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Smart Drainage Monitoring System Using IoT

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ABSTRACT: This project aims to address the challenges of human-driven well maintenance, which can be environmentally burdensome and logistically difficult. Instead, the project focuses on developing an intelligent drainage system using Internet of Things (IoT) technology. In this system, sensors are placed in wells to monitor water levels, sediment accumulation and other important factors. The data collected by these sensors is transmitted to the administrative center of the city government through an Android application. This allows for a quick response to potential problems and puts public safety first. By implementing IoT sensors, the system ensures continuous monitoring of drainage parameters and provides valuable real- time information. By integrating data analysis and intelligent controls, it optimizes the performance of sewer networks, reduces maintenance costs and improves flood control measures. Ultimately, this project aims to create a resilient and sustainable urban environment while demonstrating the transformative potential of IoT in urban infrastructure. So different kind of work has been done to detect, maintain and manage these underground systems. Also, leaks and bursts are unavoidable aspects of water distribution system management and can account for significant water loss within a distribution network if left undetected for long period. This project represents the implementation and design functions for monitoring and managing underground/road-sided drainage system with different approaches. It also gives a detail regarding the safety issues like gases which adversely affects to the workers, temperature details weather it is suitable for the workers or not and also blocking parts are present or not.

KEYWORDS: Blynk, IoT, GSM, GPS, Arduino, Node MCU Wi-Fi Module, Alarm, Sensors, LED.

I. INTRODUCTION

The Internet of Things (IoT) is a concept that focuses on connecting physical objects to communication devices, which in turn are connected to networks of sensors. This connectivity enables seamless communication and automated interaction between the physical world and the digital realm. Before the Internet of Things, computers could independently access data from objects and devices, but the Internet of Things was developed to overcome the limitations associated with manual data entry. It aims to improve the efficiency, accuracy and overall usefulness of data collection and management. Sensor networks are an important part of how the Internet of Things works and are essential to its successful implementation. Simply put, IoT means connecting everyday objects to the Internet using sensors and communication devices so that they can automatically collect and share data.

This information can then be used for various purposes, such as increasing efficiency and making better decisions in areas such as healthcare, agriculture, transportation and more. Sensor networks are like the "eyes and ears" of the Internet of Things, helping it gather information from the physical world. The drainage system is an important part of large cities with millions of inhabitants. This is the basis for keeping the land dry by managing excess and sewage, including rainwater and sewage.

Monitoring the condition of the sewage system is essential to ensure it is working properly. Unfortunately, not all regions have dedicated drainage monitoring teams, which leads to inconsistent monitoring of drainage conditions.
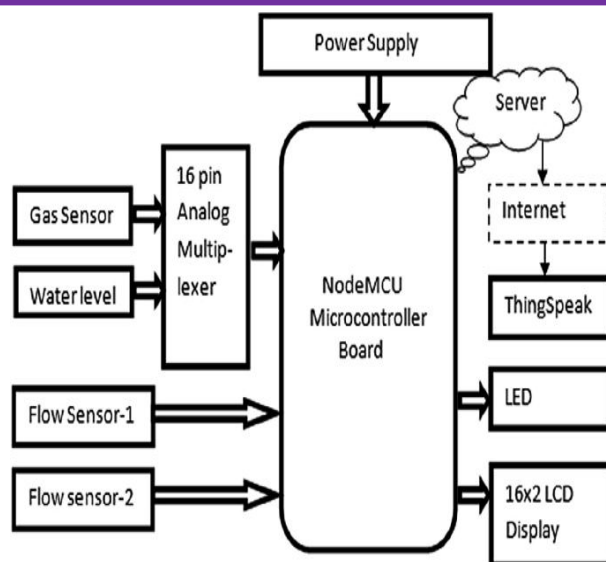
Fig 1: IoT-Based Smart Drainage System

This irregular monitoring contributes to clogging of drainage systems, which leads to localized flooding. Manual monitoring methods also prove ineffective and insufficient. An inefficient and improper sewage system poses significant risks in terms of water and soil contamination and the spread of disease, especially in relation to climate change. Properly maintained and monitored drainage systems are essential to reduce these risks and ensure a healthy urban environment. The problem of open manhole covers can have disastrous consequences, leading to accidental falls and loss of life. Such open wells can be for various reasons such as broken covers, well explosions caused by dangerous gases inside, or sewage overflows, which in addition to polluting the environment also spread infectious diseases. In addition, it can contaminate drinking water and cause serious health risks.

