

Surveillance System for Pond Water Quality using IoT

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Abstract—Water problem is the major effect for the growth of fish. Monitoring is essential for water quality. This can help to save number of lives. This will be help to aware the danger and can take necessary steps for safety IoT is used in this project that helps updating the information about landslides in mobile app through thinkspeak database. pH sensor & Turbidity sensor is used to measure the water quality level. Microcontroller takes the information and updates the information on the webpage using a Wi-Fi module connected to it

Index Terms—Arduino, IoT, Thingspeak

I. INTRODUCTION

With the rapid development of the economy, more and more serious problems of environment arise. Water pollution is one of these problems. In 2014 Hindustan company mercury wastes are dissolved in Kodaikanal Lake due to this effect many lives get into danger. It contaminates the whole water in the lake. So it affects thousands of fishes. Routinely monitored parameters of water quality are temperature, pH, and turbidity. It is important to collect this measurement because these factors might affect and be affected by organisms in the pond. Because of continuous monitoring the parameters helps to reduce the problems arrived in future.

Internet of Things

It is network of physical device. Anything can be connected from anywhere in this world. It is uniquely identifiable through its embedded computing system but is able to inter-operate within the existing internet infrastructure. IoT represents a concept in which network devices have ability to collect and sense data from the world and then share that data across the internet where that data can be utilized and processed for various purposes.

The IoT describes a vision where objects is uniquely identified and access to the network IoT communication is quite different from the traditional human to human communication, bringing a large challenge to existing telecommunication and infrastructure. It is a kind of network of network

Technology which is based on information sensing equipment such as Wi-Fi module etc.

Cloud computing is a large scale processing unit which processes in run time and it is also a very low cost technology. It is remote server hosted on the internet to store,

manage and process data, rather than a local server or a personal computer.

The application area of IoT is

- Home automation
- Water quality monitoring
- Smart garbage

Arduino

Arduino is a hardware and software technology. It is a single-chip microcontroller. Arduino board design use a variety of microprocessors and controllers. The boards are equipped with sets of digital and analog input/output pins that may be interfaced to various expansion boards or breadboards and other circuits.

It has 14 digital input/output pins in which 6 can be used as PWM outputs, a 16 MHz ceramic resonator, an ICSP header, a USB connection, 6 analog inputs, a power jack and a reset button. This contains all the required support needed for microcontroller.

Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online.

It building digital devices and interactive objects that can sense and control objects in the physical world.

Arduino Is a open source hardware The hardware reference designs are distributed under a creative common.

The Features of the Arduino UNO:

- Microcontroller: ATmega328
- Operating Voltage:5V
- Input Voltage(recommended):7-12V
- Input Voltage(limits):6-20V
- Digital I/O Pins:14
- Analog input Pins:6
- DC Current per I/O Pin:40 mA
- DC Current for 3.3V Pin: 50 mA

The ATmega328 is a chip with 32 KB.It has three flexible timer/counters with compare modes The applications are low powered, low cost micro-controller is needed. The model used are Arduino Uno and Arduino Nano models.

It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button.

It has a programmable watchdog timer with internal oscillator and five software selectable power saving modes. The device operates between 1.8-5.5 volts. The device achieves throughput approaching 1 MIPS per MHz

The Features are

- Power supply range: 3.0V to 5.5V
- Measure temperature up to: -55deg C to +125deg C
- Powered from Data line
- Convert 12-bit temperature to digital word in 750 ms
- Thermometer resolution is user-selectable from 9 to 12 bits
- User definable non volatile alarm settings

The applications are

- Thermostatic controls
- Industrial systems
- Consumer products
- Thermometers

II. SENSORS

A. DIGITAL TEMPERATURE SENSOR (DS18B20)

It is a one wire temperature sensor. It allows number of sensors to be used on one data bus. It has a unique 64 bit serial number etched into it. It can drive power directly from the data line and eliminating the need for external power supply.

The core functionality of the DS18B20 is its direct-to-digital temperature sensor.

