some methods for finding leaks as well as others for regulating and monitoring. This study discusses the use of cutting-edge techniques for water leakage detection, monitoring, and management. We have a Smart Water Leakage Detection and Monitoring Gadget in several articles. By Bheki Sithole, Suvendi Rimer, Khmaies, C. Mikeka, and J. Pinifolo; In this study, they discuss the monitoring and detection of water leaks. The most significant, necessary, and finite natural resource that supports life on earth is water (Wagan et al, 2013; Kulkarni, 2016). This study presents a flexible, low-effort gadget that can determine potential spillages on the client's property and broadcast real-time information about household water consumption. The amount of water consumed by consumers is measured using flow metre sensors. The amount of water utilised and the water flow rates will then be shown on an LCD, and the entire transaction will be submitted to the website. This solution has been carefully and effectively designed

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to reduce business losses. Wireless Sensor Network-Based Improved Underground Water Pipeline Water Leakage Monitoring And Detection System By Dr. V. Gomathi and M. Jayalakshmi: This paper describes the design and implementation of a system for monitoring and identifying water spills using remotely placed sensors in order to screen and differentiate spills. This updated system's objective is to locate potential subterranean water leaks for private water pipes that are monitored from a computer. In order to determine the proper spillage location, a robust and reliable wireless sensor organises small Printed Circuit Boards (PCB). Information from remote sensors of many types, including acoustic, weight, temperature, stream rate, and others, is gathered and shown on a PC in this manner. The water provider must take corrective action as soon as a break is found to prevent water losses in the dispersion system. In this way, the suggested framework will be used to save water and lower the cost of replacement. Buildings with leaky pipes may experience additional issues such as interior flooding, wall deterioration, decreased floor strength, decreased water pressure in the pipeline, and other issues in addition to water wasting.

LITERATURE SURVEY

Water distribution system leakage is a significant problem that has an impact on water providers and their clients globally. So, it should come as no surprise that it has lately drawn a lot of interest from both practitioners and researchers. The majority of leakage management-related techniques that have been created thus far can be broadly categorised as follows:

- Leakage detection techniques that focus primarily on finding leakage hotspots.
- Leakage control models that concentrate on the efficient management of present and potential leakage levels.
- To measure the input and outflow rates of flow, water is allowed to pass through the pipeline and the flow sensors.

Water monitoring systems such as tank water level sensing monitoring, water pollution monitoring, and water pipeline leakage sensing monitoring have been created by Deepiga and Sivasankari. The agent is informed of the level of water in the tank using the microcontroller-based water level monitoring. Force sensitive resistors (FSR), which are produced by leaks, are used to determine pressure during leak detection in water pipelines. A rise in the LED metre and a headset-audible sound of water pouring through a pipe will serve as indicators. A portable and non-destructive wireless leakage detection system has been presented by Adsul and Kumar [2] employing a variety of sensors and microcontrollers (NDT). The system uses sensors and an Arduino microcontroller to detect characteristics like humidity, temperature, pressure, sound detection, and gas detection near leaking sites. The design and execution of a system for monitoring and detecting water leaks using wireless sensors has been proposed by Jayalakshmi and Gomathi [3]. An improved system's goal is to find potential subterranean water leaks in household water pipes that are monitored by a computer. In order to solve the issue of water dispersion, Daadoo and Daraghmi [4] have concentrated on the usage of wireless sensor networks for leakage detection in subterranean water pipes. The authors have created a wireless network system that makes use of portable wireless sensors in order to solve the issue and make the leakage detecting procedure simpler. The basic theory and practical use of a fibre optic-based technique that uses Brillouin acoustic scattering to detect minute temperature changes in the cable have been described by Myles. The paper will describe the method's fundamental physics and present the findings of a case study for the detection of brine pipeline leaks. A useful, reasonably priced Smart Water Meter device (SWMD) that can identify potential leaks has been presented by Sithole etal.,. To gauge how much water a consumer uses, flow metre sensors have been installed.

