AUTOMATED WATER QUALITY MANAGEMENT USING RASPBERRY PI PICO

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Abstract:- The water purification system presented in this project harnesses the capabilities of a Raspberry Pico and an array of sensors to monitor and enhance the quality of water. It commences when an ultrasonic sensor detects the water level in the sewage tank, triggering a multi-stage purification process. The system undergoes three crucial phases: screening to remove solid particles, carbonation to eliminate unwanted chemicals and organic compounds, and RO salt pump purification to retain essential salts. The ultrasonic sensor halts the purification process once the purified water tank reaches a specific level to prevent overflow. Post-purification, a suite of sensors measures parameters like pH, gas content, turbidity, and temperature, with data transmitted to the cloud and accessible via the Blynk application. This purified water can be employed for household purposes. Future iterations may include automatic tank cleaning and maintenance alerts, adding further sophistication to this intelligent water purification solution.

1. INTRODUCTION

1.1 GENERAL

Sewage pipelines are filled with toxic gases, inhaling these gases for a long duration can lead to various chronic diseases. High concentrations of gases like Hydrogen Sulfide, Ammonia, Carbon Dioxide, Methane often leads to deaths. The lack of treatment and protection leads to the deaths of many sewage cleaners throughout the year. Manual system installation and data generation is both difficult and dangerous each time. So there is a growing need for automated data generation and monitoring. In this paper we suggest sewage tracking using

IoT technology. The developed system will help to track the sewage environment 24/7 by the authorities that employ those workers. They will be able to analyze and take precautions in real- time, based on the system-generated graphs. The system comprises gas sensors namely methane and carbon monoxide, apart from which an additional sensor that will measure the humidity and temperature is connected. The IoT analytics platform produces graphs and sends warnings whenever the gas values go beyond the standard limits. The attached camera can provide live video on the HTTP server, which can be used to identify blockages that guide workers to take the appropriate precautions. The proposed prototype can be changed based on the requirement of the industry. It can be used for monitoring the sewage conditions at different locations.

2. LITERATURE SURVEY

2.1 EXISTING SYSTEM

Current sewage water monitoring and filtering systems often rely on periodic manual sampling and basic filtration techniques, which can be inefficient, labour-intensive, and unable to provide real-time data or adaptive responses.

2.2 PROPOSED SYSTEM

The proposed sewage water monitoring and filtering system uses Raspberry Pi Pico to continuously monitor water quality parameters in real-time and control advanced filtration mechanisms, offering a more efficient, automated, and responsive approach to maintaining water quality.

3. BLOCK DIAGRAM

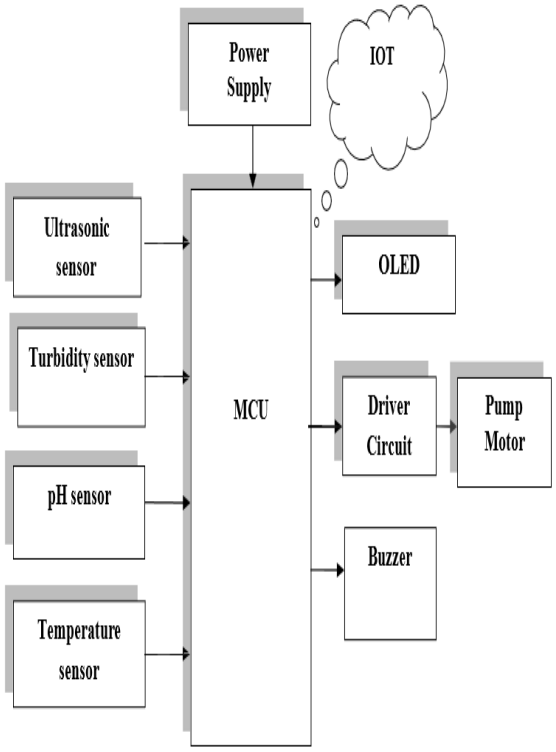

FIG: 1 Block diagram

3.1. HARDWARE COMPONENTS

- Regulated power supply.
- US sensor

- Turbidity sensor
- PH sensor
- Temperature sensor
- Micro controller.
- IOT

3.2. SOFTWARE REQUIREMENTS:

- Raspberry Pi Pico
- Embedded C

4. IMPLEMENTATION (WORKING PROCEDURE)

The ultrasonic sensor halts the purification process once the purified water tank reaches a specific level to prevent overflow. Post-purification, a suite of sensors measures parameters like pH, gas content, turbidity, and temperature, with data transmitted to the cloud and accessible via the Blynk application. This purified water can be employed for household purposes. Future iterations may include automatic tank cleaning and maintenance alerts, adding further sophistication to this intelligent water purification solution.

