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AN INTERNET OF THINGS -BASED TOTALLY FULLY SENSIBLE TECHNOLOGY FOR WATER EMERGENCY MONITORING MACHINE

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Abstract - Water is the maximum important and useful resource for human beings. A water pollutant is one of the most troubling conditions for green globalists. Confined water resources, developing populations, getting old infrastructure, and different elements all make contributions to the challenges. The excessive nice of water is described with the help of the bodily, chemical, and microbiological houses of water. it's miles a measure of the relative kingdom of water, and it includes dissolved oxygen, pH, temperature, salinity, and nutrients (nitrogen and phosphorus). The proposed system decorates a tool for water residence studies with the use of trouble speaking, an open-deliver case-primarily based, definitely composite utility with an Arduino bundle deal that specializes in low power consumption, low price, and excessive detection accuracy. Keeps the goal pH, conductivity, and diploma of turbidity. The diagrams supplied in this paper offer complete answers to some of the troubles, and we now and then need to change water records to get familiar with the gadget. The critical contributions of those paintings can be defined as follows: First improvement of a trendy tool for inexperienced management of wastewater. Second, a new method to defend human beings the use of this generation additionally benefits the surroundings.

Keywords- High-Quality Inspection, Sensors, Internet of things, Arduino

1 INTRODUCTION

There were several innovations in the twenty-first century, but at the equal time pollutants, international warming, and many others have been becoming. The pleasantness of ingesting water needs to be monitored to ensure a safe delivery for human existence. The conventional method of determining water pleasant includes a manual collection of water samples at numerous locations, accompanied using laboratory ana-lytical techniques to represent the water great. There-fore, there is a need for higher strategies to reveal water pleasant.
The internet of things (IoT) is defined as a network of bodily gadgets consisting of appliances, motors, and homes embedded with sensors, microcontrollers, and network connectivity that enable these gadgets to ac-quire and trade statistics. IoT can be known as a net-work-enabled item generation, such that it could be monitored, controlled, and linked within the present internet infrastructure. Each tool has a unique identi-fier and should be able to autonomously capture real-time records. With the help of IoT in water excellent monitoring, various troubles had been confronted like statistics collection, conversation, information analy-sis, and many others. However, to carry it into the scenario, technology, and protocols are added to reap the desired consequences. [13].

A module is connected to the Arduino device which helps in moving the statistics over the net to the cloud. An ultrasonic sensor allows for measuring the water's degree. While the water float reaches a sure level, the water flow may be stopped mechanically by means of turning off the motor or by turning off the water float within the pipe with the help of Ar-duino is. The water goes with the flow sensor measures the quantity of water flowing thru the pipe at a given time; this information can be despatched to the cloud for storage and evaluation functions. Different sensors which include temperature, pH, and turbidity sensors degree the satisfactory wireless of the water and assist determine whether the water is suitable for consumption or any agricultural cause.

I. LITERATURE REVIEW

Brinda Das, P.C. Jain et.al (2017), proposed a “Re-al-Time Water Quality Monitoring System using the Internet of things”. The conventional method of testing water quality is to gather samples of water manually and send to the lab to test and analyze. This method is time-consuming, a waste of man-power, and not economical [1].

Nikhil Kedia entitled et. al., “Water Quality Moni-toring for Rural Areas-A Sensor Cloud Based Eco-nomical Project”This paper highlights the entire water quality monitoring methods, sensors, embed-ded design, and information dissipation procedure, the role of government, network operator, and vil-lagers in ensuring proper information abandonment. It also explores the Sensor Cloud domain. Efficient use of technology and economic protocols can help improve water quality and awareness among people [2].

