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IOT Based Water Quality Measurement System Using Arduino

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A B S T R A C T

Water pollution is one of the biggest horror for the green globalization. And we all know about Coronavirus Pandemic how dangers it is. In such case water measurement is very important for human life. In order to ensure the safe supply of the drinking water the quality needs to be measure and monitoring. In this paper we present a IOT (Internet Of Things) based water quality measuring system using Arduino. The system consist of various sensors is used to measuring parameters of the water. The parameters such as temperature, PH, turbidity, sensor of the water can be measured. The measured values from the Different sensors can be processed by the Arduino core controller. These sensors relate to Arduino for the purpose of measurement the parameters of water quality.

Finally, the sensor data can be viewed on internet by user using WIFI Module.it had been found that the systemworks reliably but is reliant on human assistance and susceptible to data inaccuracies. The system however,provides a solid foundation for future expansion works of an equivalent category to elevate the system tobeing Internet of Things (IoT) friendly And Therefore, this paper aimsto investigate the feasibility of implementing an Arduino-based sensor system for water qualitymonitoring.

Keywords: Project, Internet Of Things (IOT), Arduino, Water Quality, Sensors.

1. Introduction

The Internet of Things, otherwise referred to as IOT within the simplest sense, refers to the concept of connecting physical devices, machines, software, and objects to the web .In a broader sense, it's a dynamic and global network infrastructure, during which intelligent objects and entities are utilized in conjunction with actuators, electronics, sensors, software and connectivity to reinforce connection, collection and data exchange. this sort ofnetwork generally features a sizable amount of nodes that interact with the environment and exchange data, whilst reacting to events or triggering actions to exert control or change upon the physical world. By sharing and working on shared data contributed by individual parts, an IOT system would be greater than the sum of its parts. Each network node is considered smart and consumes little resources like processing and data storage power also as energy consumption.Work is employed in various activities, like consumption like agriculture and travel, which can affect water quality measurement is important which incorporates several parameters a number of these are: PH, temperature, dissolved oxygen amount. There is go to improve existing system for measurement water bodies. IOT may be a solution in recent days, development in computing and electronic technologies have triggered Internet of Things technology. Internet of things often describe because the network of electronics devices communicating among them by the assistance of controller. The IOT may be a collection of devices communicating among them by the assistance of a controller. The IOT may be a collection of devices that employment together so as to serve human tasks during a efficient manner. It combine computational power to send data about the environments.

2. BlockDiagram

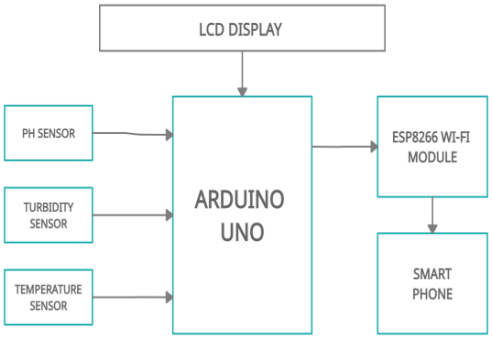

Fig.01. Block Diagram

3. ProposedSystem

In proposed system there is IOT based water quality measurement system using Arduino. As per water quality behalf all process are required for maintain and measures water quality and not just measures but also using through modern technology through IOT and various sensors using ARDUINO UNO And WI-FI module like ESP8266.

I. METHODOLOGY

This is a strategy of our IOT based water quality measurement using Arduino during this paper we specialized in several parameters .Like pH, Turbidity, Temperature. We measure this parameter because Water QualityMeasurement mostly depends on those parameters. Firstly, weconnect sensors (pH, Turbidity, Temperature, etc.) to Arduino and interface with it.This data is processed through Arduino. All processed datathen send to WI-FI Module with a serial communication with Arduino and WI-FI module. We send data through character bycharacter transmission. Then separate whole string data intoindividual data. Processed parameters data then send tofirebase Realtime database. In our own web domain, we exportdata as JSON format from firebase cloud store and show it in ourwebsite. Statistic and decision parts are exhausted web system.In this project we used ESP8266 WI-FI MODULE.