The implementation of an intelligent drainage system is crucial to solving these problems holistically. This system collects and transmits real-time data from well sensors to a central control station. The development of a smart drainage system using IoT technology is not only a response to solving urban problems, but also in line with the broader goal of creating smart, sustainable and resilient cities. This project offers an opportunity for innovation at the intersection of technology and urban infrastructure. Its potential impact extends to improving the quality of life of urban dwellers and mitigating the environmental effects of urbanization.

The underground leakage system is a critical section of metropolitan establishment. It is seen as city's assistance. Most organization on underground leakage is manual as needs be it isn't compelling to have immaculate and working underground system moreover in such huge metropolitan zones, it is hard for the public power personnel to track down the particular sewer vent which is managing the issue. By far most of the metropolitan territories got the underground drainage structure and it is the commitment of managing station (Municipal Corporation) to keep up tidiness of the metropolitan regions. If the waste upkeep isn't genuine the unadulterated water gets degrade with drainage water and compelling diseases may get spread. The drainage gets deterred during blustery season, it will make issue for routine life, for instance, traffic may stall out, the environment gets dirty, and totally it upsets general society. Expect if there should be an office which would be there in Municipal Corporation (managing station) that the specialists come to realize following discouraging of leakage in what locale and the particular spot where it is prevented. Appropriately, it is major to develop a structure which can manage underground waste without human mediation.

II. LITERATURE REVIEW

The design space of wireless sensor networks, Wireless Communications (Author: Romer, K. Mattern,) Description: In the recent past, wireless sensor networks have found their way into a wide variety of applications and systems with vastly varying requirements and characteristics. As a consequence, it is becoming increasingly difficult to discuss typical requirements regarding hardware issues and software support. This is particularly problematic in a

multidisciplinary research area such as wireless sensor networks, where close collaboration between users, application domain experts, hardware designers, and software developers is needed to implement efficient systems. In this paper we discuss the consequences of this fact with regard to the design space of wireless sensor networks by considering its various dimensions. We justify our view by demonstrating that specific existing applications occupy different points in the design space.

Sewer maintenance is essential to keeping a city clean, safe and healthy. If sewage is not adequate, clean water becomes contaminated with sewage and infectious diseases can spread. To solve these problems, most cities have adopted an underground drainage system. When the drain is blocked, many problems occur, such as traffic jams, environmental pollution, and if the drain cover is not properly closed, there is a risk of accidents and the well falls into the well. Human-led maintenance of wells is very difficult because the environment is bad and it is difficult to enter the wells to check the condition of the wells. To solve all these problems, it is necessary to implement a remote monitoring and signaling system, which sends the information detected by the sensors placed in the service opening to the gas station of the current state. Various types of sensors such as weight sensor (load sensor), flow sensor, water sensor, buzzer, water level sensor etc. when placed in the well, these sensors detect any problems like water blockage or debris accumulation or water flow stoppage. . etc. and immediately an alarm is sent to the administrative point about the problem ie. Municipal Corporation. If there is a problem in the corridor, the venerable sensor detects it and then triggers the circuit to which the sensor is connected. Since the data (signal) is in electronic form, there is a device connected to the circuit that transforms the electronic data (signal) sent from the sensor to the circuit into serial data. Then the serial data received from the serial port is displayed in the terminal ie. City Corporation Screen (Control Station).

Towards the Implementation of IoT for Environmental Condition Monitoring in Homes (Author: Kelly S.D.T, Suryadevara, N.K, Mukhopadhyay S.C) Description: In this paper, we have reported an effective implementation for Internet of Things used for monitoring regular domestic conditions by means of low-cost ubiquitous sensing system. The description about the integrated network architecture and the interconnecting mechanisms for reliable measurement of parameters by smart sensors and transmission of data via internet is being presented. The longitudinal learning system was able to provide self-control mechanism for better operations of the devices in monitoring stage. The framework of the monitoring system is based on combination of pervasive distributed sensing units, information system for data aggregation, reasoning and context awareness. Results are encouraging as the reliability of sensing information transmission through the proposed integrated network architecture is 97%. The prototype was tested to generate real-time graphical information rather than a test bed scenario.

Monitoring Smart City Applications using Raspberry PI Based on IOT (Authors: Prof. S A.Shaikh 1, Suvarna A. Sonawane.) Description: 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 consists 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.

The Internet of Things (IoT) describes physical objects embedded with sensors, processing capabilities, software and other technologies to connect and exchange data with other devices and systems via the Internet or other communication networks. Sewage overflow on the roads was also a big problem in many developed and underdeveloped cities. The existing drainage system is manual and there are insufficient monitoring teams in all areas. Manual inspection is relatively difficult. It requires a lot of manpower that wants to save only limited reports in low resolution. The above article provides design information based on IoT applications. This project represents the implementation of monitoring and control of underground systems using different approaches.

