Urban IoT Based Underground Drainage Monitoring And Maintainance Alerting System

SriramR[1], Udhayanithi R[1], Mr Joseph Sathiadhas A[2]
[1] Dept of ECE
[2]Assistant Professor, Dept of ECE
[1, 2] Meenakshi Sundararajan engineering college

Abstract- *India is continually pushing towards automation, with the goal of making every city a smart city. Several aspects must be considered while creating a smart city, such as smart water management, smart power management, smart transportation, and so on. Smart subsurface infrastructure, such as underground water pipes, communication cables, gas pipelines, electric flow, and so on, will be required. Because most Indian towns have adopted ansubterranean drainage framework, it iscritical that this system function properly in order to maintain the city is healthy, safe, and clean. If they do not manage the drainage system, clean water may get contaminated with drainage water, thereby spreading infectious illnesses .To discover, maintain, and manage these subsurface networks, a variety of pursuitshas been undertaken. Leaks and bursts are also unavoidable components of water distribution system management, and if left undiscovered for an extended length of time, they can account for considerable water loss within a distribution network. Using various methodologies, this project represents the implementation and design functions for monitoring and maintaining underground/road-sided drainage systems .GPS was utilized to locate a drainage system. It also provides information on safety problems such as gases that are harmful to employees, whether it is acceptable for workers or not, and whether or not obstructing pieces are there.*

I. INTRODUCTION

Day by day the world is growing rapidly into smart cities. But some problems faced are still no change. The problem faced in the drainage system was still problematical one. Because many countries cleaning the drainage only by underground drainage cleaners. The smart world needed Modern technological advancement and sophistication in its planning systems. The drainage overflow and hazard gases under the drainage is a major problem if this problem is not acknowledged it causes some serious consequences like inside workers death. Smart sewage system uses the properties of micro-controllers and some sensors for detecting the underground drainage conditions. This reduces the man-effort and also gives a quick check over the problem. The smart system should be able to work with standard alarm and monitoring systems so that the fluctuations in the sewer can be monitored as well as the system gives an alarm when the harmful gases inside the drainage are raises. These details provide the complete view of drainage condition and ensure to produce the drainage cleaning workers lives.

In metropolitan India, the risk of stepping into a manhole to clear clogged sewer lines is almost equal to that of security officers combating terrorism in Jammu and Kashmir. Over the last 8 years the death rate around 356 all over India . The smart system having the micro controller a based Drainage monitoring. The micro controller is programmed to sense the sewage water level, gas, presence of human and Harmful gases .GPS was utilized to locate a drainage system. The smart system should be able to work with standard alarm and monitoring systems so that the fluctuations in the sewer can be monitored as well as the system gives an alarm when the harmful gases inside the drainage are raises attached gas sensor give the early report if any gas leakage by an alert message or sound by abuzzer and send the data over the internet to the municipality department.

Water is being used very fast in today. The drainage system receives water from commercial and industrial sources. which also contains water and additional solid ingredients. These days, properly disposing of sewage from businesses and industries is still a difficult task..Automated Downsizing Water cleaning solves the issues with traditional systems and permits drain water to flow continuously. Sewage water needs to be treated in order to keep our country clean and green and to improve the quality of life for everyone.

Due to the numerous infections that are spreading throughout the population and the environment, the waste and gases generated by sewage are extremely dangerous to humans. The suggested technique uses automation to regulate drainage flow without the need for any solid ingredients. Drainage pipe blockages are currently removed manually by humans, which increases the risk of fatalities during the clearing process.

It is positioned across the swear system. trash such as bottles, etc. Using the servo motor and sensors, floating in the drain are observed, cleaned, and maintained. Teeth are used to lift waste, which is then gathered in a waste storage tank. The solid waste is lifted and pushed to the end of the collecting tank with the assistance of the servo motors. In the Swachh Bharat mission, smart drainage monitoring and cleaning systems will be very beneficial because they separates the waste thereby providing continuous flow of drain water. The use of a DC supply will be regarded as a benefit of power quality. DC supply is recommended for automatic sewage cleaning because it can be used and stored at the necessary drainage system. There will be harmonics in the system if an AC supply is used.

