WATER POLLUTION MONITORING RC BOAT

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***Abstract*—Water pollution has become a major issue these days, due to the dumping of industrial waste, harmful chemicals and other pollutants. This has led to an increasing demand for water purification system to provide clean drinking water. Hence, to monitor the different pollutants present in water sources we use a RC boat equipped with different sensors. We use turbidity sensors and ph sensor and temperature sensor to monitor the pollution level in the water sources.**

Keywords*— *ESP32 WROOM, TURBIDITY SENSOR (SKUSEN0189), PH SENSOR, TEMPERATURE SENSOR

I. Introduction

Due to excessive sources of pollutants, it has become difficult to ensure the safety of water. The main causes for water quality problems are over use and exploitation of natural resources. Water quality is affected due to sewage discharge from industries and other man-made pollutants. Water quality monitoring is defined as the collection of information at specific locations and regular intervals to provide information which may be used to define current conditions and established trends etc.

II. Literature Survey

A. Related Work

The different sensors are interfaced to the controller viz. ph sensor, Turbidity sensor, conductivity sensor etc. In addition, the camera is interfaced to controller for getting the live video of the present location of boat. The interfaced sensors are placed on boat and the real time data can be obtained once the boat moves over the water surface. This real time data is uploaded on to the cloud server. Once the data is uploaded the parameters are observed and analyzed. The readings of sensor generated on terminal are uploaded on Thing speak cloud server and the real time parameters are uploaded.[1]

Wireless communication system and customized buoy detect water temperature, dissolved Oxygen and PH in a pre-programmed time interval. The developed prototype disseminates the gathered information in graphical and tabular formats through a customized web used portal and re-register mobile phones to better save relevant and users. The system has grade prospect can be used for environment monitoring. [2].

In this research IoT platform has been built which consists of water condition monitoring sensor, embedded system capable of processing sensor data and sending to data center, data transmission with MQTT protocol. The system monitoring of Automated Water Quality Device using passive and active sensors that shown in the research result and discussion that report all status monitoring system from Things-to-Things connections through internet while sending data and transmission the report status using MQTT protocol [3].

Based on the Remote-sensing technology, the digital image processing technology, the pattern recognition and Object-Oriented Method, we have implemented RWQMS. RS provides correct, rapid and macroscopic observation data. GPS provides the precise location information of ground monitor point. GIS provides the spatial information management and analysis and the establishment of database, model and images.3S uses will achieve water RWQMS function extending, expand application fields, and promote the water pollution control work [4].

B. Methodology

In this project we have designed a RC Boat which monitors and check the water quality and it returns the monitored data over cloud in google excel sheets. Every water source has some impurities or pollutants present in them. So, we use an RC boat equipped with ph sensor, turbidity sensor and temperature sensor. The DS18B20 Temperature Sensor is a one-wire digital temperature sensor. It has better operating voltage, temperature range and accuracy as compared to others. We have used SKU SEN0189 sensor because of its low cost and high durability. It has a high operating temperature and operating voltage. This RC boat is deployed in the water source to monitor the level of impurities and pollutants present in the water source. The data is stored on the Cloud in google Excel sheet. As well as result is displayed on the Blink app in the Mobile. The RC Boat is hence controlled using this application. With the help of this data acquired, we will get to know the nature of water and the quality of water.

III. BLOCK DIAGRAM

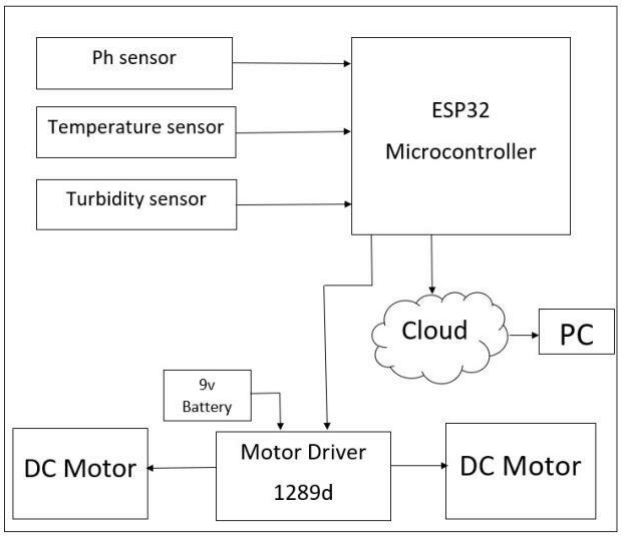

Fig 1. Block diagram of System

We have interfaced Ph sensor, turbidity sensor, temperature sensor and a motor driver to ESP32 microcontroller. We have interfaced two DC motors to motor driver. The motor driver is connected to 9v battery.

IV. FLOW CHART

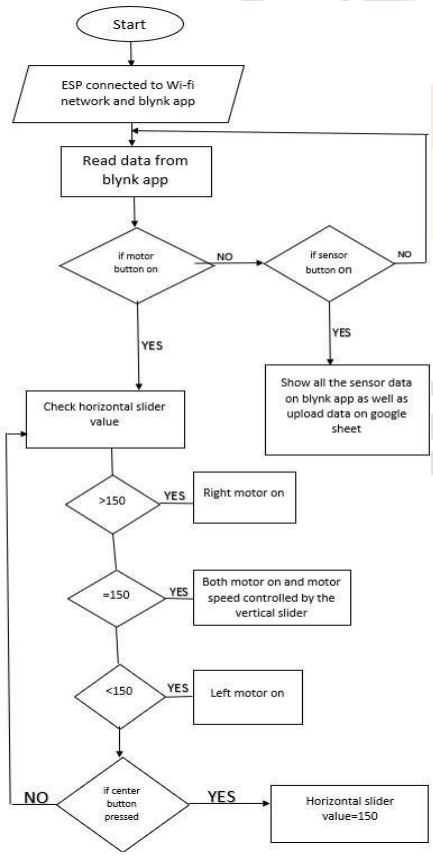

Fig 2. Flowchart of Blynk application

When the blynk application is started on the mobile phone, the Espwroom32 microcontroller is connected to Wi-Fi and blynk application. Then it reads data from the Blynk app. Then it checks for two conditions.