The temperature will be printed on the serial monitor of the codebind or IDE

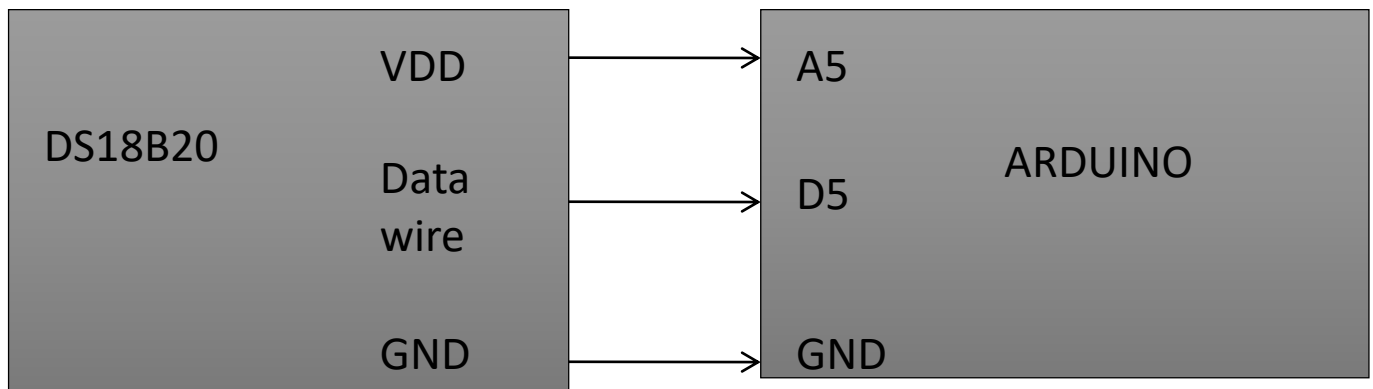


Fig.1.1 Digital temperature sensor

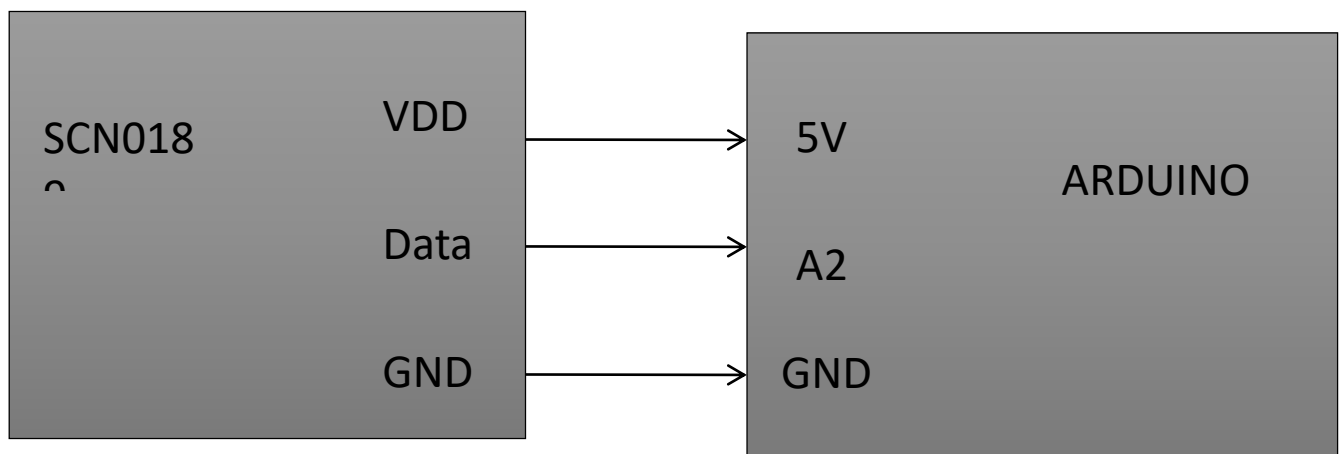


Fig.1.2 Turbidity sensor

B. TURBIDITY SENSOR (SCN0189)

The Arduino turbidity sensor is an electronic monitoring module specially developed to work with microcontroller platforms Arduino, Raspberry Pi, PIC, ARM, AVR, among others. It is one of the very efficient methods to measure the turbidity level in the water. It is specially prepared for direct Contact and having an electronic module to amplify and send the received data to the microcontroller of the project.

The Arduino turbidity sensor detects water quality by measuring level of turbidity. It is able to detect suspended particles in water by measuring the light transmittance and scattering rate which changes with the amount of total suspended solids. As the TTs increases, the liquid turbidity level increases.