Up until now, drainage cleaning and monitoring have been done by hand. It is unsafe since the worker could be harmed by the toxic gases present in the drainage system. The suggested approach eliminates the drawbacks, preserves worker lives, and streamlines the procedure through automation. The IoT-based smart drainage cleaning and monitoring system for solid waste materials is described in the current work.

II. RELATED WORK

In several nations, the problem of improperly maintained and pilfered gas well covers is becoming concerning. It has been discovered that the current manhole cover systems only cover one monitoring parameter, have nascent technology, and have ineffective analytic capabilities to find and eradicate issues regarding manhole covers and security. The difficulties posed by growing populations and subterranean infrastructure cannot be met by the conventional techniques of manhole cover protection and monitoring. As a result, more automated monitoring systems must be created. If they fail to maintain the drainage system, the pure water may get contaminated with drainage water and can spread infectious diseases. 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 worker. Underground drainage monitoring system plays an important role in keeping the cities clean and healthy. In contrast to other nations, India has the largest population of sewage workers .Exposure of sewage workers to poisonous gases like hydrogen sulphide, sulphur dioxide, carbon monoxide, methane, ammonia, nitrogen oxide increases the death of the sewage workers. The main aim of this project is to design a network system which helps in monitoring poisonous gases present in sewage

III. PROPOSED METHODOLOGIES

The suggested technique is based on IoT, which aids in the monitoring of harmful gases found in sewage. When the gas level exceeds a certain threshold, sewage workers are warned by a buzzer indicating whether it is safe for the worker to work or not via an app on the web page. Then, an ultrasonic sensor is used to detect water levels, a GPS device is used to locate drainage, and a cellular phone is used to send SMS messages to a firm. Finally, all data is shown on an LCD screen and an IoT device is employed. This technology contributes to the safety of sewer employees.

The following features are proposed by our proposed system.

1. Identifies the drain where the blockage occurs.
2. Instant knowledge of the restriction.
3. The system controls the sewage flow from the pipes.
4. Flow sensors are used to detect differences in the flow.
5. Get previous notifications about blockages and use IOT to detect them.
6. Use GPS to track your location and send SMS over GSM.

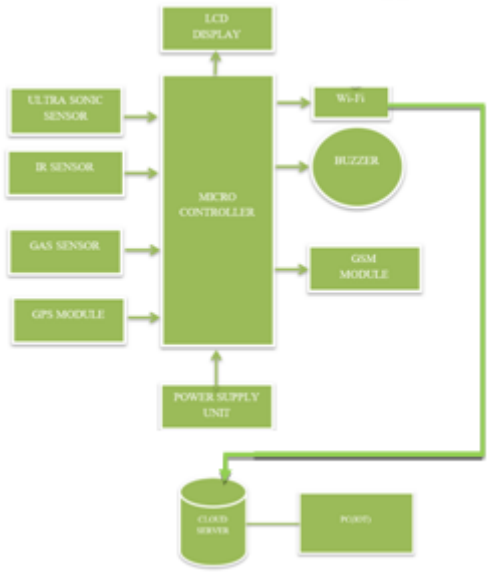

Fig 1 Basic flow diagram.

A.SENSOR INTERFACING

Sensor interfacing is a mix of amplification, filtering, and other signal conditioning as well as analog-to-digital conversion. The analog-to-digital converter (ADC) may be in your microcontroller, but you will still need to make the sensor compatible with the ADC input.

B.PREPARING POWER SUPPLY UNIT

A power supply unit (or PSU) converts mains AC to low-voltage regulated DC power for the internal components of a controller. A power supply is used to reduce the mains electricity at 240 volts AC down to something more useable, say 12 volts DC. There are two types of power supply, linear and switch mode. A linear power supply uses a transformer to reduce the voltage. The AC signal is rectified and regulated to produce a high DC voltage.

An external power supply known by various names such as AC adapters, AC/DC adapters, or AC/DC converters is typically housed in a casing resembling an AC plug. One may refer to adapters for battery-operated devices as rechargers or chargers (see also battery charger). When using electrical devices that need power but lack internal components to obtain the necessary voltage and power from main power, AC adapters are utilized. An internal or built-in power supply's internal circuitry is extremely similar to that of an external power supply.

