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Wireless Smart Water monitoring and quality measurement system

Hitarth Patel[1], Yash Patel[2],Manthan Mistry[3], Dharmesh Tukadiya[4],S.N.Shah[5],S.Y.Rathod[6]

Student, Instrumentation and control, Vishwakarma gov. Eng. college, Ahmedabad, India[1 2 3 4]

Assistant professor, Instrumentation and control, Vishwakarma govt. Eng. college, Ahmedabad, India[5 6]

Abstract:Water is a vital resource for human survival. Nowadays, water scarcity has become an important crisis. Water scarcity is defined as the sufficient available water in all the water resource particularly to meet the demands of water usage. Pollution of water is one of the main threats in recent times as drinking water is getting contaminated and polluted. The polluted water can cause various diseases to human and animals, which in turn affects the life cycle of the ecosystem. If water pollution is detected in early stage, suitable measures can be taken and critical situations can be avoided. To make certain supply of pure water, the quality of the water should be examined in real-time. Smart solutions for monitoring of water level and pollution are getting more and more significant these days with innovation in sensors, communication, and IoT technology. In this paper, we have included detailed review of the latest work that were implemented in the college water system. The paper Propose a cost effective and efficient Wireless Smart Water Monitoring and Quality Measurement System. The measured parameters are transmitted to the cloud server for further action.

Keywords: Sensors, ESP32, wireless monitoring, Cloud, Mobile application.

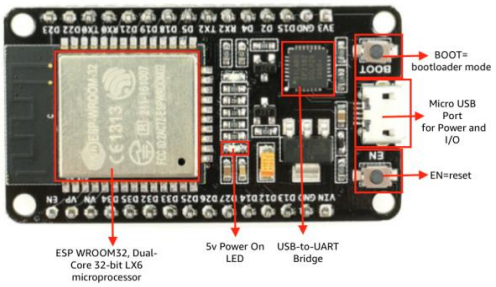
I.INTRODUCTION

Water pollution ensures when lethal materials move into water sources like ponds, rivers, lakes, seas and oceans, gets dissolved and suspends in water or gets deposited on the bed. Pollution will degrade the quality and purity of water. Ensuring pure and safer water is really challenging due to undue sources of chemicals and contaminants. Pollution of water can be instigated by numerous ways; one of the main reasons for pollution is industrial waste discharge and city sewage. Secondary sources of pollution are pollutants that enter the water from soils or from atmosphere via rain or from groundwater systems. Usually, soils and groundwater Comprises of residues of modern practices in agriculture and also indecorously disposed wastes from industries. The major pollutants of water include viruses, bacteria, fertilizers, parasites, pharmaceutical products, pesticides, nitrates, fecal waste, phosphates radioactive substances and plastics. These materials will not alter the color of the water always, but they might be indiscernible contaminants. Hence small quantity of water from such water resources and marine organisms are examined for determining the water quality.This current method is time consuming and also expensive. There are available many sensors for measuring water quality. We are measuring and monitoring water quality parameters like Ph, turbidity etc. and other parameter like temperature, flow, level etc.

II.HARDWARE COMPONENTS

1.ESP32

ESP32 is a series of low-cost, low-power system on a chip Microcontrollers with integrated Wi-Fi and dual-mode Bluetooth. All the sensor are interfaced with esp32. The sensors will measure different parameters and will provide information regarding environmental condition to ESP32.



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2. RTD

A Resistance Temperature Detector (RTD) is a device with a significant temperature coefficient (that is, its resistance varies with temperature). It is used as a temperature measurement device, usually by passing a low-level current through it and measuring the voltage drop. In our project the data received by this sensor is fed to controller and with internet connectivity of esp32 the data is displayed on Blynk application. So, it becomes easy for users to view and understand the current temperature of water in water tank.

3. Ph sensor

A pH sensor is one of the most essential tools that's typically used for water measurements. This type of sensor is able to measure the amount of alkalinity and acidity in water and other solutions.

4. TDS sensor

TDS stands for total dissolved substances. For TDS measurement we are using DF robot TDS sensor. This is an analog sensor. Here are its specifications,
Input Voltage: 3.3 to 5v
Output Voltage: 0 to 2.3v
Range: 0 to 1000 ppm

5. Float Switch

For level measurement we are using float switch. Float switch is digital sensor. It gives high output when water level reached otherwise it gives low output.

6. Flow sensor

Water flow sensor consists of a plastic body, a water rotor, and a hall-effect sensor. When water flows through the rotor, rotor rolls, its speed changes with different rate of flow. And the hall-effect sensor outputs the corresponding pulse Signal.Range of this sensor is 2 to 100 Lit/min.

III.SOFTWARE COMPONENTS

Arduino IDE

The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino and Genuino hardware to upload programs and communicate with them. All the sensors are connected with Arduino and their interfacing is done using IDE and in this we observed the behaviour of each sensor.

Blynk App

Blynk platform powers low-batch manufacturers of smart home products, complex HVAC systems, agricultural equipment, and everyone in between. The Blynk app is really an app editor. It allows us to create one or more projects. Each project can contain graphical widgets, like virtual LEDs, buttons, value displays and even a text terminal, and can interact with one or more devices.

IV.PROPOSED SYSTEM AND ITS WORKING

Our System consists of different sensors such as Flow sensor, Ph sensor, TDS sensor, Level sensor. All these sensors are connected with controller named ESP32. According to sensor it will detect and measure the corresponding parameters from water tank and water source.