The Arduino turbidity sensor have both analog and digital output modes..

Turbidity sensor can be used in measurement of water quality in rivers and streams and pond to measure the sediment transparent in the water

The turbidity sensor directs a focused beam into the monitored water.

The liquid sensor provides analog and digital signal output modes. The threshold is adjustable when it is in a digital mode

sensor helps to monitor the pH level accurately and it is also cost efficient sensor to be used in all the researches. This is the professional Arduino pH sensor with industrial electrode. It has build in convenient, simple, practicable sensor

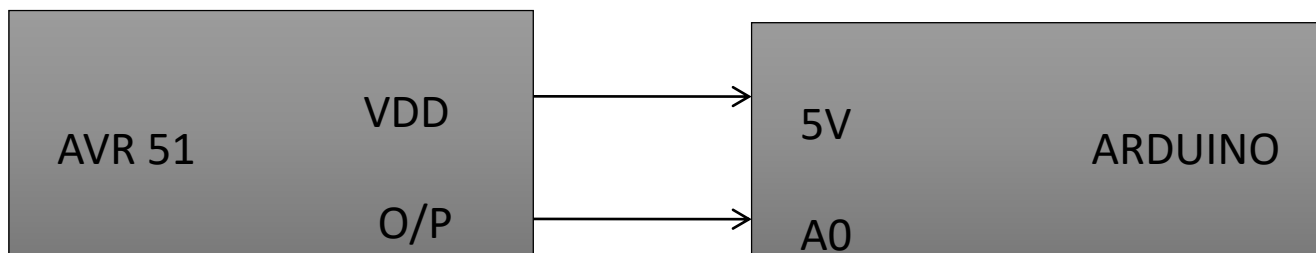


Fig.1.3 pH sensor pin diagram

The features are:

- Operating voltage: 5 V
- Operating Current: 40 mA(MAX)
- Response Time: < 500 mS
- Insulation Resistance: 100 M
- Output Method: Analog
- Analog output: 0-4.5 V
- Operating Temperature: 5°C~90°C
- Storage Temperature: -10°C~90°C

The Applications of turbidity sensor are measuring the sediment in the water and the turbidity level in any type of water. It give accurate measurement of the dust level in the water.

C. pH SENSOR (AVR51)

pH stands for power of hydrogen, which is a measurement of the hydrogen ion concentration in the body. The total pH scale ranges from 1 to 14 with 7 considered to be neutral. A pH less than 7 refers to be acidic and pH greater than 7 refers to basic. For water the pH level should be measured because it also determines the water quality level.

For the growth of the fisheries in the water, it is essential to monitor the pH level and to keep it within the range. This pH

The features of pH sensor is

- Module power: 5 V
- Module size: 43 * 32 mm
- Measuring Temperature: 0-60 deg C
- Accuracy: 0.1 pH
- Response time: <1 min
- Gain adjustment potentiometer
- pH sensor with BNC connector

The applications of pH sensor is

- Water quality testing
- Aquaculture

D. BLYNK APPLICATION

It is a platform with iOS and Android apps to control Arduino, Raspberry pi over the internet. It's a digital dashboard where we can build a graphic interface for our project by simply dragging and dropping widgets Blynk is not tied to some specific board or shield. Instead it's supporting hardware og our choice. Whether your Arduino or Raspberry pi is linked is linked to the internet over Wi-Fi, Ethernet or this new ESP8266 chip. Blynk will get you online and ready for the internet of things.

III.EXISTING METHODOLOGY

A calibrated transducer CMOS circuit is used for measuring the turbidity of water Turbidity is measured by monitoring the frequency rate and water samplers of a pond water.CMOS circuit convert the turbidity information into an output pulse. With the help of the light penetration in the water using this instrument the turbidity is measured because if there is sediment or dust particles in the water the light are not able to penetrate into the water. With the help of this method the turbidity level is measured and with the help of the reading the values are generated the pulse form. In this method it is difficult to handle the circuit connection and also the instruments and it is costly when compared with the sensors.

