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A IOT Based Smart Drainage Monitoring And Cleaning System

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ABSTRACT—

The essential ingredient needed for life to exist on Earth is water. The primary uses of water are drinking, cleaning, and cooking. This also contains water and additional solid substances. Sewage disposal remains a difficult task in the modern world. The primary function of a smart drainage system is to gather and transfer solid waste, such as bottles and polythene, to a disposal location. If not, the drainage system will become clogged with solid waste. Solid trash must be gathered and disposed of in collecting bins in order to prevent such a disaster. In order to prevent drainage blockages, the suggested system will automatically clean the water in the drainage system using a mechanical setup powered by a servo motor and a drive system controlled by an Arduino. Solid waste will be collected and disposed of in a waste bucket. Both the expense of manual labor and the risk to human life are decreased.

Keywords: Internet Of Things(IoT), Sewage Monitoring, Arduino, Sensors

I. INTRODUCTIONII.

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Water is the basic requirement for the survival of life on earth. The water is mainly used for cooking, cleaning and drinking purpose. In which more solid ingredients along with water also reaches. The disposals of sewages are still a challenging task in this modern world. The main purpose of smart drainage system is collecting the solid waste which includes bottles, polythene and transport to the disposal area. Otherwise, the solid waste will block the drainage system. To avoid such situation, the solid waste is need to be collected and disposed it into collecting bin. The proposed system will automatically clean the water in the drainage system with the help of drive system controlled by Arduino and the mechanical setup which are driven by servo motor collect the solid waste and dispose it in waste bucket to avoid drainage block. It reduces the cost of manual labor as well as reduces the threat to human life.

The cleaning of drainage and monitoring is done manually till now. It is not safe because presence of poisonous gases in the drainage may affect the labor. The proposed method overcomes the disadvantages and saves the life of workers and makes the process easy with automation.

The present work describes the IoT based smart drainage monitoring and cleaning system for the solid waste materials.monitoring and cleaning system for the solid waste materials.

These days, water is consumed quite quickly. The drainage system receives water from commercial and industrial sources. This also contains water and additional solid substances. Nowadays, properly disposing of sewage from commercial buildings and businesses remains a difficult problem. Automated Drainage 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 make the surrounding area more livable.

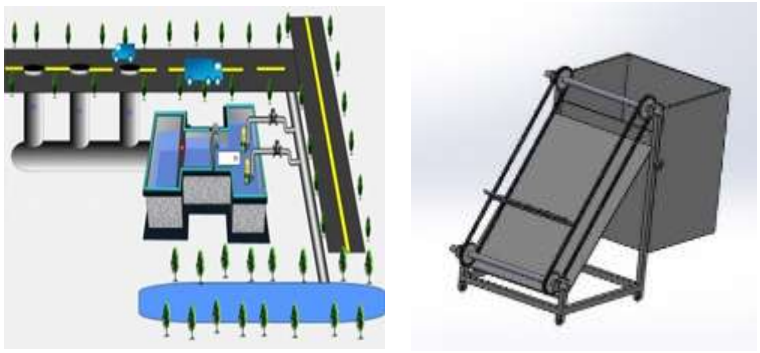

Fig1: drainage monitoring and cleaning system

II. LITERATURE SURVEY

Paper1: Monitoring Smart City Applications using Raspberry PI Based on IOT

In this research paper implementation of Internet Of Things (IoT) is shown for monitoring various applications in Smart City using Raspberry PI. which leads to improvement in efficiency as well as reducing cost and maintaining economic value. Using easy wireless communication system information can be shared faster. There are various types of sensor present in smart city and collecting data from all those variety of sensor and transferring it to Raspberry PI3 controller which further send this to control room via email can be done.

Paper 2: Automated Internet of Things for Underground Drainage and Manhole Monitoring System for Metropolitan Cities.

This research paper discusses the importance of sensor networks in the IoT world. Since there are a lot of devices that too of different varieties which sometimes leads to issues in defining common requirements for the WSN nodes and platforms. Real world approach to resolve this issue and making system more accurate, less costly and easy to maintain. This model checks water level, temperature as well as pressure in drainage system IoT technology for improving and maintaining sewage conditions and providing solutions to fatal issues that will have features like low maintenance, low cost, fast deployment, and a high number of sensors, long life-time and high quality of service. There can be improvement by provide more features like blockage preventions, safety precautions, and concerns for sewage cleaners by checking sewage lines conditions, live analysis of every sewage line analyzing sewage waste.