The first condition is as follows: If the motor button is switched on then it will go to check horizontal slider value (used for turning RC boat to left and right). Here also we have four conditions. If the value of horizontal slider value is more than 150, the right motor will get switched on. If the value of horizontal slider value is equal to 150, both the motors will get switched on and speed of the motor will be controlled by the vertical slider. If the value of horizontal slider value is less than 150 then, the left motor will be switched on. If the center button is pressed, then Horizontal slider value will come directly to 150 and both the motors will be rotating together. If the slider button is not on 150 then again it will go back to check horizontal slider value.

The second condition is as follows: That if the motor is switched off then it will go to check whether the sensor button is switched on or not. And if the sensor button is switched on, then it will show all the sensor values that are obtained in blynk app as well as it will upload and store the data on google sheets. If the sensor button is switched off then it will again go to read the data from the blynk application and the loop is continued.

a. Hardware Setup

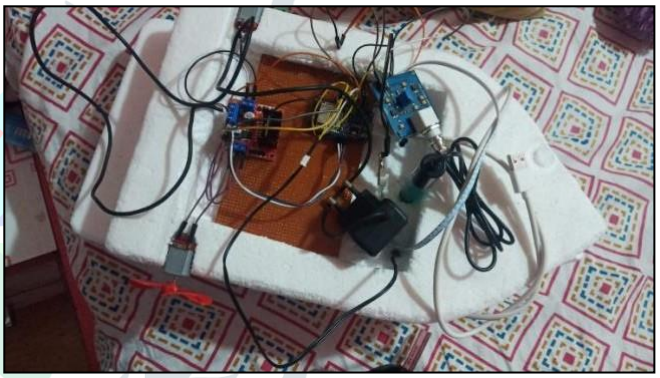

Fig 3. Hardware of the proposed system

In this project we have interfaced Esp-32 microcontroller to different sensors like Ph sensor, temperature sensor, turbidity sensor. The Espwroom32 is used to collect data from the sensors like Ph level, temperature, turbidity percentage and send this data to the mobile phone as well as store the data in google excel sheet.

We have made the remote for the RC boat in such a way that the RC boat can move in left or right direction. There is a speed controller in the remote for maintaining the speed intensity of the boat. The Espwroom32 is a powerful, genetic Wi-Fi+ BT Microcontroller module that targets a wide variety of applications. It has Maximum power of 3.3V, 12-bit SAR ADC that is 4096.

The turbidity sensor provides us percentage of clear water, temperature sensor provides the temperature rate in Celsius. The Ph sensor on the scale of 0-14 gives values according to the type of water. For example, if the water is basic then it

will show above 8, if its acidic it will show the reading below 6 and if its neutral it will show range between 6-8.

b. Software

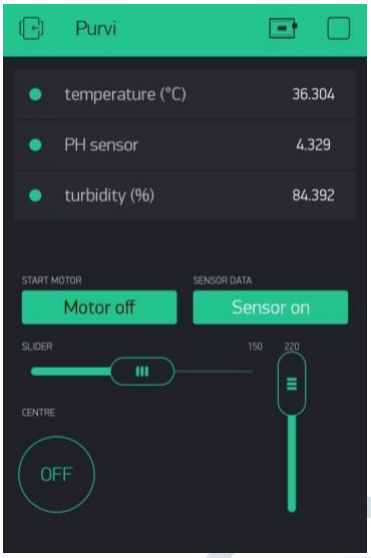

Fig 4. Blynk Application

Blynk is a new platform that allows you to quickly build interfaces for controlling and monitoring your hardware projects from your iOS and Android device. After downloading the Blynk app, you can create a project dashboard and arrange buttons, sliders, graphs, and other widgets onto the screen.

V. Results and Discussion

Here we have used a Turbidity sensor to calibrate the turbidity of drinking water as well as dirty water

Type of Water	**% of Clean Water**
Drinking Water	97.13
Dirty Water	60.17
Type of Water	**Degree C of water**
Hot Water	72.01
Cold Water	2.46
Normal Water	27.15

Type of Water	**Ph value**
Lemon juice	1.91
Soap water	12.54
Tap water	7.13

We measured the temperature of normal water which came out close to the room temperature. This test was carried out first so that the reading could later be used for the comparison between other samples of water. The sensor was cleaned and then inserted in hot water and later dipped in cold water to gather the readings respectively.

We have used an analog pH sensor to calculate the pH value of different water samples. First, we have used tap water forneutral pH, the ideal pH reading for tap water lies between 6.5-8.5. Then we used soap water for basic solution, the ideal pH reading for soap water is 12. Lemon juice is used for acidic solution, the ideal pH reading for lemon juice is around 2 as it is acidic in nature.

VI. CONCLUSION

Hence, the conclusion is that our water pollution monitoring RC boat is efficient, low cost and durable. It measures the Ph, turbidity and temperature of the water. It gives accurate readings. Anyone can operate it easily with the help of remote present in mobile. We can get the data on mobile and also store it in the google excel sheet.

Monitoring of turbidity, ph & temperature of water makes use of water detection sensor. The system can monitor the temperature, Ph and turbidity automatically with the help of remote control, and it is low in cost. So, the water quality testing is likely to be more economical, convenient and fast. The system has good flexibility. The operation is simple. It has widespread application and extension value.

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