IV.PROPOSED METHODOLOGY

The pH, Turbidity and Temperature of the water measured with the help of the specific sensors. The data's are collected through the microcontroller and it send it to the Web server through the Wi-Fi module. The threshold value must be set before the process start and if the measuring data exceeds the threshold level it will give a intimation through the mobile app as Blynk. The threshold value is set based upon the normal level should be in the water which will does not affect the fishes and human lives.

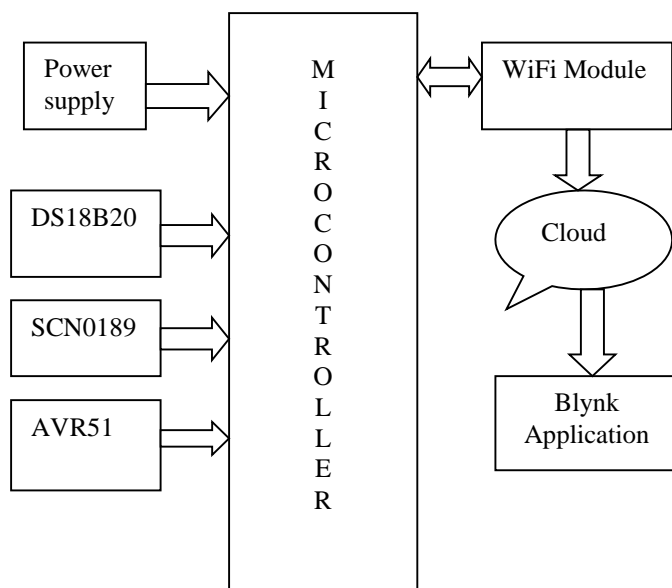
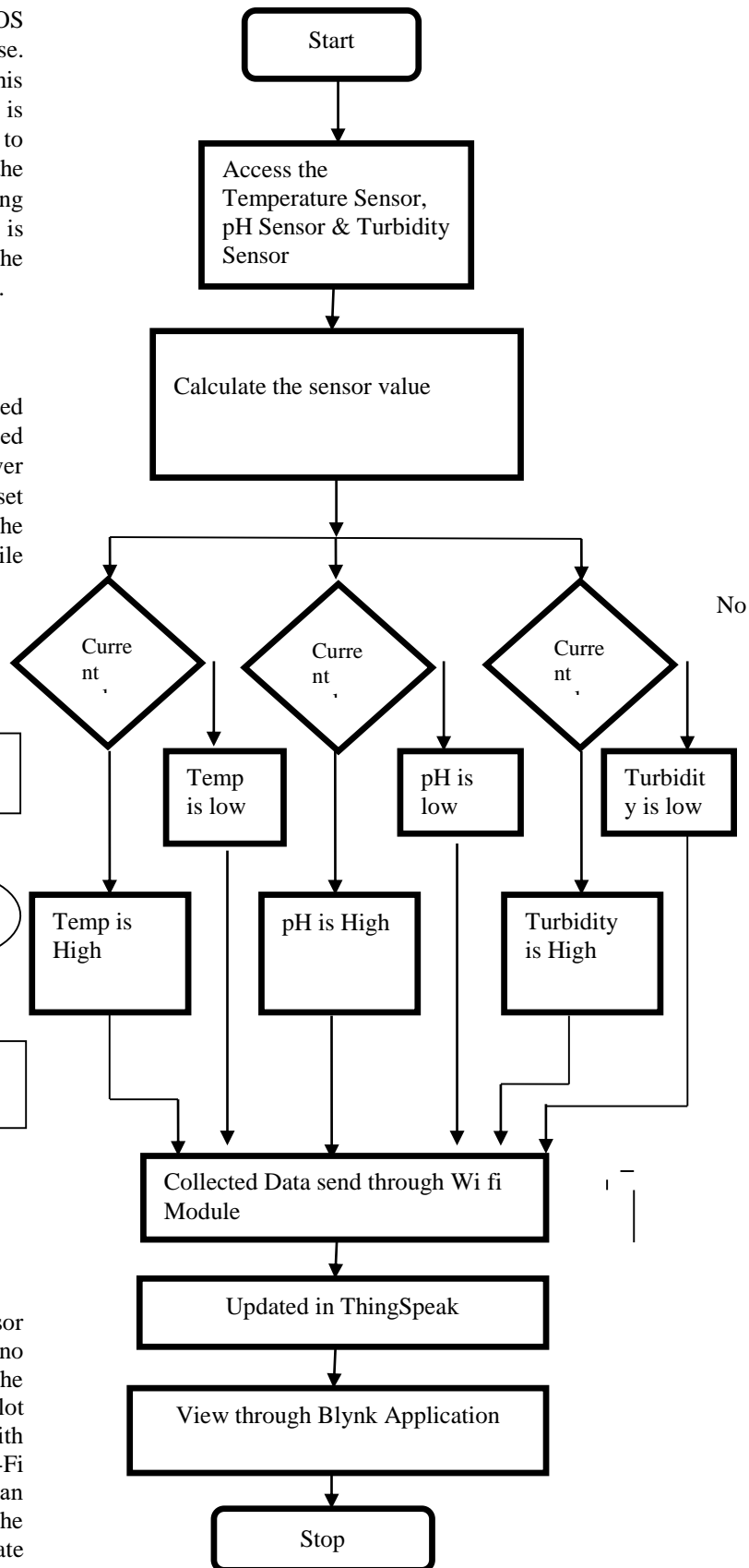


