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Design and Implementation of IoT Water Pollution RC Boat

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Abstract : The design and implementation of an IoT-based remote-controlled (RC) boat for measuring water pollution parameters is presented in this abstract. The system comprises a custom-built RC boat equipped with various sensors to measure water quality parameters such as temperature, pH, and turbidity. The boat is controlled using a mobile application, allowing the user to navigate the boat to the desired location and collect data. The boat's sensor data is transmitted to a cloud-based platform, where it is processed and analyzed to provide real-time water quality information. The platform includes a dashboard that displays the measured parameters in a user-friendly interface, allowing stakeholders to monitor water quality trends and make informed decisions. The boat is powered by a rechargeable battery and uses a Wi-Fi module to communicate with the mobile application and cloud-based platform. The boat's design includes a waterproof casing to protect the electronics from damage. Overall, the IoT-based RC boat provides an efficient and cost-effective solution for monitoring water quality parameters in lakes, rivers, and other bodies of water. The system's remote-controlled feature allows it to access hard-to-reach areas and collect data quickly, while the cloud-based platform enables real-time monitoring and analysis of water quality data.

IndexTerms **– Internet of Things (IoT), Arduino Uno, RC boat, Sensors.**

INTRODUCTION

Water quality can be influenced by various sources of pollution, both direct and diffuse. These sources encompass activities like the discharge of sewage and industrial waste, as well as the runoff from agricultural fields and urban areas. Additionally, water contamination can arise from natural occurrences such as floods and droughts, exacerbated by the lack of awareness and education among users. It is imperative to involve users in preserving water quality and address related factors like hygiene, environmental sanitation, and proper storage and disposal practices. The consequences of poor water quality are far-reaching, leading to the spread of diseases, loss of life, and hindrance to socio-economic development. The use of fertilizers and pesticides by farmers can result in their transportation via rainwater runoff, ultimately reaching rivers and other water bodies. Industrial waste products are similarly carried into rivers and lakes. These contaminants infiltrate the food chain and accumulate, eventually reaching toxic levels and causing harm to birds, fish, and mammals. Chemical factories also contribute to water pollution by discarding waste into water bodies. Additionally, factories draw water from rivers for machinery operations or cooling purposes, which elevates the water temperature and disrupts the balance of dissolved oxygen, adversely affecting aquatic life. Given these factors, the monitoring of water quality becomes indispensable.

NEED OF THE STUDY

The main goal of an IoT-powered remote-controlled (RC) boat designed for measuring water pollution parameters is to obtain real-time information about various factors that impact the water quality in a specific location. The boat can be equipped with diverse sensors that measure different parameters like pH levels, dissolved oxygen, temperature, and conductivity [1,2]. By employing an IoT network, the collected data can be transmitted to a central server for analysis and processing, ultimately offering insights into the water quality of the area without any human intervention.

To control the boat, a mobile app or a web-based interface can be used remotely. This allows the operator to navigate the boat in the water and collect data at specific points of interest. Furthermore, the boat can incorporate a camera or other imaging sensors to provide visual feedback regarding the state of the water [3].

