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An Internet of Things (IoT) gateway for monitoring borewell water quality

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ABSTRACT

For eco-conscious globalisers, water contamination is a major concern. Constant monitoring of water quality is required to provide a steady supply of potable water. In this project, we showcase the design and construction of an affordable system that uses motor pumps and Internet of Things (IoT) technology to monitor water quality in real-time. Several sensors make up the system, and their job is to measure water pollution characteristics. Water contamination level (dirtiness) is detected by a turbidity sensor, and the temperature of the motor pump is recorded by a DHT sensor. The core controller is able to process the sensor readings. As a central controller, the ESP8266-based NodeMCU may read the values and upload them to the cloud server. Watching sensor readings on a web dashboard or a mobile app dashboard is made possible with the help of Blynk IoT cloud server.

INTRODUCTION

Groundwater is essential for India's agricultural sector. Forcibly digging borewells to deeper depths became necessary as a result of the unpredictability of rainfall and the monsoon's failure. People living in urban areas rely on water from borewells since there is no other reliable source. Additionally, water contamination has become more of an issue in recent times. By using technological breakthroughs such as Big Data, the Internet of Things, cloud computing, and internet facilities, we can monitor the borewell and solve drawbacks such as low-quality drinking water, higher labour needs, and permanent damage caused by unmonitored public motors. For the population, borewells are an essential supply. This project's implementation calls for a temperature sensor to track the motor's performance and a turbidity and DHT11 sensor to measure the water's clarity.

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Water is one of the most vital resources for sustaining life on Earth. However, in recent years, the quality of water has been increasingly threatened by various pollutants, posing significant challenges to human health and the environment. Pollution of water bodies occurs through the discharge of harmful substances, such as industrial waste, agricultural runoff, and household chemicals, into rivers, lakes, and groundwater sources. This essay delves into the causes and consequences of water pollution and explores how borewell water quality projects play a crucial role in detecting and monitoring contamination levels.

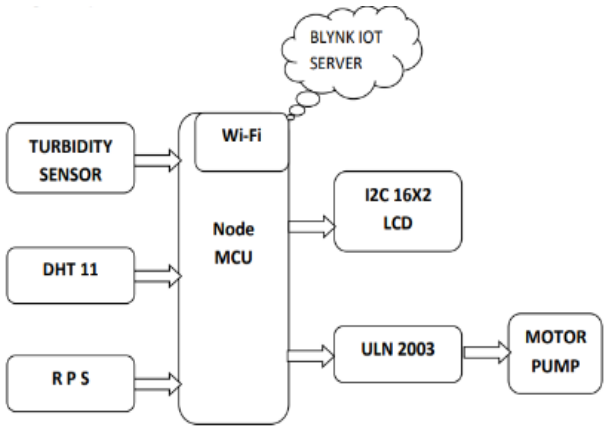

Figure.1 Block diagram

OBJECTIVE OF THE PROJECT

Monitor Water Quality: The project aims to continuously monitor the quality of water in borewell by collecting data on various parameters such as pH, turbidity, dissolved oxygen, and levels of contaminants like heavy metals and pesticides.

Early Detection of Contamination: By employing sensors and monitoring devices, the project seeks to detect contamination events in real-time, allowing for prompt intervention and mitigation measures to prevent further deterioration of water quality.

Localized and Decentralized Monitoring: The project aims to provide localized and decentralized monitoring solutions, particularly in remote and rural areas where access to clean water is limited and contamination risks are high.

PROPOSED SYSTEM

The main aim is to detect the WATER CONTAMINATION LEVEL remotely. It is very helpful when we want to use a water from underground,as we cannot see the water directly instead of

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that if we use this technique,then we can reduce the contamination water intake and can decrease the environment pollution. When we ON the motor pump,it indicates the water quality and temperature in a server itself. We written a code for BLYNK server to access remotely. This is actually can operate through remotely also. The Turbidity value and temperature of a water will be shown in a LIQUID CRYSTAL DISPLAY. We keep the TURBIDITY SENSOR in a water for testing quality of a Water.