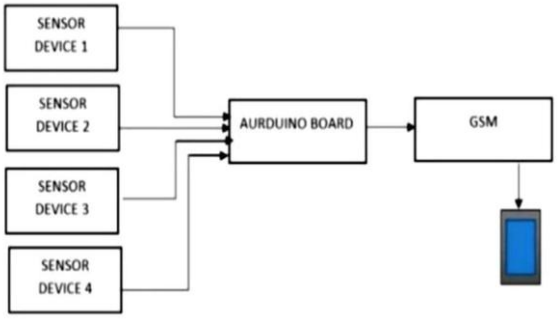

Fig.02. System

II. INTERNET OF THINGS (IOT)

IOT (Internet of Things) may be a complicated automation and analyticssystem which exploits networking, sensing, big data, and AItechnology to deliver complete systems for a product or service.These systems allow greater transparency, control, andperformance when applied to water quality measurement system.IOT systems have applications across industries through theirunique flexibility and skill to be suitable in any environment. Theyenhance data collection, automation, operations, and far morethrough smart devices and powerful enabling technology. In thisproject IOT is extremely important for sending signal through wi-fimodule. Internet of Things are often describe because the network ofelectronics devices communicating among them by the assistance of acontroller.Internet of Things (IOT) may be a quite network technology, which is predicated on information sensing equipments like RFID, infrared sensors, GPS, laser scanners, gas sensors then on, can make anything join the web to exchange information, according to the protocol, which provides intelligent identification, location and tracking, monitoring and management