PROPOSED WORK

The objective of this paper is to develop an intelligent and smart system, which can perform the real time monitoring and detection of the water leakage in the pipelines in early stages itself. The major components of the proposed water leakage system. The system mainly consists of Arduinomega Uno, GSM, LCD, flow sensors and power supply Water leakage monitoring system integrated with GSM is developed to save every single drop of water, which is wasted through pipeline leakages in building. The data that is used in this study is the rate of flow from sensors which is provided at the inlet and outlet section. Two water flow sensors are used to determine the inflow and outflow rate of water. In this study, YF- S201 is used as the water flow sensor which is having a working range of 1-30 L/min and water pressure <= 2.0 MPa. This sensor mainly consists of a rotor, plastic valve body and a hall effect sensor. When the water starts to flow through the sensors, the rotor rotates and the speed of that rotation (water) is directly proportional to the flow rate. Hall effect sensor generates pulse/signals for every rotation of rotor (Rahmat et al, 2017).The pulse generated by the hall effect sensors are send to the Arduinomega to analyse and display the flow rate. The flow sensors are connected by a 2 m pipe to measure the inflow and outflow through the pipe. Flow sensor consists of 3 wires; they are 5v power supply, pulse line and ground line. These are very easy to interface with Arduinomega, which makes the system smart. The signal line of flow sensor is connected with the digital pin 2 of Arduinomega where the power line and ground line of sensors are connected with the power line and ground line of Arduinomega. A water pump is used to supply the water through the pipeline. When the system starts to work, water is allowed to flow through the pipeline which is connected with the inflow and outflow measurement sensors.

PROJECT DESCRIPTION

In the indoor of a business organization, the robotic is placed at the vicinity where fire accidents can appear. A microcontroller and sensors are used to perform this robotic. If there exist any fireplace signal, the sensors will ship the records to the important coordinator unit. The coordinator unit is the mind of the robotic. It makes selections primarily based upon the sensor indicators. The complete machine includes a digicam, sensors, a Microcontroller unit, and vehicles. The sensors' information is sent constantly to the NodeMCU.NodeMCU Collects the statistics from sensors and camera and then manner the statistics relying upon the program. If the statistics are analog fee, then the facts are transformed to a virtual value using ADC conversion and dispatched to the server and the android app. The PIR sensor, Gas sensor, and the humidity and temperature sensor values are without delay sent to the server and app via NodeMCU. Best the flame sensor value is used to decide to interchange on the CO2 and water cylinder automatically. For guide mode,the joystick brought in the app is used to govern the robotic. Moreover, an ultrasonic sensor and flame sensors had been used to move the robot mechanically. While the robot is in independent mode, the critical processing unit collects information from the ultrasonic sensor to keep away from barriers to discover the way and the flame sensors discover the precise position of the hearth. The module has to be related with a Wi-Fi router or cellular hotspot to switch the comments records from the robotic to the server and Android App. We have used a series to join the 2 wheels of the robot in order that robotic speed is progressed. We have in- built digicam to monitor the fire and the operator can see active.

BLOCK DIAGRAM

Water enters the pipeline by the inflow sensor and exits through the outflow sensor at first. The rate of inflow and outflow is sensed by the flow sensors linked to the pipe and have a diameter which is equivalent to the diameter of the sensors. The Arduino receives the sensor data for processing, and the processed data's findings (inflow and outflow rate) are shown on the LCD panel. By comparing the inflow and outflow rates, it is possible to identify any leaks in the pipes between the two sensors. A difference of less than 60 L/hr suggests a water pipeline leak, while a difference of more than that indicates a leak. In the event that a leak is discovered, Arduino will automatically When the water starts to flow through the sensors, the rotor rotates and the speed of that revolution (water) is directly proportional to the flow rate. Hall effect sensor generates pulse/signals for every rotation of rotor (Rahmat et al, 2017). (Rahmat et al, 2017). The pulse\generated by the hall effect sensors are communicated to the Arduino to analyse and display the flow rate. In order to detect the inflow and outflow through the pipe, the flow sensors are connected by a 2 m pipe. Three wires make up a flow sensor: a ground wire, a pulse line, and a 5 volt power supply. The system is made intelligent by the