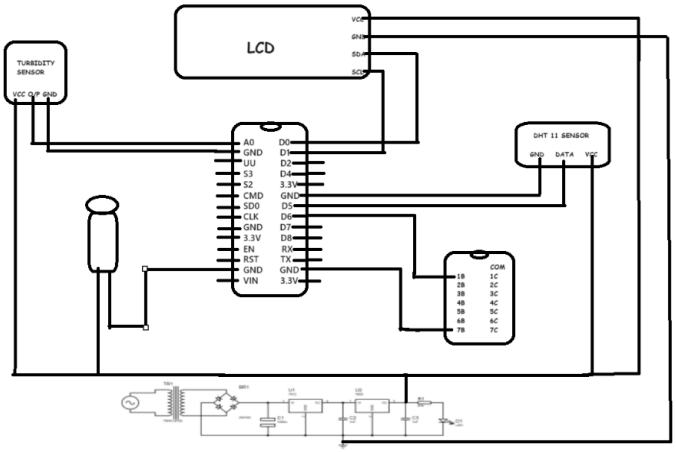

Figure.2 Schematic Diagram

RESULTS

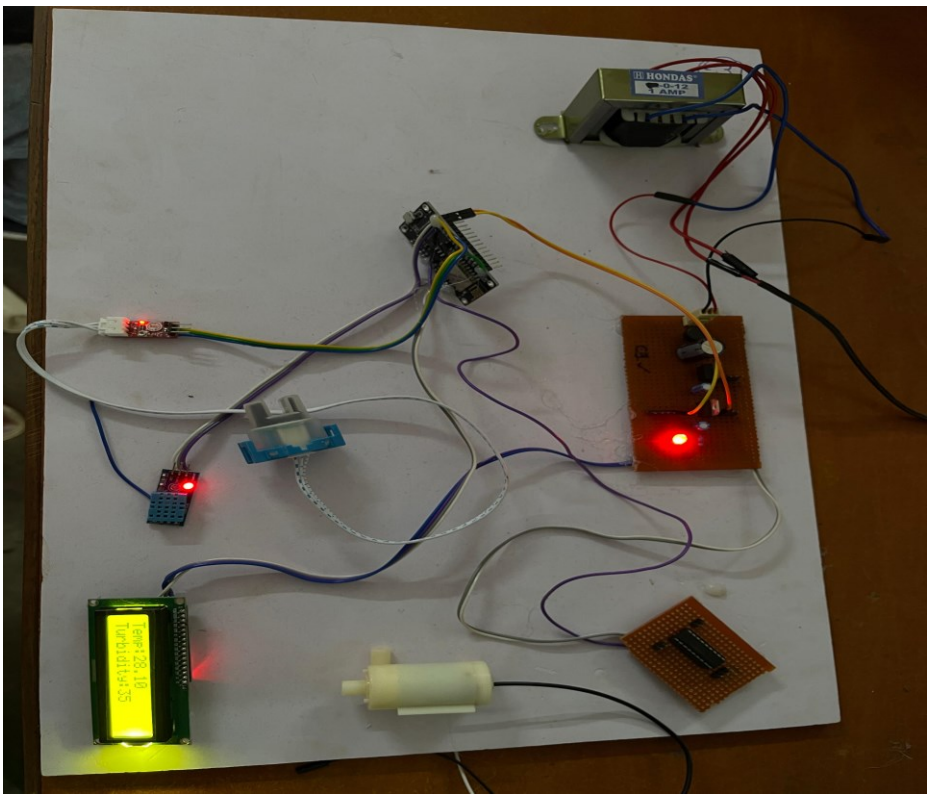

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Figure.3 Displaying the values on LCD

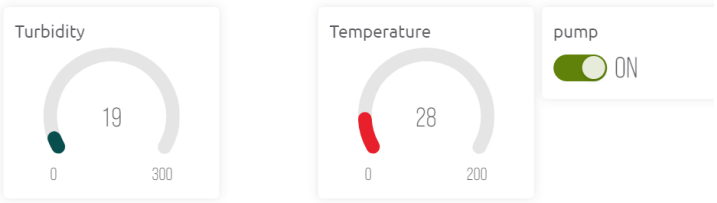

Figure.4 Values on Blynk App

ADVANTAGES

- Seamless Communication
- Data Accuracy
- Early Detection of Contamination
- Cost Efficiency
- Remote Access and Control
- Environmental Conservation
- Improved Resource Management

APPLICATIONS

- Agriculture
- Industrial Use
- Drinking Water supply
- Environment Monitoring
- Ground Water Management
- Research and Education

CONCLUSION

In conclusion, the implementation of a borewell water quality monitoring system utilizing IoT gateway technology has demonstrated significant potential in ensuring real-time water quality assessment and management. Through the integration of sensors and data processing

capabilities, this project offers a comprehensive solution for continuous monitoring, analysis, and remote management of borewell water quality parameters.

By harnessing the power of IoT, stakeholders can access timely and accurate information about water quality, enabling prompt decision-making and intervention to address any detected issues. This proactive approach to water quality management not only safeguards public health but also supports sustainable resource management practices.

Furthermore, the scalability and adaptability of this system allow for its deployment in various settings, ranging from individual households to community water supply networks. Its ability to provide actionable insights in real-time empowers users to take preventive measures and optimize resource utilization effectively.

As we continue to face challenges related to water scarcity and pollution, the integration of innovative technologies such as IoT-based water quality monitoring systems becomes increasingly crucial. This project serves as a testament to the potential of technology-driven solutions in addressing complex environmental challenges and underscores the importance of ongoing research and development in this field. Through collaborative efforts and continued innovation, we can strive towards a future where access to safe and clean water is ensured for all.

FUTURE SCOPE

In addition to the significant advancements achieved through the implementation of the borewell water quality monitoring system based on IoT gateway technology, there exists a promising future scope for further enhancements and applications.

One avenue for future development lies in the refinement of sensor technologies to enable even more precise and comprehensive monitoring of water quality parameters. This may include the integration of advanced sensors capable of detecting a broader range of contaminants or the development of miniaturized, low-cost sensors to facilitate widespread deployment.

Furthermore, advancements in data analytics and machine learning algorithms hold great potential for enhancing the predictive capabilities of the monitoring system. By analyzing historical data patterns and incorporating predictive models, the system could anticipate

changes in water quality, enabling preemptive measures to mitigate potential risks or contamination events.

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