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Arduino UNO based Water Quality Monitoring and Reporting over Web Server

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Abstract: Water is essential component for survival of every living being on earth. The increase of development technology results in the water pollution. The maintenance water quality is the major concern of every developing country. The proposed system consists of embedded sensors that measures physical as well as chemical properties of water. The parameters such as temperature, P^H, turbidity, level and presence of ammonia in the water can be measured. The measured values from the sensors can be processed by the Arduino Microcontroller. LCD is used for displaying the values of all the sensors. Finally, the sensor data can be viewed on web server using Zigbee and Wi-Fi module.
Keywords: pH sensor, Turbidity sensor, Temperature sensor, Ultrasonic sensor, Arduino UNO, ZigBee module.

I. INTRODUCTION

The 21st century is the fastest growing century that provides various developments in both industrial and technological fields. The growing industrial and technical fields result in the water pollution which has becoming life threatening issue of every country. Many measures have been taken by the government to reduce the water pollution. By considering the all issues we came to conclusion that there is a need of continuous monitoring of the water quality to provide the safe environment to every species on earth. The proposed system provides the water quality monitoring by utilizing embedded sensors and the quality parameters are updated on both LCD and web server. The range of pH is 0-14 P^H. For drinking purpose, it should be 6.5-8.5pH. Turbidity measures the large number of suspended particles in water that is invisible. Clean water has low turbidity value. Temperature sensor provides the temperature of the surrounding environment. Ultrasonic sensor measures the level of water. The Ammonia concentration in water is also determined with the help of MQ2 sensor. The sensors data can be viewed on the web page. The proposed system utilizes Arduino UNO microcontroller that provides the processing information collected from the level sensor, temperature sensor, turbidity sensor, P^H sensor and MQ2 sensor on the LCD. The proposed system is also capable of providing all the details of the quality parameters of the water on the web server with the help of ZigBee module that provides Wi-Fi connectivity.

II. LITERATURE SURVEY

In [1] the proposed system in this project utilizes Arduino microcontroller. The quality of the water is monitored with the help embedded sensor and its information is processed by the Arduino UNO microcontroller. The proposed system creates the awareness among the peoples regarding the quality of the water.

In [2] this paper presents the novel method for monitoring the quality of the water. The major issue of today's world is the water pollution that results in dangerous life taking diseases. The proposed method in this paper utilizes turbidity sensor that determines the quality of the water. The proposed system uses LPC2148 microcontroller for processing the information of the senor on both LCD and web server.

In [3] the proposed system in this paper utilizes the 8051 microcontroller that monitor the analog data received from the temperature sensor and this information is displayed on the LCD. The analog to digital convertors converts the analog value of the sensor in to the digital value and continuously update on the LCD.

In [4] the paper presents the real time monitoring of the water with the help of the Raspberry Pi processor. The P^H sensor, ammonia sensor and temperature sensor is connected to the processor. The P^H sensitivity, presence of ammonia and the temperature of the water is monitored and the monitored parameters of the water from the different sensors are updated on the web server. The Raspberry pi processor provides the feature of the internet connectivity