Paper 3: Simulation and development of sewage cleaning and monitoring robot using IOT

This project's main objective is to build and create a low-cost, commercially unobtainable sewage monitoring robot. Initially, this robot will keep an eye on the level of sewage, detect obstructions, and eventually steer clear of major sewage problems. To further reduce the cost of building two distinct devices, the cleaning system would also be integrated into the robot itself.

Paper 4: Design of real time automatic drainage cleaning and monitoring system using IOT

This paper provides In order to save personnel costs and ensure prompt, realtime clearing, automatic drainage cleaning devices were developed. In this project, all solid wastes are collected by an automatic drainage cleaning system that also helps to prevent chokes.

III. DESIGN OF THE PROPOSED SYSTEM

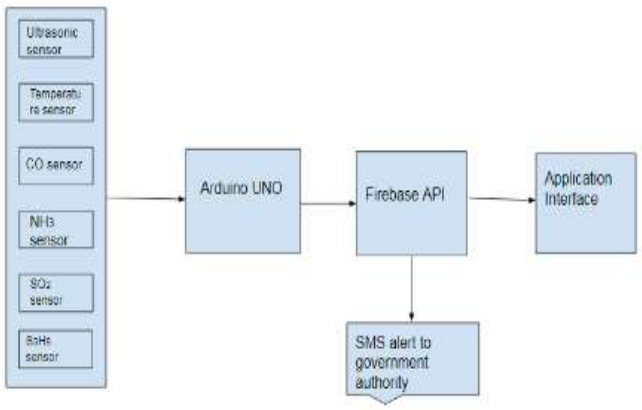

Fig1: Block schematic of the drainage monitoring system

This figure shows workflow of the system initially all the hardware modules are initialized and mounted on an Arduino board which passes on continuously fetched data to Arduino UNO which work as intermediate between nodes and sent it to Firebase API where all comparisons takes place based on those comparisons SMS alert is sent to government authorities and Application interface is used as graphical user interface in this proposed system. Initially all the hardware modules are initialized and mounted on an Arduino board. As all sensors continuously fetch data from the environment using microcontroller. And passes on to firebase. Firebase provides a real-time database as well as back-end as a service. This service API allows application data to be synchronized and stored on its cloud. Where it compares live fetched data to threshold values of respective hazardous sewage gases. If live data of any sensors exceed the threshold value the nearby municipal corporation is informed by sending a notification to respected authority. Not only data about sewage gases but temperature water level is also obtained if the water level is above some specific level it will notify the authority about which can be tracked with help of GPS and GSM system. If there is sudden fall in water level of adjacent sensors in sewage line there could be two reasons behind it one is blockage and other is leakage and water level crosses threshold height the nearby municipal corporation is informed as mentioned above. If the batteries of sensors reduce to minimum threshold same procedure will be followed.by admin and user credentials of all participants are stored as well as checked in firebase API with help of android application and every activity performed is stored and maintained in application with details like place, reason, time of incident etc.

IV. WORKING PRINCIPLE

The proposed system provides you an interconnected web of various sensors which will bring us real time values of the environment which can be compared to concentration of gases and temperature up to point that does not harm human body and provides workable conditions. These threshold values can be classified into various categories such as workable and dangerous. Apart from providing safety precautions to cleaners our proposed system will have record of water level with sudden water level change in any two adjacent sensor can be blockage or leakage which both are hazardous can be avoided and crossing threshold height of drainage a notification will be sent to government authorities which are responsible for maintaining sewage lines and take care of potential overflow and similar to gases we can have a database for battery of sensors which will lead to ease in maintaining process and over underground system will become smart which will contribute to making a city smarter. The device is placed across drain so that only water flow through screen, the waste like bottles, plastic etc. Floating in drain are lifted by lifter which is attached with screen. Screen is connected to the shaft which is driven by chain with the help of DC motor. The Device automatic drainage cleaning system Is Place Across Drain So That Only Water Flow Through Lower Grids. Waste Like Bottle, Etc. Floating In Drain Are Lifted By Teeth Which Is Connected To Chain. This Chain Is Attached By Gears Driven By Motor. The Energy Provided To Motor Is Solar Photovoltaic Cell Connected To It. When Motor Runs The Chain Starts To Circulate Making Teeth To Lift Up. The Waste Materials Are Lifted By Teeth And Are Stored In Waste Storage Tank.

V. COMPONENTS

1.Arduino Uno

Arduino Uno is an ATmega328P based microcontroller. It has 14 digital pins of which 6 can be used as PWM outputs, 6 analog inputs, a USB connection, a 16 MHz quartz crystal, a power jack, an ICSP header and a reset button.