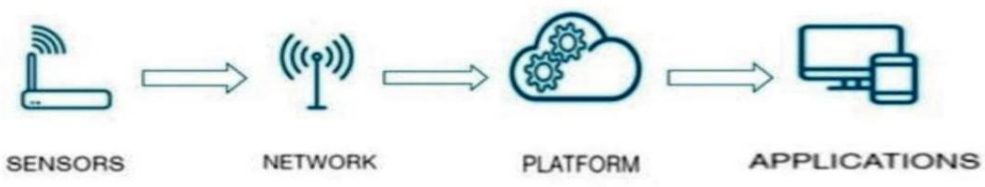

Fig.03. Internet Of Things

4. Working

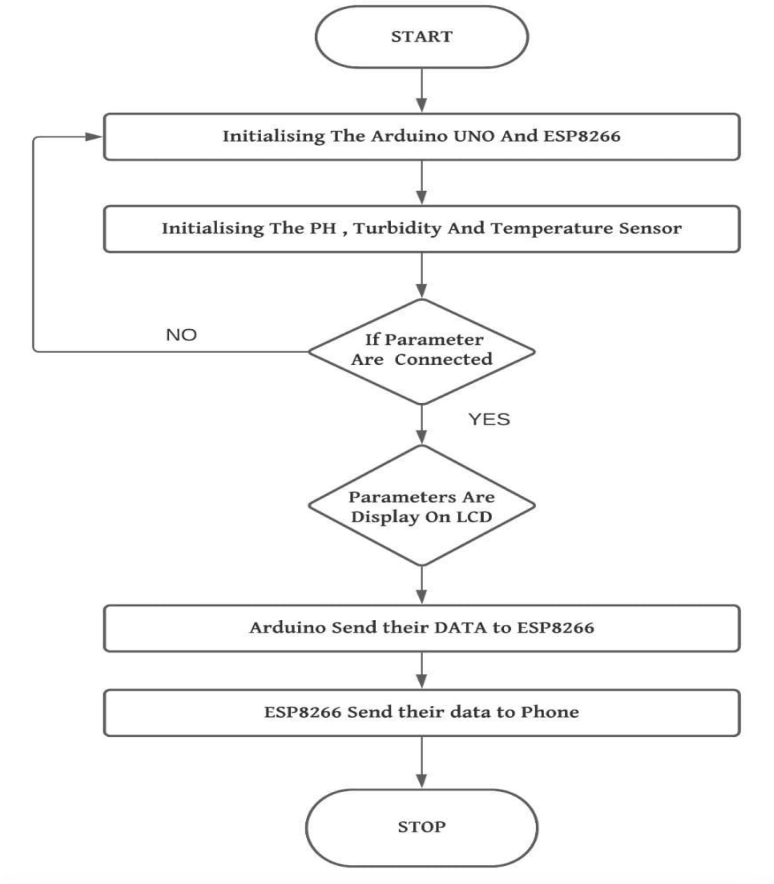

Fig.04. Flowchart Of Project

I. ARDUINO UNO

Arduino Uno may be a microcontroller board supported 8-bit ATmega328P microcontroller.along side ATmega328P, it consists other components like quartz oscillator , serial communication, transformer , etc. to support the microcontroller. Arduino Uno has 14 digital input/output pins (out of which 6 are often used as PWM outputs), 6 analog inputpins, a USB connection, an influence barrel jack, an ICSP header and a push button .

Frequency – 16MHz
EEPROM- 1KB
SRAM – 2KB
Flash Memory – 32KB
Operating Voltage – 5V

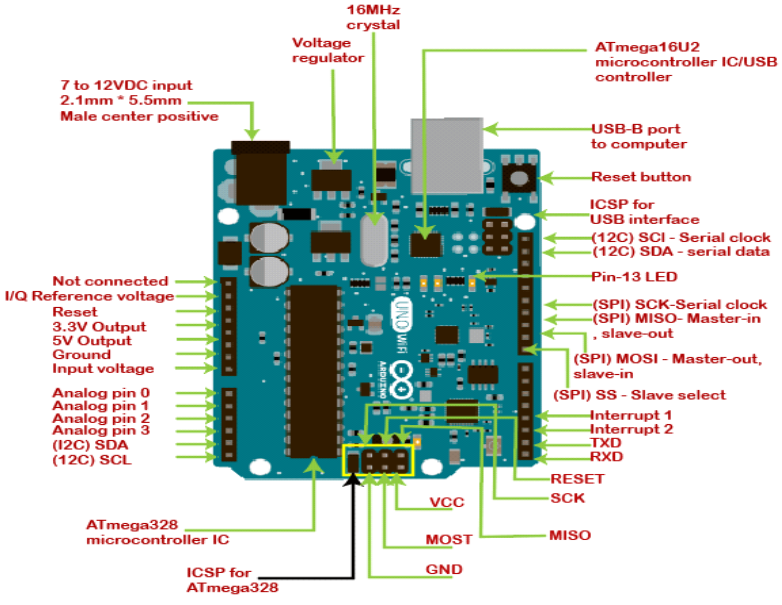

Fig.05. Arduino UNO In Detail.

II. ESP8266 WIFI MODULE

The ESP8266 Wi-Fi Module could also be a self contained SOCwith integrated TCP/IP protocol stack which can give anymicrocontroller access to your Wi-Fi network. The ESP8266is capable of either hosting an application or offloading allWi-Fi networking functions from another application processor. Each ESP8266 module comes pre-programmedwith an AT command set firmware, meaning, you'll simplyhook this up to your Arduino device and acquire about the maximum amount Wi-Fi-ability as a Wi-Fi Shield offers.
Flash Memory – 4MB
Operating Voltage – 3.3V
SRAM – 64KB
PCB ANTENNA