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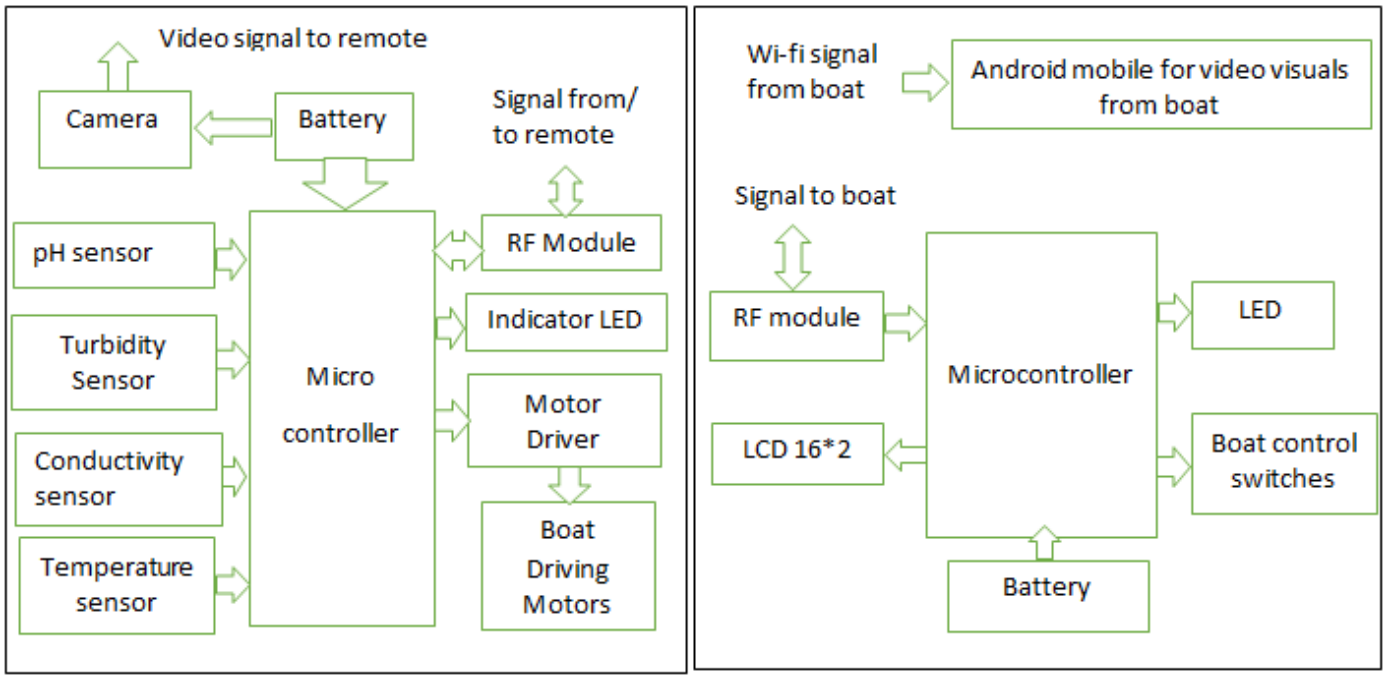
RESEARCH METHODOLOGY

Two sensors, a turbidity sensor and a pH sensor, are employed in this project to get the necessary data from the required water. The NODE MCU ESP8266N is linked to these sensors [3,4]. The sensors collect data on water parameters, and the processed data is transferred to the mobile application through the W-FI MODULE. The Blynk application, which shows data on water parameters, is used to see the result on a mobile device. The sensor results are gathered from several solutions, and using the PH range and turbidity values, it is determined that the water is safe for drinking. This IOT system offers a wi-fi hotspot to enable customers to access data on their mobile devices and collect information on the amount of liquid [5].



RESULTS AND DISCUSSION

Currently, a water sample is manually taken in order to assess the water's quality. To assess the quality, these samples were given to labs, which required more labour, money, and time. In our technology, the characteristics of water will be shown automatically on screen without further human effort [6]. These characteristics allowed us to assess the quality of water.

Table 4.1: Parameters Monitored

Parameter Monitored	Quality Range	Unit
Temperature	20-30	Degree Celsius
pH	6.5-8.5	pH
Turbidity	5-10	NTU

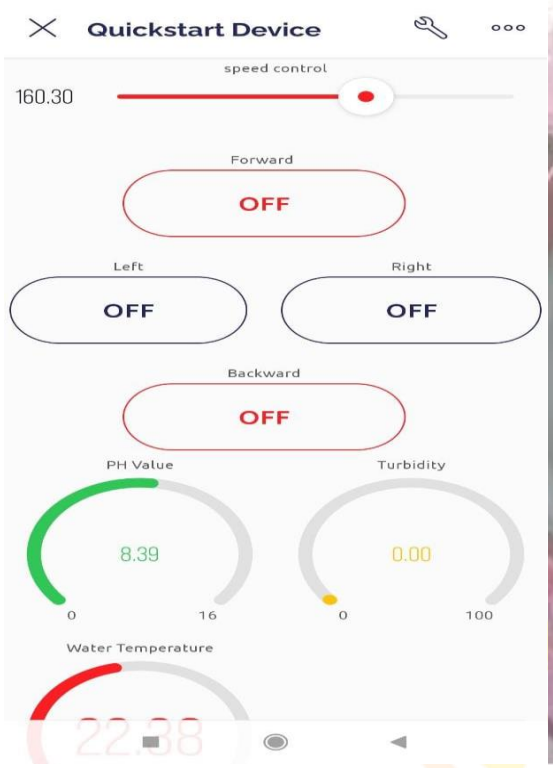


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Fig.1 Result Display on Blynk Platform

Fig. 2 RC Boat Model

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