Fig.4.1 Block Diagram

The DS18B20 Sensor, AVR51 Sensor,SCN0189 Sensor collect the data from the water in the microcontroller. Arduino is used as an microcontroller to collect the data from the sensor. The collected data send to the ThingSpeak and plot the output in the waveform and the cloud is interfaced with the Blynk Application. The data's are send through Wi-Fi module as ESP8266.With the help of the App the data's can be viewed from anywhere and if the values are above the threshold level it will generate the intimation .So that it create

the awareness to the people about the water contamination. The ESP8266 Module is used to send the data to the web server. If the values are exceed the threshold level it.

FLOW CHART



In flowchart it explains about the easy detail about the flow of the project .To start the process by getting the input data's with the help of the Sensors. The Temperature, pH and the Turbidity level by using sensors. By getting the data and calculating the values and compare it with threshold value if it is below the value the data's are send to ThingSpeak through Wi-Fi Module. If it is below the normal value it will indicate as the value is low through Wi-Fi module to the ThingSpeak after plotting the graph the values are send to the Blynk application.

V.RESULTS AND CONCLUSION

In the existing method (Wireless Communication) WSN has been installed on a location which is prone to landslide. Data collected by sensors are delivered through the network to a unit. Collected is stored on a MySQL database for further visualization and ost processing. The problem in the existing method is that the information about the event is not send to the end user and the implementation is difficult. To overcome his problem we have used the arduino for implementing the system .This system helps the end user know about the quality of the water in a simple and cost efficient method.

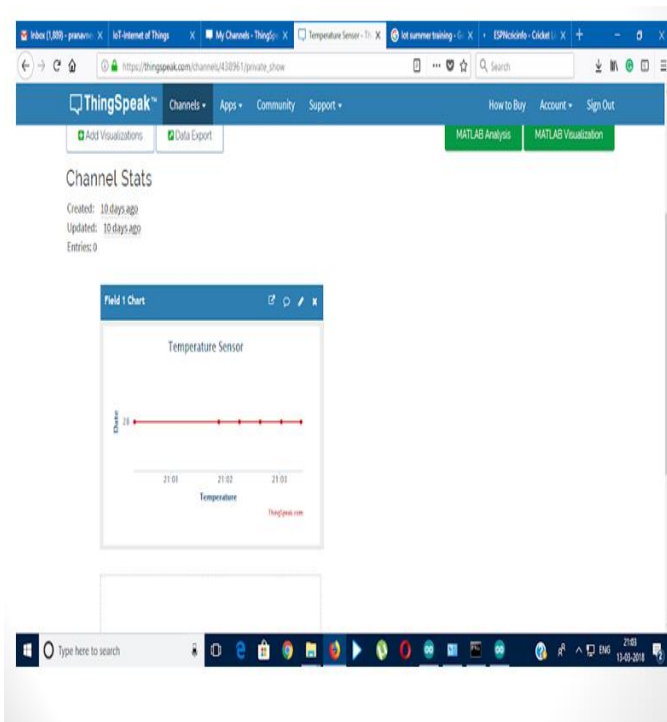


Fig.5.1 Temperature sensor in ThingSpeak

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