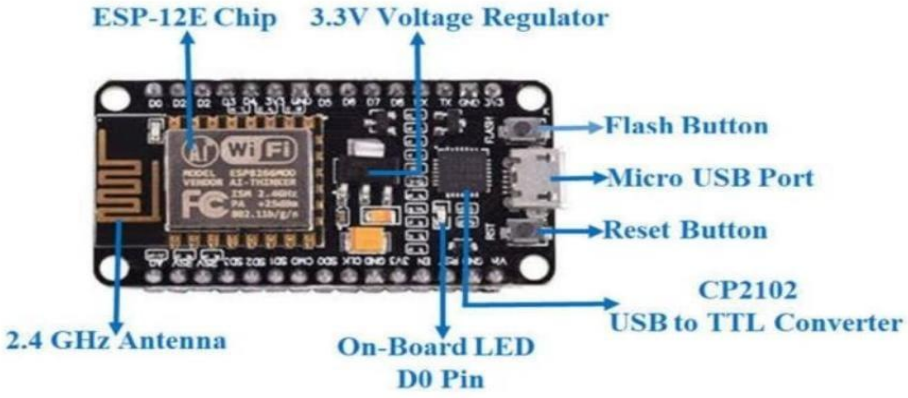

Fig.06. ESP8266 WI-FI Module In Detail.

III. CIRCUIT DESIGN

The whole design of the system is predicated mainly on IOT which is newly introducedconcept within the world of development. there's basically two parts included, the primaryone is hardware & other is software. The hardware part has sensors which helpto measure the values, another one is Arduino UNO converts the analogvalues to digital one, & LCD shows the displays output from sensors, Wi-Fi modulegives the connection between hardware and software. In software we developed aprogram supported embedded c language.The PCB is design initially level of construction and component and sensors mounted on it. When the system start dc current given to the kit and Arduino and WIFI gets on Theparameters of water is tested one but one and their result's given to the LCD display.The app went given hotspot gives the precise value as on LCD display showson kit. Thus like this when the kit is found on any specific water body and WIFI isprovided we will observe its value on our android phone anywhere at anytime.consist of several sensors (temperature, pH, turbidity,) is connected to core controller. The core controller are accessing the sensor values and processing them to transfer the info through internet. Arduino is employed as a core controller. The sensor data are often viewed on the web WI-FI system.