III. METHODS

The Underground Drainage System are maintained through Cleaning places of work in India to make easy healthful environment and for this reason surroundings. But frequently because of bad renovation of the underground drainage device, the water within side the drainage device receives combined up with the natural water and intake of this Polluted water ends in water borne diseases. The unexpected modifications within side the ecosystem and versions

within side the weather throughout exclusive seasons the drainage receives blocked or water logged, making surroundings bad and disturbs the healthful ordinary of not unusual place people.

Initially all of the hardware modules are initialized and installed on an Arduino board. As all sensors constantly fetch facts from the surroundings the usage of microcontroller. And passes directly to net of factors Where it compares stay fetched facts to threshold values of respective unsafe sewage gases. If stay records of any sensors exceed the edge cost the nearby municipal business enterprise is knowledgeable via manner of way of sending a notification to reliable authority. Not handiest facts approximately sewage gases however temperature water degree is likewise received if the water degree is above a few precise degree it's going to notify the authority approximately which may be tracked with assist of GPS and GSM system. admin and person credentials of all members are saved in addition to checked in BT terminal with assist of android utility and each hobby executed is saved and maintained in utility.
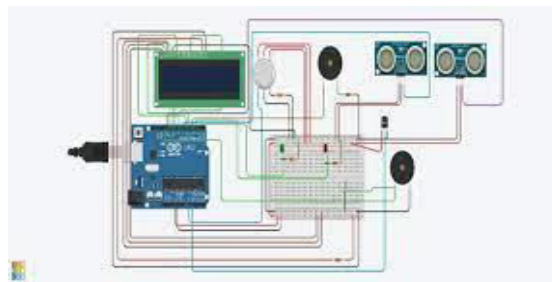

Fig 2: Smart Drainage Monitoring and Controlling System Using IOT

All electricity elements have a electricity enter connection, which gets strength withinside the shape of electrical present day from a supply, and one or extra electricity output or rail connections that supply present day to the load. The supply electricity can also additionally come from the electrical electricity grid, together with an electrical outlet, strength garage gadgets together with batteries or gasoline cells, turbines or alternators, sun electricity converters, or some other electricity deliver. The enter and output are normally hardwired circuit connections, aleven though a few electricity elements appoint wi-fi strength switch to electricity their hundreds with out stressed connections. Some electricity elements produce other kinds of inputs and outputs as well, for features together with outside tracking and control. Direct present day electricity elements are both unregulated or regulated. Regulated elements are available in numerous alternatives inclusive of linear, switched and battery-based.

IV. RESULT ANALYSIS

Overflow sensor is largely a board which has a coating of nickel withinside the shape of traces and works at the precept of resistance. The module is primarily based totally on LM393 op-amp. The sensor is a resistive dipole that indicates much less resistance due to the fact water conducts strength and connects the nickel traces in parallel and subsequently reduces resistance and voltage drop throughout it. The sensor indicates greater resistance while it's far dry. Water Level sensor: The stage sensor used right here is an ultrasonic sensor that is largely used for distance dimension and water stage dimension with out real touch with the obstacle. The precept of distance dimension is primarily based totally on echo. The sensor transmits a legitimate wave which returns returned to the starting place as echo after putting the obstacle. Hence the journeying time of the sound wave is referred to and the gap is being calculated.
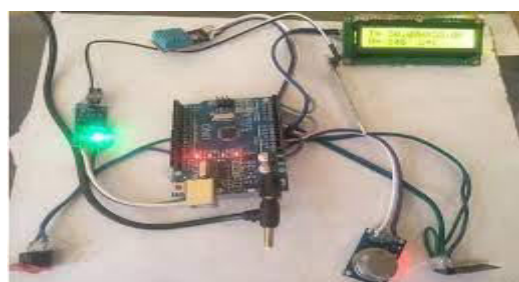