Jayti Bhatt, and Jignesh Patoliya et. al., have de-scribedensuring the safe supply of drinking water the quality should be monitored in real-time for that purpose new approach of IoT (Internet of Things) based water quality monitoring has been proposed. In this paper, we present the design of IOT based water quality monitoring system that monitors the quality of water in real-time. This system consists of some sensors which measure the water quality parameter such as pH, turbidity, conductivity, dis-solved oxygen, and temperature. The measured val-ues from the sensors are processed by the microcon-troller and these processed values are transmitted remotely to the core controller which is raspberry pi using Zigbee protocol. [3].

Michal Lom, OndrejPribyl, Miroslav Svitek et. al., proposed the conjunction of the Smart City Initia-tive and the concept of Industry 4.0. The term smart city has been a phenomenon of the last few years, which is very inflected, especially since 2008 when the world was hit by the financial crisis. The main aimof the emergence of the Smart City Initiative is to create a sustainable model for cities and take careof the quality of life of their citizens. The agen-da of the smart city cannot be seen only as a tech-nical discipline, but different economic, humanitar-ian or legal forms must be involved as well. In the concept of Industry 4.0, the Internet of Things (IoT) shall be used [4].

ZhanweiSun, ChiHarold et. al. In this paper authors have described an efficient energy management framework to provide a satisfactory QOI experience in IoT sensory environments. Contrary to past ef-forts, it is transparent and compatible with lower protocols in use, preserving energy efficiency in the long run without sacrificing any attained QOI lev-els. Finally, acase study based using the sensor net-works to perform water level monitoring is given to demonstrate the ideas and proposed algorithms [5].

Thinagaran Perumal1, 1Md Nasir Sulaiman, 2Leong.C.Y, et. al., proposed that an IoT based wa-ter monitoring system that measures water level in real-time. The model is based on idea that the water level can be very important parameter when it comes to the flood occurrences especially in disas-ter prone areas. A water level sensor is used to de-tect the desired parameter, and if the water level reaches the parameter, the signal will be feed in real time to social networklikeTwitter [6].

II.SYSTEM DESIGN

The whole design of the system is based mainly on IOT which is newly introduced concept in the world of development [8]. There is basically two parts in-cluded, the first one is hardware & second one is software. The hardware part has sensors which help to measure the real time values, another one is ar-duino UNO R3 converts the analog values to digital one, & Desktop shows the displays output from sen-sors, Wi-Fi module gives the connection between hardware and software.

The IoT based Water Quality Monitoring System de-veloped involves Arduino and as microcontroller and processing unit. In addition TDS Sensor deployed in Water and same connected to Arduino microcontrol-ler for collecting the water parameters which are hy-drogen ion concentration and total dissolved solvents Also the Arduino unit connected serially to R3 for communication of data for analysis where ma-chine learning algorithm K-Means Cluster been de-veloped [3]. The results been updated in Cloud serv-er.

The TDS is design at first level of construction and component and sensors mounted on it. Thingspeak app is installed in the android version to see the out-put. When the system gets started dc current given to the kit and arduino and WIFI gets on. The parameters of water are tested one but one and their result are given to the Desktop display. The app went provided with hotspot gives the exact value as on Desktop dis-play shows on kit. Thus like this when the kit is lo-cated on any specific water body and WIFI is provid-ed we can observe its real time value on our android phone anywhere at any time.