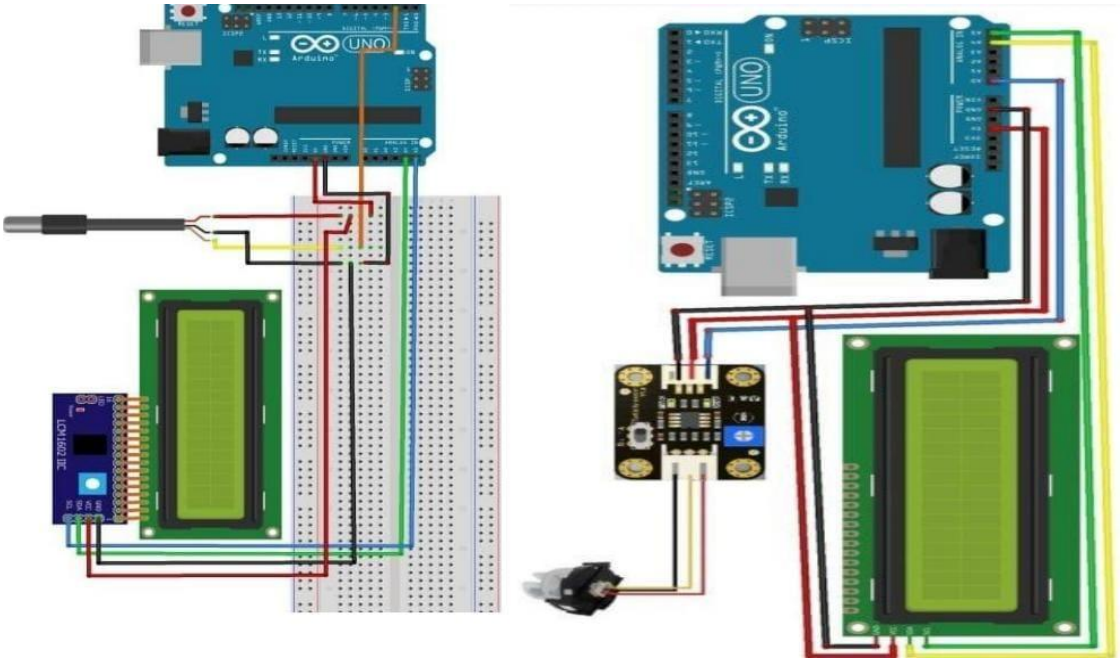

Fig.07. Circuit Design

5. CONSTRUCTION

The system used is an Arduino microcontroller with three accommodating sensors: pH, Temperature, Turbidity.. Sensors were chosen supported simple use, measurability (of parameters), porbability, also as being economical and cost-effective as a strict budget must be adhered to.Due to the limited number of power outputs of the Arduino, the power pin of the Arduinowasconnectedtoabreadboardtoallowpoweringofmultipledevicesatthesame time. Both turbidity and pH sensors require calibration to convert the obtained voltage readings to the corresponding turbidity and pH readings. To calibrate, different concentrations.of soil and water mixtures and different pH solutions were wont to calibrate the turbidity and pH sensors, respectively.The turbidity sensor was calibrated by measuring several soil and water mixtures made up of known masses of soil mixed with 0.6 L of water.This system is using Wi-Fi module (Esp8266) to send the sensor data to the cloud. All the sensors are connected with Wi-Fi module. Wi-Fi module needs the web So here Mobile data or Wi-Fi is that the access point for the web .And after all this data sends to the cloud