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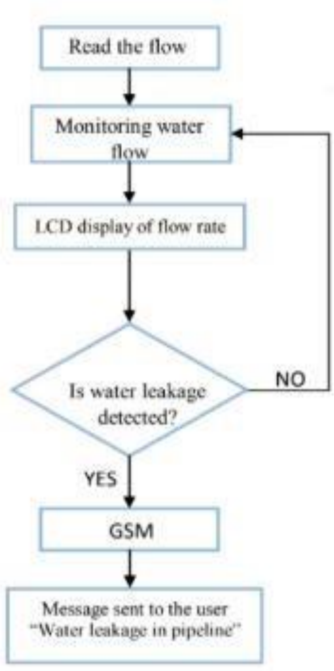
ease with which they may be interfaced with Arduino. The flow sensor's signal line is connected to Arduino's digital pin 2 via a signal cable. Water is supplied through the pipeline using a water pump. Water is permitted to flow through the pipeline that is attached to the inflow and outflow measurement sensors when the system is first turned on. The location of the water flow sensor indicates where the water flow sensors are located in the pipeline. Water enters the pipeline by the inflow sensor and exits through the outflow sensor at first. The flow sensors, which are attached to the pipe and have an equal diameter to the sensors, measure the rate of inflow and outflow. The Arduino receives the sensor data for processing, and the processed data's findings (inflow and outflow rate) are shown on the LCD panel. By comparing the inflow and outflow rates, it is possible to determine whether there is a leak in the pipes between the two sensors. A difference of less than 60 L/hr suggests a leak, whereas a difference of more than that indicates a leak of leakage in water pipeline. When a leak is found, Arduino will automatically start up.



WATER FLOW SENSOR
A plastic valve body, a water rotor, and a hall-effect sensor make up a water flow sensor. The rotor rolls as water passes through it. Flow rates affect its speed in a variety of ways. The appropriate pulse signal is output by the hall-effect sensor. This one can be used to detect flow in a coffee maker or water dispenser. We offer a wide variety of water flow sensors in various sizes. Examine them to choose which best suits your needs.

A LIQUID-CRYSTAL DISPLAY(LCD)
The liquid crystal display, or LCD, relies on the light modulation capabilities of liquid crystals. It is offered in flat panel displays, video displays, and electronic visible displays. You may view the various categories and features available in LCD markets on the screens of your smartphone, laptop, computer, and television. The development of LCD revitalises the electronic sector and displaces lED and gas plasma technologies. Moreover, it takes the place of the CTR (cathode ray tube) used for visual display. Compared to light-emitting diodes and plasma displays, the liquid crystal display uses less power during the manufacturing process. In this article, we'll examine the 20 x 4 LCD, including its functions, applications, and actual use in various electronic devices.

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CONCLUSION

The amount of consumable water is just about 3% of the total amount of water that is available on earth, hence it is crucial to prevent leaks in the water pipelines. Typically, a significant volume of water is lost during the transmission of water through pipes due to leaks. Consequently, the proposed prototype's use of cutting-edge machinery and technology aids in the detection and monitoring of water pipeline leaks. This smart sensor network system's key benefit is that it features a real-time monitoring system with little user interruption and a leakage detection system that corrects problems at an early stage to lessen the severity of damage. Water flow sensors have been used in a method for measuring water flow. This technique makes it possible to put sensors in pipes quickly and easily without disrupting pipe networks. The Internet of Things allows for the observation of water pipeline flow from any location at any time. Although the monitoring and detecting system may initially cost more, it ends up being more affordable because it requires less labour and upkeep.

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