III. PROPOSED DESIGN METHODOLOGY
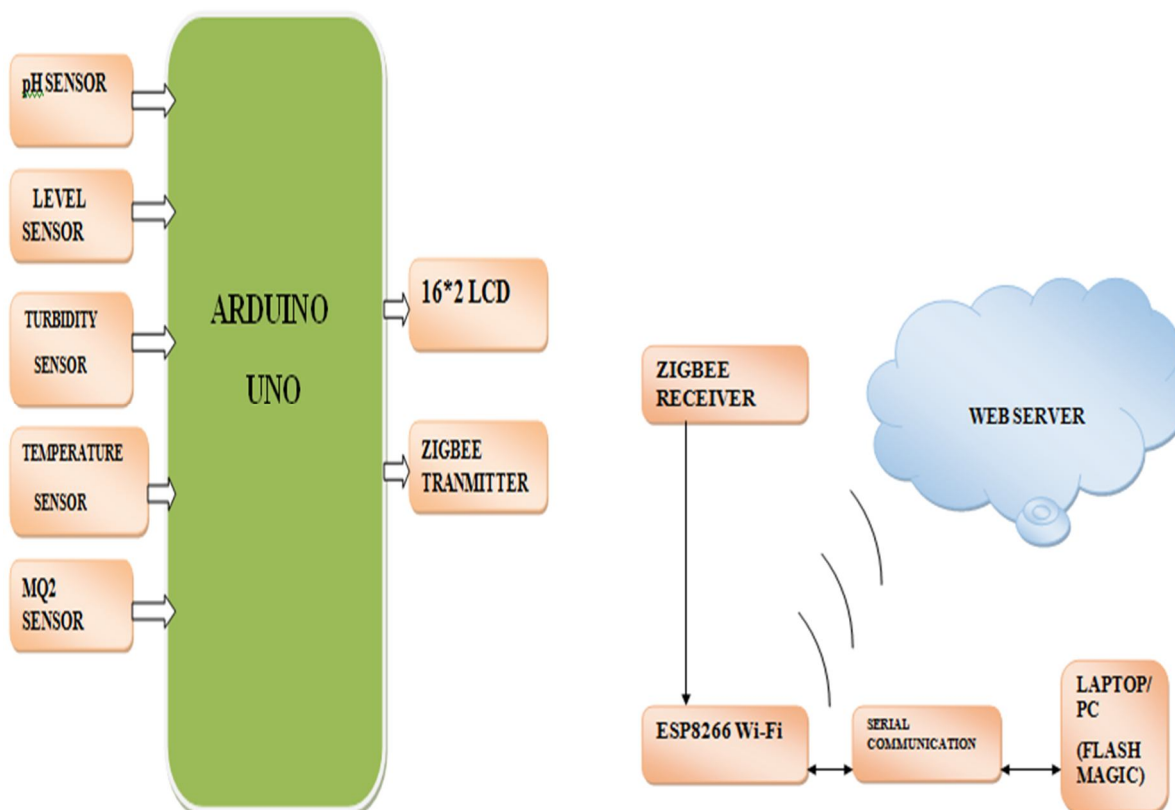
A. Block Diagram

Fig. 1 Block diagram of proposed system

IV. HARDWARE IMPLEMENTATION

A. Components Required

1) *Arduino UNO:* Arduino UNO is the microcontroller based on the ATMEGA328 processor. The Arduino UNO consists of 40 pins and provides digital and analog input/output pins to the user.

2) *Node MCU (ESP8266 Wi-Fi):* Node MCU is an open source IoT platform. It includes firmware which runs on the ESP8266 Wi-Fi SoC.

3) *Zigbee Module:* Zigbee module provides wireless communication and Zigbee transmitter and Zigbee receiver are the two main blocks of Zigbee module.

4) *Ultrasonic Sensor:* An ultrasonic sensor is an instrument that measures the distance to an object using ultrasonic sound waves. An ultrasonic sensor uses a transducer to send and receive ultrasonic pulses.

5) *Temperature Sensor:* The temperature sensor is an analog sensor; it takes analog value from the surrounding and converts them to digital value.

6) *P^H Sensor:* The normal range of P^H sensitivity for drinking water should lies between 6 to 8.5. The P^H sensor operates at 5V.

7) *Turbidity sensor:* The Turbidity sensor measures the quality of water. The turbidity results in blocking of sunlight inside the water. The blocking of sunlight damages aquatic vegetation.

8) *MQ2 Sensor:* The MQ2 sensor is used for detection of ammonia present in the surrounding environment.

9) *16*2 LCD:* LCD stands for Liquid Crystal Display. The 16*2 LCD is utilized in this proposed system for displaying the results.