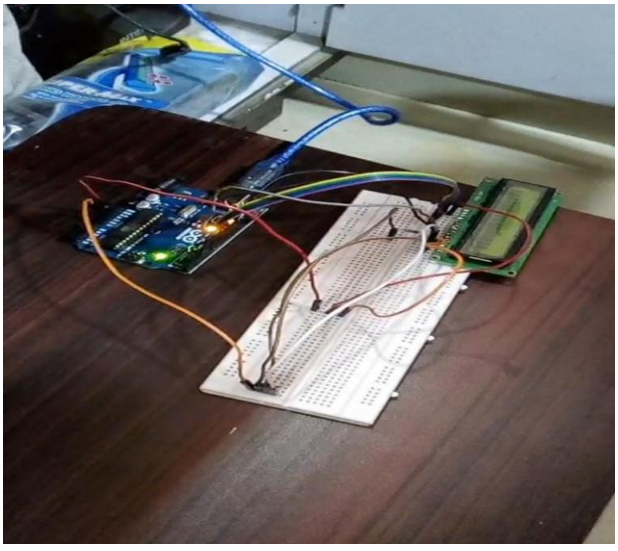

Fig.08. Demonstration Setup 1

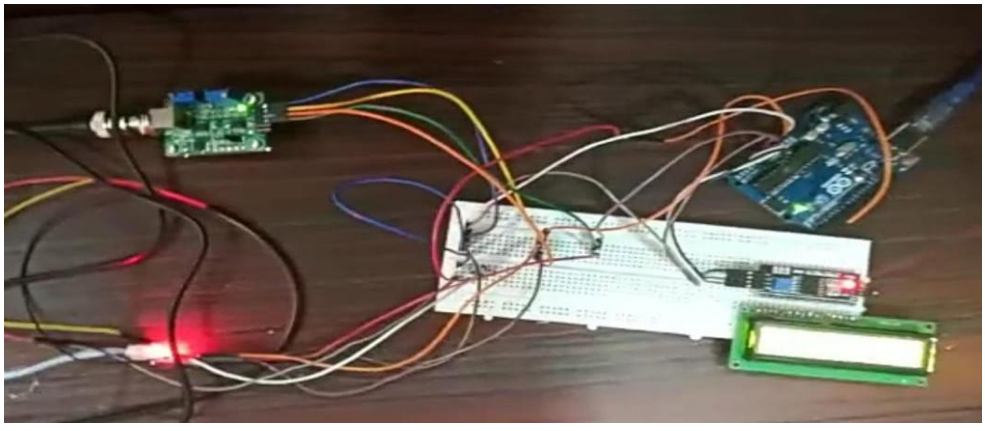

Fig.09. Demonstration Setup 2

Fig.10. Demonstration Of pH Sensor

6. COMPONENETS

I. PH Sensor

A pH sensor helps to live the acidity or alkalinity of the water with a worth between 0-14. Any number above seven equates to more alkaline. Each sort of pH sensor works differently to live the standard of the water. The pH of water can help determine the standard of water.

Fig.11. ph Sensor

II.Turbidity Sensor

Turbidity sensors measure the quantity of sunshine that's scattered by the suspended solids in water. Turbidity sensors are utilized in river and stream gaging, wastewater and effluent measurements, control instrumentation for settling ponds, sediment transport research, and laboratory measurements.

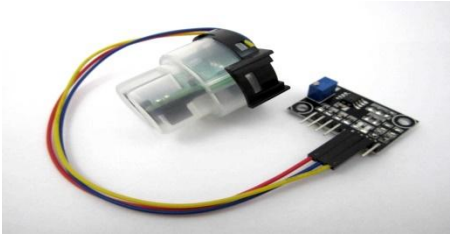

Fig.12. Turbidity Sensor

III. DS18B20 Temperature Sensor

The DS18B20 may be a 1-wire programmable Temperature sensor from maxim integrated. it's widely wont to measure temperature in hard environments like in chemical solutions, mines or soil etc. It can measure a good range of temperature from -55°C to +125° with an honest accuracy of ±5°C.

Fig.13. Temperature Sensor

IV. I2C Module

I2C Module has an inbuilt PCF8574 I2C chip that converts I2C serial data to parallel data for the LCD display. These modules are currently furnished with a default I2C address of either 0x27 or 0x3F. If there a 3 sets of pads labelled A0, A1, & A2 then the default address are going to be 0x3F

Fig.14. I2C Module

V. LCD Display

A liquid-crystal display (LCD) may be a flat-panel display or other electronically modulated device that uses the light-modulating properties of liquid crystals combined with polarizers. Liquid crystals don't emit light directly, instead employing a backlight or reflector to supply images in color or monochrome.

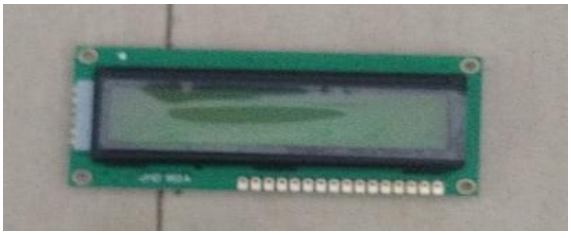

Fig.15. LCD Display

7. Conclusion

IOT based water quality measurement system usingARDUINO. Measurement of Turbidity, PH & Temperatureof Water makes use of water detection sensor with uniqueadvantage and existing GSM network. The system canmonitor water quality automatically, and it's low in cost anddoesn't require people on duty. therefore the water qualitytesting is perhaps getting to be more economical, convenientand fast. The system has good flexibility. Only by replacingthe corresponding sensors and changing the relevant softwareprograms, this system are often used to monitor otherwater quality parameters. The operation is simple .The system are often expanded to observe hydrologic,pollution , industrial and agricultural production then on. it'swidespread application and extension value. By deployingsensor devices within the environment, we will bring theenvironment into real world i.e. it can interact with otherobjects through the network. Then the collected data andanalysis results are going to be available to the top user through theWi-Fi.

8. Future Scope

The proposed work features a lot of scope interms of maintainingthe purity of water. the general project scope includes cityspecific water quality monitoring. to deal with the water quality altogether the economic areas water monitoring stations will be installed at locations like residential, industrial areas. we will use Machine learning and other things in future.

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