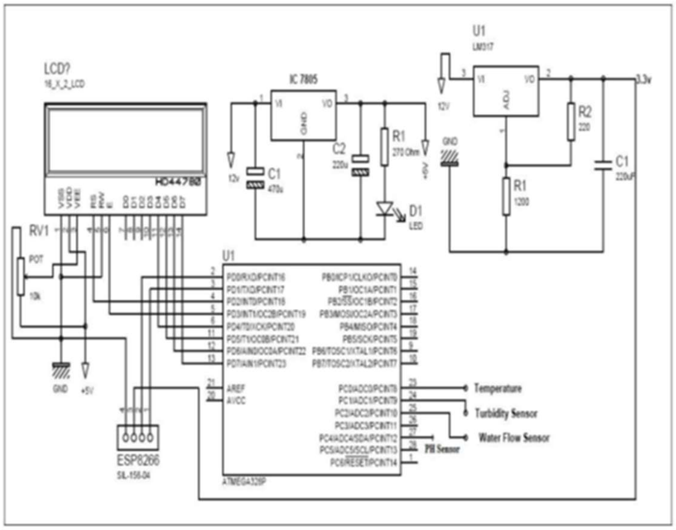

Fig 2.1 Block diagram of devices used in proposed work

2.1 Thing Speak

ThingSpeak is an open-source Internet of Things (IoT) application and API to store and retrieve data from things using the HTTP protocol over the Inter-net or through a local area network. ThingSpeak ena-bles the creation of a social network of things with sensor logging applications, location tracking appli-cations, and status updates.

The thing speak in create my channel (temperature, flow of water and humidity) and connation of arduino R3 send a data LCD display. Find a value of water temperature, water flow of water using to IoT tech-nology.

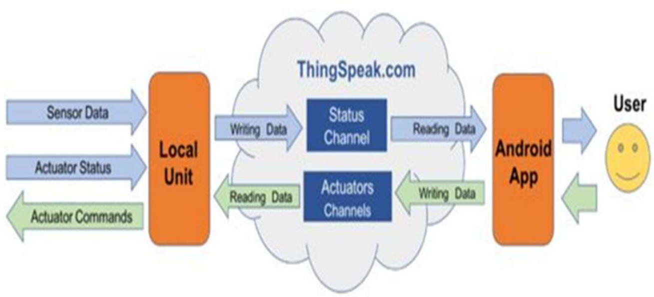

Fig.5.1 (b) Thingsspeak working

The TDS is design at first level of construction and component and sensors mounted on it. Thingspeak app is installed in the android version to see the out-put. When the system gets started dc current given to the kit and arduino and WIFI gets on. The parameters of water are tested one but one and their result are given to the Desktop display. The app went provided with hotspot gives the exact value as on Desktop dis-play shows on kit. Thus like this when the kit is lo-cated on any specific water body and WIFI is provid-ed we can observe its real time value on our android phone anywhere at any time.

III Experimental Setup

In this IOT based work there are four sections, first-ly Humidity and Temperature Sensor DHT11 senses the Humidity and Temperature Da-ta. Secondly Arduino Uno R3 extracts the DHT11 sensor's data as suitable number in percentage and Celsius scale, and sends it to Wi-Fi Module.

Modules of proposed work are given as:

1. Turbidity sensor
2. Arduino UNO R3
3. Wi-Fi module(ESP8266)
4. Temperature Sensor Module (DTH 11)

TDS

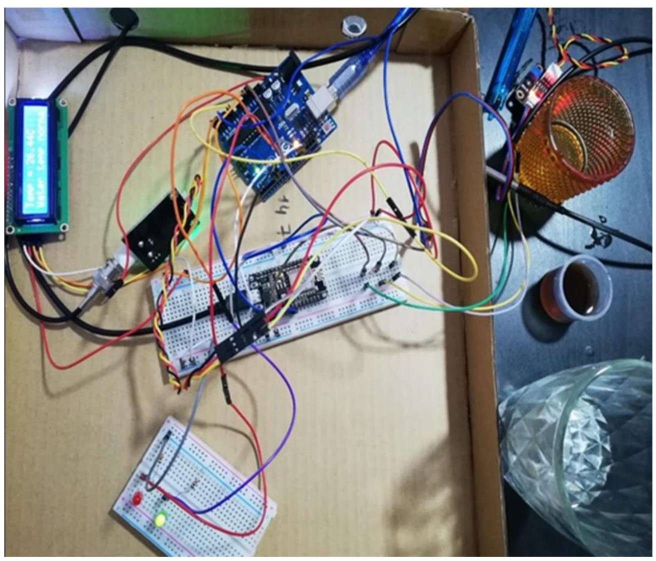

Fig.3.1 IOT based Water quality monitoring sytem prototype

3.1 Turbidity sensor-

Turbidity is the measure of a number of particles in the water. We used Turbidity Sensor (SEN0189) for measuring the Turbidity. Turbidity is measured in Nephelometric Turbidity Units (NTU). It is taken as the optical property of water and is an expression of the amount of the light that is scattered by the sus-pended particles in the water when a light is shined through the water sample. As the intensity of scat-tered light is increased, the turbidity increases.