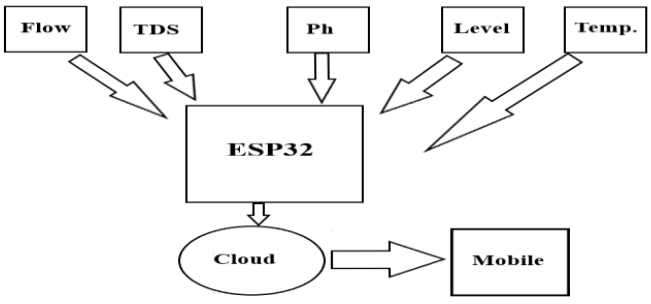

Fig 1. Block diagram of the system

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The sensor data is sent and received by client or costumer through Internet connectivity provided by the esp32 controller.All the sensors are interfaced with hardware. The sensors provide input to controller and the data received from sensor is fed to webpage through local area network by using the internet connectivity enabled by Arduino. The farmer can view the information on webpage as well as on mobile. The information provided by sensor gives the live condition of field crops and accordingly the action can be taken. Along with sensor information the prediction if weather by live weather forecasting can be done. By this information it becomes easy for anyone to understand and take actions for proper and effective irrigation.

Table1: TDS Measurement CriteriaTable2: Ph Values

Sr. No.	TDS Value	Water Situation
1	0 to 170	Ideal
2	< 500	Drinkable
3	>500	Undrinkable

Sr. No.	Ph Value	Type of solution
1	0 to 6	Acidic
2	7	Neutral
3	7 to 14	Basic

V.Results

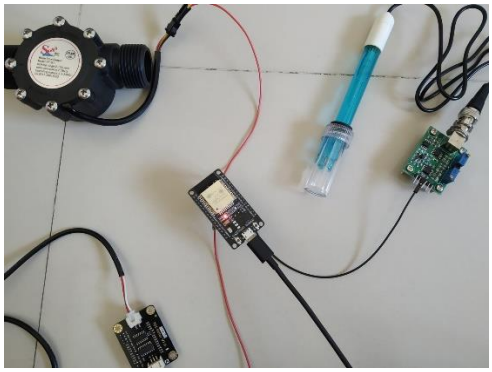

Fig 1. Sensors connections with ESP32

Fig 2. Water Tank

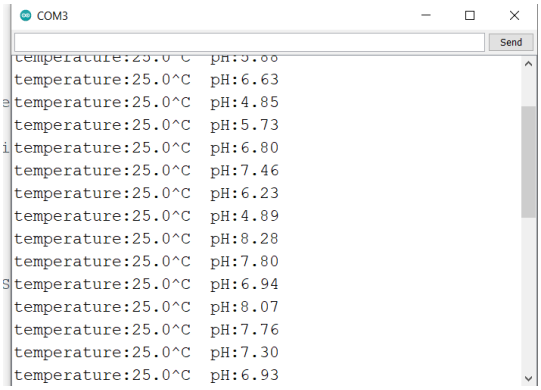

Fig 3. Readings of pH

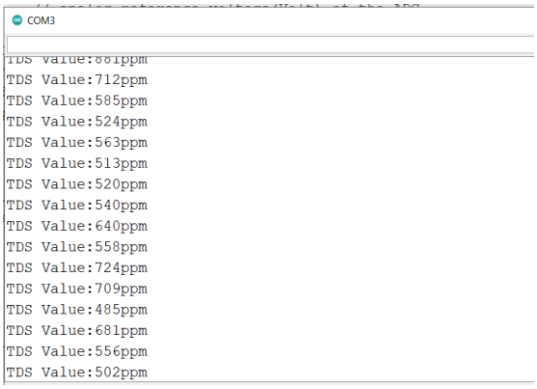

Fig 4. Readings of TDS

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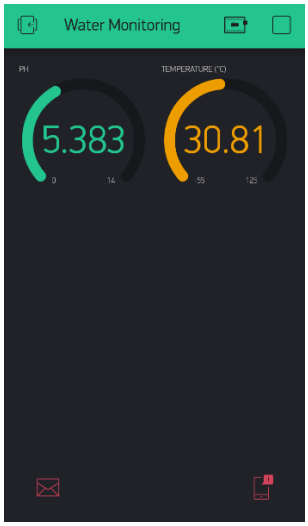
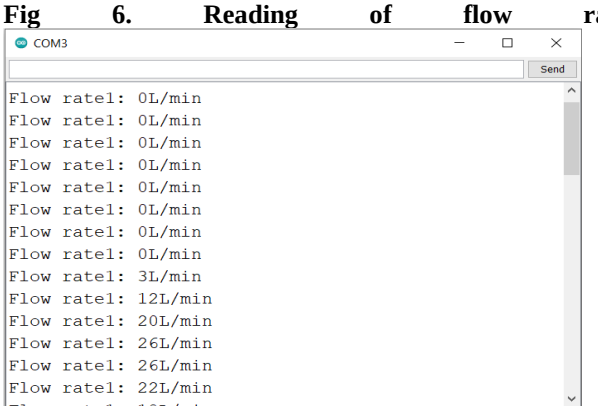


Fig. 5 Pictorical view of an app

Fig 6. Reading of flow rate



VI. CONCLUSION

The system that we integrate can check water quality every time. The advantage of it is we don't need to take sample every time. Traditional method of water quality measuring is too much time consuming and also costly. Using technology like IoT we make wireless water quality measurement system which will monitor the quality of the system automaticallyand does not require any trainee to monitor the data.So the water quality testing is likely to be more economical, convenient and fast.

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