5. CIRCUIT DIAGRAM

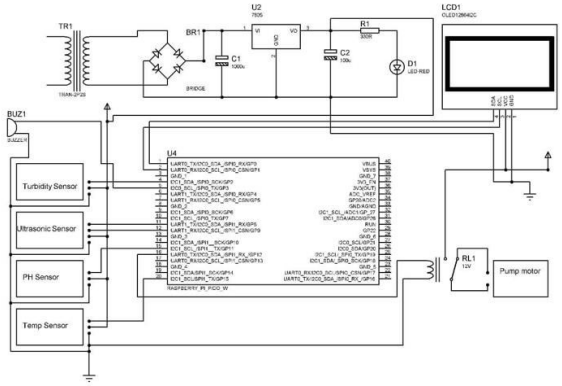

Fig : 2. circuit diagram

6. RESULT

This project is well prepared and acting accordingly as per the initia specifications and requirements of our project. Because of the creative nature and design the id of applying this project is very new, the opportunities for this project are immense. The practical representation of an experimental board is shown below:

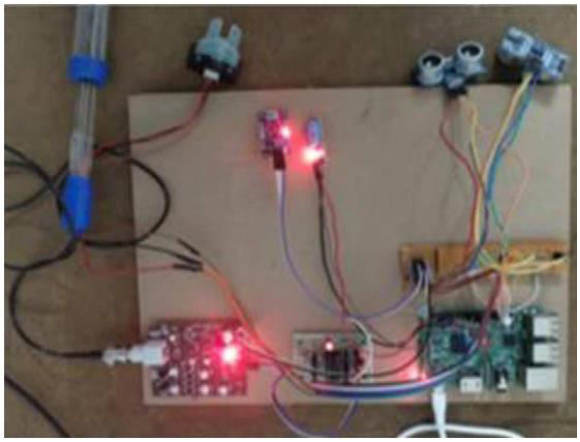

Fig:3. Project Model

7. CONCLUSION

Through natural decomposition, drainage always leads to production of toxic gases. These gasses can be harmful if inhaled for a long period of time and can lead to chronic diseases, if they are absorbed in the body at high concentrations. These toxic gasses are extremely hazardous for sewer workers and often lead to death. The goal of this project is to provide a technique to measure the harmful release of gaseous materials into the drainage system and thereby give the authorities a warning message to save the lives of the sewer workforce. The previous system failed to take into account several variables such as humidity, temperature, and live video generation. The humidity and temperature sensors, in addition to the gas sensors, can help determine the sewage's overall environment. The sensor values were utilized to measure each gas's voltage, density, and ppm. And the graphs were plotted in real time on the ThingSpeak platform using those values. This provides the authority with a means to track the sewage remotely. In addition, the ThingHTTP application allows the user to set the thresholds and adjust them according to the requirement. The device provided the planned performance whenever the gas levels exceeded the thresholds, and the user received the alert message on the Pushover Application. In addition, the Raspberry Pi camera's live video can help sewage workers detect blockage. There may be potential changes to enhance the overall efficiency of the proposed program. MQ- 135 Ammonia and Nitrous Oxide, MQ-136 Sulphide Hydrogen gas sensors are equally dangerous to human beings so can be added to the system. Chassis can be used to mount the designed prototype so that the camera can have broader coverage, and sensors can gather data as the system moves. An alarm/siren can be installed to warn people around the area of some unfortunate occurrence of an incident in and around the sewage for the sufferer's emergency rescue. With respect to, the values stored in the database with the corresponding date can be used as a dataset for the machine learning algorithms and the desired output can be obtained.

9. REFERENCES

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