Fig 3: Underground Drainage Monitoring System

The concept of including sensors and intelligence to fundamental gadgets become mentioned in the course of the Nineteen Eighties and 1990s (and there are arguably a few a good deal in advance ancestors), however other than a few early projects -- consisting of a web-related merchandising machine -- development become gradual surely due to the fact the generation wasn't ready. Chips have been too large and ~ 51 ~ cumbersome and there has been no manner for gadgets to speak effectively. Processors that have been reasonably-priced and energy-frugal sufficient to be all however disposable have been wanted earlier than it sooner or later have become value-powerful to attach up billions of gadgets. The adoption of RFID tags -- low-energy chips which could speak wirelessly -- solved a number of this issue, together with the growing availability of broadband net and cell and wi-fi networking. The adoption of IPv6 -- which, amongst different matters, need to offer sufficient IP addresses for each tool the world (or certainly this galaxy) is ever probable to need -- become additionally a important step for the IoT to scale. Kevin Ashton coined the phrase 'Internet of Things' in 1999, even though it took at the least any other decade for the generation to trap up with the vision"The IoT integrates the interconnectedness of human culture -- our 'matters' -- with the interconnectedness of our virtual facts system -- 'the net.' That's the IoT," Ashton informed ZDNet. Adding RFID tags to high priced portions of devi

V. CONCLUSION

Underground monitoring is challenging problem. This project proposes different methods for monitoring and managing underground drainage system. It explains various applications like underground drainage and manhole identification in real time. Various parameters like temperature, toxic gases, and level of water are being monitored and updated on the internet using the Internet of Things. This enables the person incharge to take the necessary actions regarding the same. In this way the unnecessary trips on the manholes are saved and can only be conducted as and when required. Also, real time update on the internet helps in maintaining the regularity in drainage check thus avoid the hazards. Our project helps to reduce the problems of drainage system with the help of sensors like ultrasonic, gas and Temperature sensors. Our mechanism helps to notify the registered number, when the harmful gases are detected to gas sensor and level is detected by ultrasonic sensor, with help Wi-Fi module like NODE_MCU Arduino which is connected with the blink server. By this project the underground drainage system can be easily organized.

REFERENCES

[1]. Lazarescu, M.T., "Design of a WSN Platform for LongTerm Environmental Monitoring for IoT Applications," Emerging and Selected Topics in Circuits and Systems, IEEE Journal on, vol.3, no.1, pp.45,54, March 2013

[2]. Kelly, S.D.T.; Suryadevara, N.K.; Mukhopadhyay, S.C., "Towards the Implementation of IoT for Environmental Condition Monitoring in Homes," Sensors Journal, IEEE, vol.13, no.10, pp.3846, 3853, Oct. 2013.

[3]. I. Akyildiz, W. Su, Y. Sankarasubramanian, E. Cayirci, "A Survey on Sensor Networks", IEEE Communications Magazines, August 2002.

[4]. Lazarescu, M.T., "Design of a WSN Platform for Long Term Environmental Monitoring for IoT Applications," Emerging and Selected Topics in Circuits and Systems, IEEE Journal on, vol.3, no.1, pp.45,54, March 2013.

[5]. Kelly, S.D.T.; Suryadevara, N.K.; Mukhopadhyay, S.C., "Towards the Implementation of IoT for Environmental Condition Monitoring in Homes," Sensors Journal, IEEE, vol.13, no.10, pp.3846,3853, Oct. 2013.

[6]. ZigbeeAlliance, Zigbee 2007 Specification, 2007. https://xively.com

[8]. Romer, K.; Mattern, F., "The design space of wireless sensor networks," Wireless Communications, IEEE, vol.11, no.6, pp.5 4,61, Dec. 2004.

[9]. Prof S. A. Shaikh1, Suvarna A. Sonawane2," Monitoring Smart City Application Using Raspberry PI based on IoT" International Journal of Innovative Science, Engineering & Technology, Vol 5 Issue VIL, July 2017.

[10] Prof Muragesh SK1, Santhosha Rao2,"Automated Internet of Things for Underground Drainage and Manhole Monitoring systems for Metropolitan Cities."International Journal of Innovative Science, Engineering & Technology, Vol. 2 june 4, june 2015.

[11] Lazarescu, M. T., "Design of a WSN Platform for Long-Term Environment Monitoring for IoT Applications, "Emerging and Selected Topics in Circuits and system, IEEE journal on, vol 3, no.1,pp.45,54, March 2013.

[12]T.Leppanen, Harjula, E., Ylianttila, M., Ojala, T.,,,,and Yang, L. T. (2013)."Cloud things: A common architecture for integrating the internet of things with cloud computing." Proceeding of the 2013 IEEE 17th International conference on computer supported cooperative work in design (CSCWD), 651-657(june).

[13] Manna, s., Bhunia, S. S., and Mukherjee, N. (2014)."Vehicular pollution monitoring using iot" International Conference on Recent Advances and Innovation in Engineering(ICRAIE-2014), 1-5(May).

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