2.Ultrasonic Sensor

The ultrasonic sensor and radar system work on the same principle. It is used to measure distance with the help of ultrasonic waves of frequency more than 18kHz.IN our research it will be used to detect water level in sewages.

3.Temperature Sensor (DTH 11)

The DHT11 is a basic digital temperature and humidity sensor. It is used to detect temperature as well as humidity under a manhole and determine whether it is safe for cleaner to get in.

4.Carbon Monoxide Sensor (CO)

This Carbon Monoxide (CO) gas sensor detects the concentrations of CO. The sensor ranges concentration from 10 to 10,000 pp. Operating temperatures for the sensor are -10 to 50°C and consumption is less than 150 mA at 5V.

5. Ammonia Sensor

Ammonia detectors work on electrochemical principle. Electrochemical sensors are electrochemical measuring transducers for measuring the partial pressure of gases under atmospheric conditions.

6.Methane Sensor

This methane gas sensor detects the concentration of methane gas in the air and outputs its reading as an analog voltage. The concentration sensing range of 300 ppm to 10,000 ppm is suitable for leak detection.

7.Propane Sensor

This propane gas sensor detects the concentrations of LPG, isobutane, and propane in the air and outputs its reading as an analog voltage. The sensor can measure concentrations of 300 to 10,000 ppm.

8. Sulphur Dioxide Sensor

Sulphur Dioxide, is a colorless gas with a strong Oduor. Sulphur dioxide is not combustible but it is considered an extremely toxic gas. Sulphur dioxide is heavier than air and PemTech uses electromechanical technology to detect it

VI.CONCLUSION

The Underground monitoring is a challenging problem. This proposes different methods for monitoring and managing underground drainage systems. It explains various applications like underground drainage and manhole identification in real time. Various parameters like temperature, toxic gases, flow and level of water are being monitored and updated on the internet using the Internet of Things. This enables the person in-charge to take the necessary

actions regarding the same. In this way the unnecessary trips of sewage workers are saved and can only be conducted as and when required. Also, real time updates on the internet helps in maintaining the regularity in drainage check thus avoiding the hazards.

VII.REFERENCES

[1] Y Nandini, K Vijaya Lakshmi, T Indra Sai Surjan, M Yasheswi, K Sri Jagadish, "Design of real time automatic drainage cleaning and monitoring system using iot ” Feb 2023.

[2]Ayush Kumar, Ronit Gupta, Anand Kumar, " Simulation and development of sewage cleaning and monitoring robot using iot. July 2023.

[3]Z. Mohd Hussin, S.S Saaddin. "Development of automated drainage system”. June 2022.

[4]Ajitesh Kumar, " Real time communication based Iot enabled smart sewage workers safety monitoring system”. Oct. 2021

[5] P. Srivastava, P. Mishra, A. Rai, S. K. Agrahari, R. Yajee and R. Agarwal, "Development of Water quality and Service Integrity Analyzer using IoT", 2022 10th International Conference on Reliability Infocom Technologies and Optimization (Trends and Future Directions) (ICRITO), pp. 1-4, 2022.

[6] P. Dhananchezhiyan, Somashekhar S. Hiremath, "Design and Development of a Reconfigurable Type Autonomous Sewage Cleaning Mobile Manipulator", Procedia Engineering, vol. 64, pp. 1464-1473, 2013, ISSN 1877-7058.

[7] V. Jha, S. Pal, A. Sonkhla and N. Jain, "Safety Monitoring Of Sewage Workers Using IOT and Machine Learning", SSRN 3866193, 2021.

[8] S. Kumar, S. Kumar, P. M. Tiwari and R. Viral, "Smart Safety Monitoring System for Sewage Workers with Two Way Communication", 2019 6th International Conference on Signal Processing and Integrated Networks (SPIN), pp. 617-622, 2019.

[9] U. V. Kumar, K. I. T. S. Warangal, D. Teja, T. Sanjana, G. SriRupa and D. S Teja, Smart Safety Monitoring System For Sewage Workers, 2021.

[10] V. Jha, S. Pal, A. Sonkhla and N. Jain, "Safety Monitoring Of Sewage Workers Using IOT and Machine Learning", SSRN 3866193, 2021.

[11] Adebayo Olatunbosun Sojobi and Tarek Zayed, Impact of sewer overflow on public health: A comprehensive scientometric analysis and systematic review Environmental Research, vol. 203, pp. 111609, 2022, ISSN 0013-9351.

[12] 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.

[13] 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 Issue 4, June 2015.

[14] 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