C.MICRO-CONTROLLER PROGRAMMING

The microcontroller is one of the most potent instruments in contemporary design because of its versatility. The fundamentals of microcontrollers and their programming will be covered in this tutorial.

D. READING ANALOG DATA

An analog-to-digital converter, or ADC, is a circuit inside the board's microcontroller that reads this fluctuating voltage and converts it to a number between 0 and 1023. The input value is 0 and there are no voltages applied to the pin when the shaft is fully turned in a single direction. The input value is 1023 and there are 5 volts going to the pin when the shaft is fully turned in the opposite direction. In between, analog Read() yields a number proportional to the voltage applied to the pin, ranging from 0 to 1023.

E. TEST AND DEBUG

Testing means verifying correct behaviour. All phases of module development, including requirements analysis, interface and algorithm design, implementation, and module integration, are amenable to testing. In the following, attention will be directed at implementation testing. Implementation 1 testing is not limited to run-through testing. As explained below, correctness proofs, code tracing, and peer reviews can also be used to test an implementation. Code correction and execution testing are cyclical aspects of debugging. The goal of testing during debugging is not the same as that of testing the final module. While testing during debugging is primarily focused on identifying errors, testing for final modules aims to demonstrate correctness. The selection of testing strategies is significantly impacted by this distinction.

F. SUBMISSION

Submitting the prototype for the presentation to the faculty guide for review purpose . This UV sensor will also work in the same manner . This sensor in our device will detect the level of water from the lid of the manhole 24X7 . This sensor will have a threshold value for it , if it finds it's value crossing the threshold value it will make an alert through the buzzer fixed in the device and it will send a message like "IDENTIFIED OVERFLOW OF WATER IN REGION " . Now we found exact problem that is happened in the drainage and the message is sent to the concern authority before the problem is been identified by the people and it could be rectified in a quicker manner This system deals with different methods to overcomes the existing project monitoring methods and gives the best solution for network problems as well as a quick response to the reading. To make these projects as a real-time the system measures the parameters like water level, gases and sewage water levels are being monitored and updated to the internet server using IOT.

IV. INTERNET OF THINGS (IoT)

The network of physical objects, or "things," that are embedded with sensors, software, and other technologies in order to connect and exchange data with other devices and systems over the Internet, is known as the Internet of things (IoT).

Real-time analytics, machine learning, commodity sensors, embedded systems, and the convergence of multiple technologies have all contributed to the evolution of things. The Internet of things is made possible by the traditional domains of embedded systems, wireless sensor networks, control systems, automation (including automation of homes and buildings), and others. As a consumer product, Internet of Things (IoT) technology is most commonly associated with items related to the "smart home" concept, such as lighting

fixtures, thermostats, cameras, home security systems, and other appliances that facilitate one or more common

The IoT is the strategy for gadgets that encase hardware, and network, which enables these devices to fix, act together and switch information .IoT incorporates broadening Internet beneficial than standard gadgets, for example, work areas to any decision of generally non web get to material gadgets and on a day by day source objects. Inserted through innovation, these gadgets can banter and coordinate over the Internet, and they can be a little checked and restricted

V. RESULTS AND DISCUSSION

Problem identified by ultrasonic sensor

Alert By Message**:**

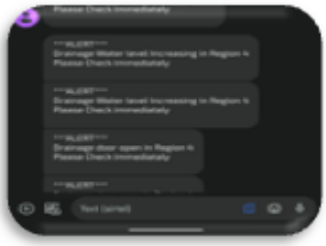

Figure 2: Message For Water Level

Result In Web Site**:**

Figure 3: Web Result ForWater Level

Result In Display**:**

Figure 4: Water Level Displaying

Problem identified by gas sensor

AlertBy Message**:**

Figure 5: Message For Gas Level

Result In Web Site :

Figure 6: Web Result For Gas Level

Result In Display**:**

Figure 7: Gas Level Displaying

Problem identified by ir sensor

Alert by message:

Figure 8: Message For Open Lid

Result In Web Site :

Figure 9: Web Result For Open Lid

Result In Display :