3.2 Arduino uno R3-

The Arduino UNO is an open-source microcontroller board. Arduino Uno Wi-Fi is an Arduino Uno with an integrated WiFi module. The board is based on the ATmega328P with an ESP8266 WiFi Module in-tegrated. Arduino Uno Wi-Fi is an Arduino Uno with an integrated WiFi module. The board is based on the ATmega328P with an ESP8266 WiFi Module in-tegrated.

3.3 Wi-Fi module (ESP8266)

The ESP8266 WiFi Module is a self-contained SoC with an integrated TCP/IP protocol stack that can provide access to your WiFi network. A helpful fea-ture of the Uno WiFi is support for OTA (over-the-air) programming, either by transferring Arduino sketches or WiFi firmware. The Arduino Uno WiFi is programmed using the Arduino Software (IDE), the integrated development environment common to all our boards and operates both online and offline.

3.4 Temperature Sensor Module (DTH 11)

A temperature sensor plays an important role of many applications. For example, maintaining the specific temperature is essential for equipment used to fabri-cate medical drugs, heat liquid or clean other equip-ment.

3.5 TOTAL DISSOLVED SOLID (TDS)

"Dissolved solids" refers to any minerals, salts, met-als dissolved in water. Total dissolved solids (TDS) comprise in organic salts (principally calcium, mag-nesium, potassium, sodium, bicarbonate, chlorides, and sulphate) and some small amounts of organic matter that are dissolved in water. TDS (total dis-solved solids) sensor kit is compatible with IoT de-vices, plug and play, and easy to use. We can build a TDS detector easily to measure the TDS value of liq-uid.

3.6 Assemble the circuit and interface with Arduino

Assemble the circuit as given in the picture below.

• LM35

(Pin 1)----> 5v of Arduino

(Pin 2)----> A0 pin of Arduino

(Pin 3)----> Ground of Arduino

• LDR

One terminal----> 5v of Arduino

Second terminal---> 220Ω Re-sistance ---> Ground of Arduino

Junction of LDR & Resistance--> A1 pin of Arduino

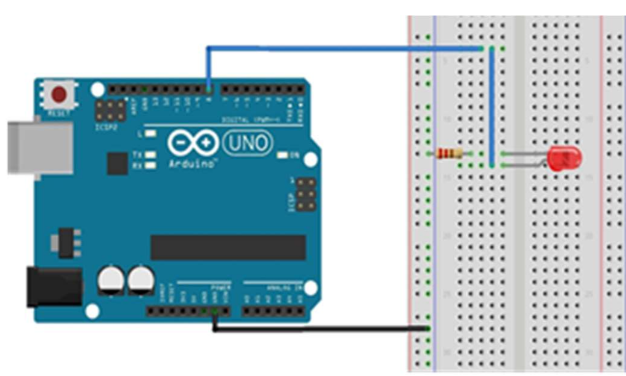

Fig.3.2 Pin of Arduino IDE

4. Create a ThingSpeak channel for Data logging

• Now to upload this serial data to an internet cloud we will require an stream for that cloud. ThingSpeak is a famous cloud for IOT applica-tions.Create a new channel,fill up the infor-mation for this channel and save this channel as shown in the image below.