V. EXPERIMENTAL SETUP AND RESULT

The proposed system utilizes Arduino UNO microcontroller that provides the processing information collected from the level sensor, temperature sensor, turbidity sensor, P^H sensor and MQ2 sensor on the LCD. The proposed system is also capable of providing all the details of the quality parameters of the water on the web server with the help of ZigBee module that provides Wi-Fi connectivity.
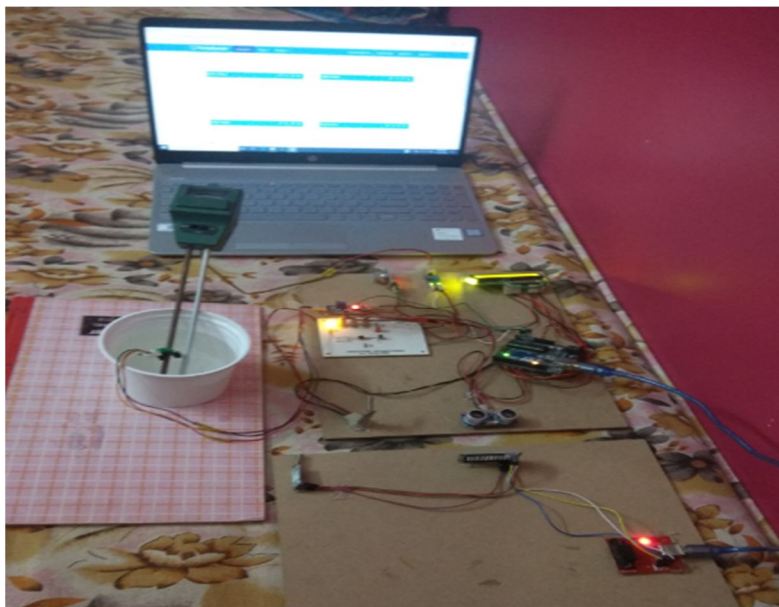

Fig. 2 Experimental setup of the project

The following figures represent the LCD display containing welcome message and the value of level, humidity, ammonia, temperature and turbidity of the water.
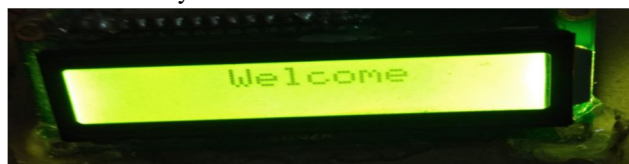

Fig. 3LCD display welcome message   Fig. 4 LCD display all sensors value

The value of level, humidity, ammonia, temperature and turbidity sensors is also updated on the webpage as shown by the following figures.
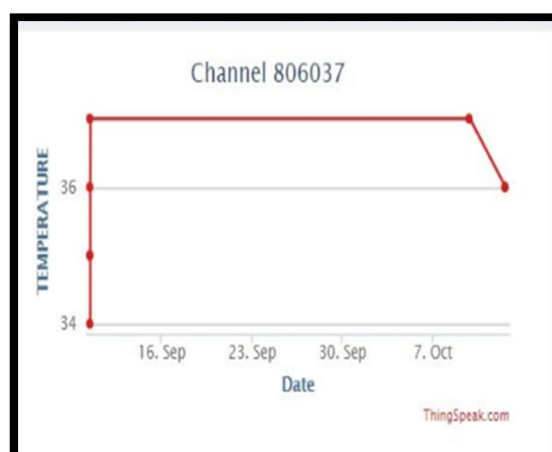

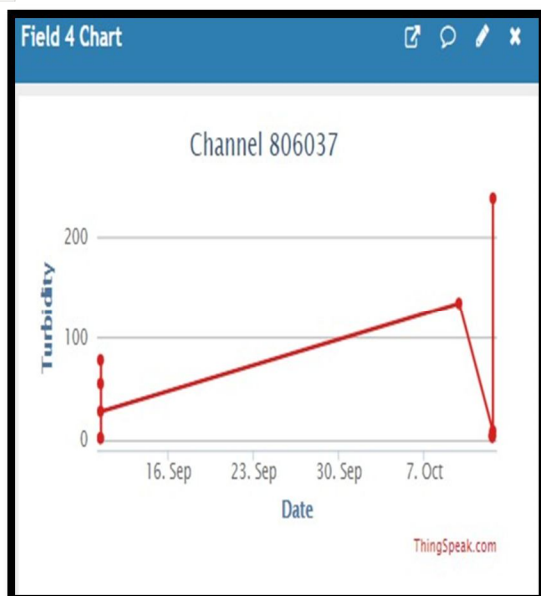Fig. 5 pH sensor value on web server   Fig. 6 Temperature sensor value on web server

Fig. 7 Turbidity sensor value on web server

Fig. 8 Ammonia sensor value on web server

VI. CONCLUSION

The proposed system successfully monitors the quality of the water with help of level sensor, temperature sensor, turbidity sensor, P^H sensor and MQ2 sensor and updates these quality parameters of the water on the web server with the help of ZigBee module. . The proposed system creates the awareness among the peoples regarding the quality of the water.

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