Figure 10: Open Lid Displaying

Results Of GPS :

Website Result:

Figure 11: Web Result For GPS

Google Map Result :

The values of latitude and longitude ofwebsite should be copied and pasted in the Google map to get the location with a comma (,) in between latitude and longitude

Figure 12: GPS Result In G-Maps

VI. CONCLUSION

Monitoring the underground drainage is a challenging problem. This system deals with different methods to overcomes the existing project monitoring methods and gives the best solution for network problems as well as a quick response to the reading. To make these projects as a real-time the system measures the parameters like water level, gases and sewage water levels are being monitored and updated to the internet server using IOT. The real time updated data on the internet helps in maintaining the regularity drainage check and ensuring the worker's safety. Drainage system is a very important system whether it is a industrial zone civil zone , so it had to be maintained in a secured and in a clean manner . In the case of drainage in civilian zone is not maintained in a clean and safe manner it will cause some serious infection , life time incurable diseases and some time dangerous to life of people , which makes the purpose of drainage system meaningless . If such drainage system for industrial zone is not maintained in a safe manner the waste or the things that pass through the drainage will not be unpredictable and it could leave to severe problems . The main problems related to drainage system is blockage ,the which is the starting point most other problems if the blockage is identified as quicker as possible and rectified the most

frequent problem of drainage system will be rectified . The other most important problem related to drainage system is the open lid , it's a dangerous fault that happens in drainage system , it may cause loss of life many time . The main reason of this fault is the time taken by news to reach to the authority to solve this problem , if this is been done in a quicker manner we can save our people from infections and some time save their life

REFERENCES

[1] Ahmed S. H, S. Rani, ''A hybrid approach, Smart Street use case and future aspects for Internet of Things in smart cities,'' Future Generation Computer Systems, 79, pp.941-951, 2018.

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

[3] Chellaswamy .C, H. Famitha, T. Anusuya, and S. B. Amirthavarshini, ''IoT based humps and pothole detection on roads and information sharing,'' in Proc. Int. Conf. Comput. Power, Energy, Inf. Commun.(ICCPEIC), Chennai, India, 2018.

[4] Eldemerdash .T, et al., "IoT Based Smart Helmet for Mining Industry Application," International Journal of Advanced Science and Technology, vol. 29, no. 1, pp. 373-387, 2020

[5] Garcillanosa .M. M, J. M. L. Pacheco, R. E. Reyes, and J. J. P. San Juan, \Smart Detection and Reporting of Potholes via Image Processing using Raspberry-Pi Microcontroller," in 2018 10th International Conference on Knowledge and Smart Technology (KST), Chiang Mai, 2018, pp. 191- 195, 2018..

[6] Guevara .J, F. Barrero, E. Vargas, J. Becerra, S. Toral, "Environmental wireless sensor network for road traffic applications," IET Intell.Transp. Syst., Vol.

[7] Guo .X, B. Liu, L. Wang, ''Design and Implementation of Intelligent Manhole Cover Monitoring System Based on NB-IoT,'' In 2019 International Conference on Robots & Intelligent System (ICRIS), 4(3), pp. 207-210, 2019.

[8] Kang .B.H and S.-I.Choi, ''Pothole detection system using 2D LiDAR and camera,'' in Proc. 9th Int. Conf. Ubiquitous Future Netw. (ICUFN), pp. 744–746, Jul. 2017.

[9] 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.

[10] 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

[11] OzanBicen .A and Ozgur B. Akan and V. CagriGungor, "Spectrum-Aware and Cognitive Sensor Networks for Smart Grid Applications," IEEE Communications Magazine, No.

[12] Romer, K.; Mattern, F., "The design space of wireless sensor networks," Wireless Communications, IEEE , vol.11, no.6, pp.54,61, Dec 2004..

[13] Vupparaboina .K. K, R. R. Tamboli, P. M. Shenu, and S. Jana, "Laser based detection and depth estimation of dry and water-filled potholes: A geometric approach", in Proc. Nat. Conf. Communications, pp. 1–6, 2015.

[14] ZigbeeAlliance, Zigbee 2007 Specification, 2007.