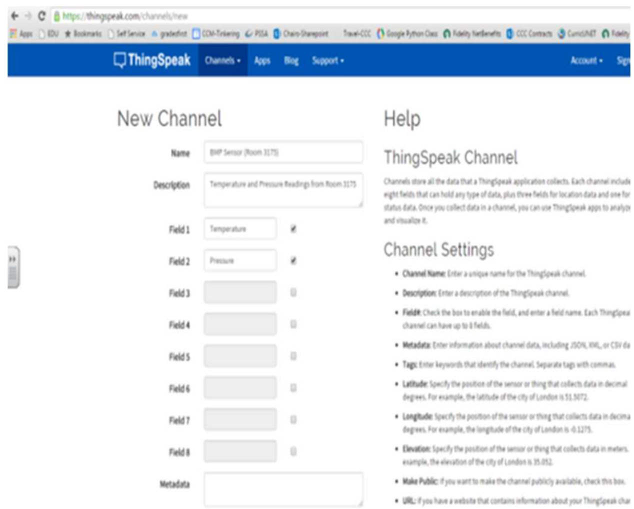

Fig.3.3 Create a new channel

After creation of channel in Thing speaks draw the flowchart of temperature, PH value, water flow and channel status.

You will be redirected to a page as below which is actually the cloud and you will see graphs and loca-tion of your weather data.

IV RESULTS AND DISCUSSION

In our proposed system these sensors are connected (Temperature, Turbidity, and TDS) are connected to Arduino R3. These three sensors measure the temperature, turbidity, and TDS parameters of wa-ter when immersed in water.

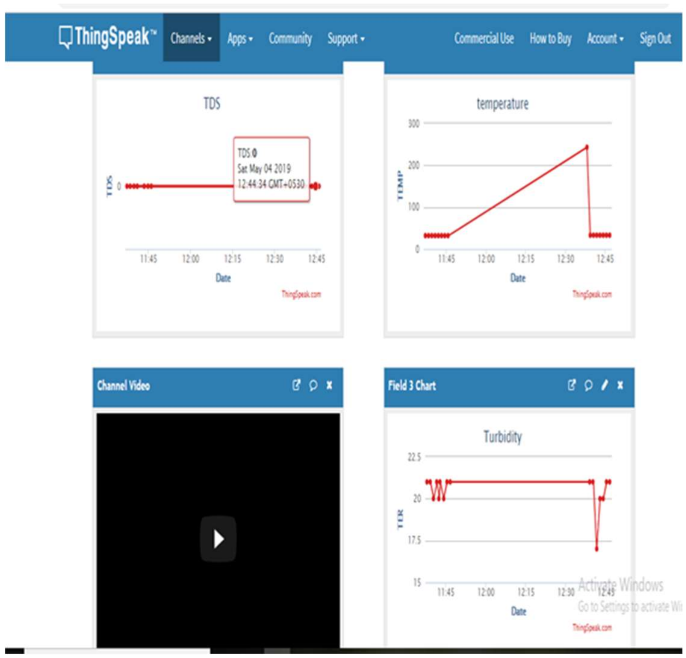

Fig.4.1 Data displayed in ThingSpeak

4.1 Measurement of Water Temperature using temperature sensor

Sensor measuring water temperature from -50°C to one hundred twenty five°C. Basically, the water body is assessed into bloodless, regular and hot based on its temperature. If the temperature is among -55°C to 20°C, it's miles considered bloodless water, 21°C to 39°C is taken into consideration ordinary water, and forty°C to one hundred twenty five°C is taken into consideration heat water.

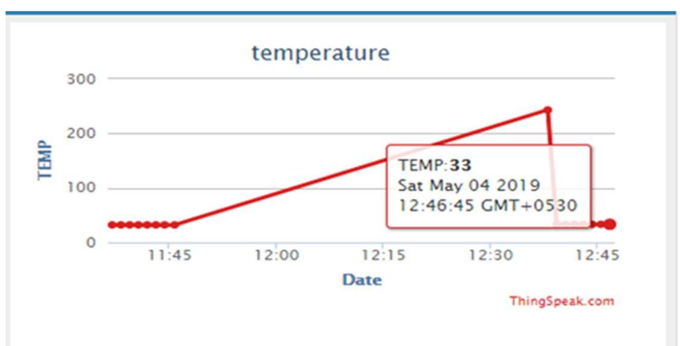

Fig. 4.1.1 Measurement of Temperature sensor

4.2 Measurement of TDS value of water using TDS sensor

"Dissolved solids" refers to any minerals, salts, met-als dissolved in water. Total dissolved solids (TDS) comprise in organic salts (principally calcium, mag-nesium, potassium, sodium, bicarbonate, chlorides, and sulphate) and some small amounts of organic matter that are dissolved in water.

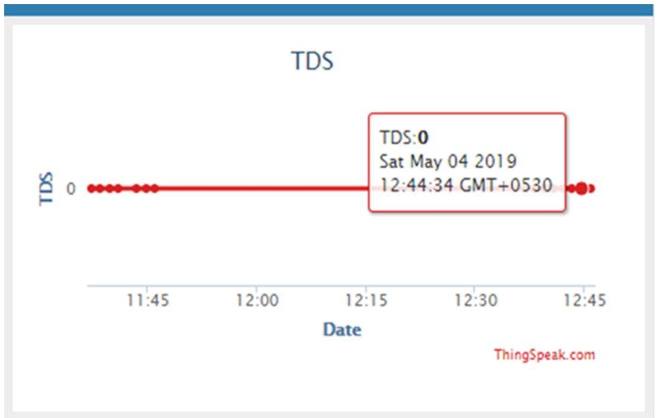

Fig.4.2.1 Measurement of TDS Sensor

4.3 Measurement of Turbidity of water

The turbidity of water is its clarity. If any mud, slit or sand particles etc. are mixed with the water, its quali-ty varies. According to the water quality norms, nor-mal water ranges from 0 NTU (Nephelometric Tur-bidity Units) to 5 NTU and also maximum of up to 5 NTU is permissible. If the water goes over 6 NTU up to 3000 NTU it is classified as turbid or mud mixed water.

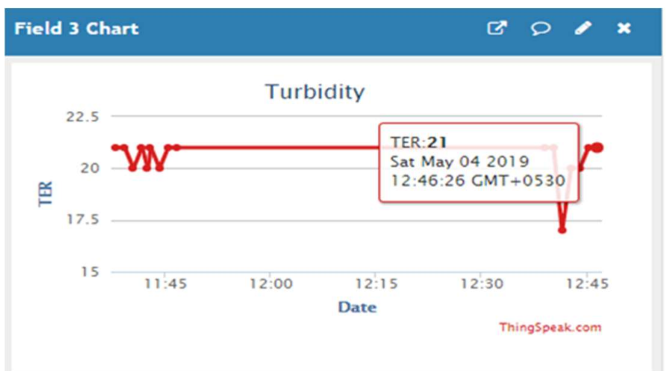

Fig. 4.1.3 Measurement of Turbidity Sensor

5. Conclusions

TDS and water temperature tracking utilize water detection sensors with precise benefits and existing GSM networks. The system can routinely reveal wa-ter first-class; its miles low in price, and do not re-quire people to be on responsibility. Water fine try-ing out is consequently possible to be greater reason-ably-priced, handy, and faster. The machine has right flexibility. By sincerely reattaching the relevant sen-sor and converting the relevant software program, the device may be used to screen other water great parameters. Operation is simple. The system can be accelerated to display hydrologic, air pollutants, business and agricultural production, and so forth. It has extensive software and extension price.

Many different troubles remain to be resolved on these paintings and want to be worked on. There are some recommendations for taking this painting for-ward. Which will discover more parameters for the safest purpose, and boom the parameters with the aid of adding multiple sensors with interface-ing relays, we manipulate the water deliver.

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