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Smart Water Quality Meter

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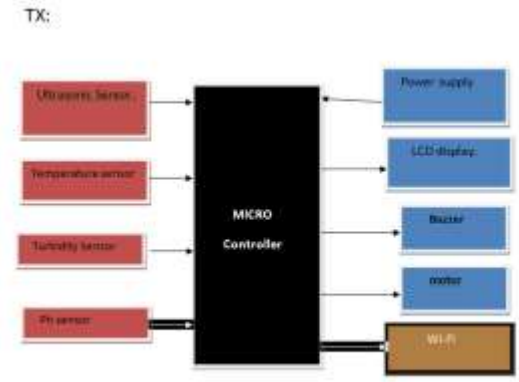
ABSTRACT

This project abstract is all about how to monitor the Quality of water, interns of monitoring the level of water, the temperature of the water and its surrounding, the turbidity of the water (how clean the water is) as well as the PH levels of the Water. So this system monitors all of these aspect and finally when all check have been completed, its sends the information or data as THINK SPEAK to notify the authorized personnel

1. INTRODUCTION

Water is an important resource for all the livings on the earth. In that, some people are not getting sufficient amount of water because of unequal distribution. We can use this approach so that everyone gets the equal amount of water. It is also used to avoid the wastage of water during the distribution period. In the previous method, the employee will go to that place and open the valve for a particular duration, then again the employee will go to the same place and close the valve, it is waste of time.The proposed system is fully automated. Here human work and time are saved. To ensure the safe supply of drinking water the quality should be monitored in real time for that purpose new approach IOT (Internet of Things) based water quality monitoring has been proposed. In this project, we will implement the design of IOT base water quality monitoring system that monitors the quality of water in real time. This system consists some sensors which measure the water quality parameter. The real-time monitoring of water resources information will benefit the water resources management department and the public. The primary concept of real-time IOT based water resources information system is to provide comprehensive and accurate information. The system is developed through defining some explicit water resource parameters then, Water level and flow parameter are defined for water measure & management, followed by a sensor network for water resources information monitoring is constructed based on IOT.

Block diagram



Rx

WORKING

This system can be implemented on water tanks for safe and waste less consumption. Water when supplied from the reservoir to tanks then the pH level of water will be checked, if it comes in required range than the conductivity of water will be checked. If pH or conductivity of water will not be in safe range than the water will not be supplied to household tanks and valves will be closed. The Same procedure will be followed till water does not come in safe range. After the satisfactory quality check of water if the tanks are full than valves of the tank will be opened and water will be distributed. During distribution of water rate of flow is measured so that equal distribution is done .and also the water is cool heat calculating. This whole data is sent from Wi-Fi to the Web page (www.thinkspeak.com) so that

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system can be accessed remotely from a computer. The flow of distribution and quality of water both will be monitored from the graphs which can be displayed anywhere using the internet.

HARDWARE TOOLS

1. Regulated Power Supply.
2. LCD with driver.
3. Microcontroller.
4. Temperature sensor
5. PH sensor
6. Turbidity sensor
8. Wi-Fi module
9. Ultrasonic sensor

Software tools

1. Arduino
2. Thinkspeak

PH SENSOR

3-in-1 Soil Moisture Sensor Meter PH Acidity Tester and Light Meter is a three in one product. It measures your soil's moisture, it's pH level and the light level in one small tester. It is easy to use. All you have to do is plug it in, push the meter into the soil and find the reading. No batteries are needed. pH Acidity Tester and Light Meter is compact and can be used indoor and out. The is perfect for letting you know when you need to add water, adjust your pH or change the light for your plants. It is scientifically accurate and promotes healthy plants Understanding pH measurement In the process world, pH is an important parameter to be measured and controlled. The pH of a solution indicates how acidic or basic (alkaline) it is. The pH term translates the values of the hydrogen ion concentration- which ordinarily ranges between about 1 and 10 x -14 gram-equivalents per litre - into numbers between 0 and 14. On the pH scale a very acidic solution has a low pH value such as 0, 1, or 2 (which corresponds to a large concentration of hydrogen ions; 10 x 0, 10 x -1, or 10 x -2 gram-equivalents per litre) while a very basic solution has a high pH value, such as 12, 13, or 14 which corresponds to a small number of hydrogen ions (10 x -12, 10 x -13, or 10 x -14 gram-equivalents per liter). A neutral solution such as water has a pH of approximately 7. A pH measurement loop is made up of three components, the pH sensor, which includes a measuring electrode, a reference electrode, and a temperature sensor; a preamplifier; and an analyzer or transmitter. A pH measurement loop is essentially a battery where the positive terminal is the measuring electrode and the negative terminal is the reference

Ultrasonic SENSOR HC - SR04

Product features**:-**Ultrasonic ranging module HC - SR04 provides 2cm - 400cm non-contact measurement function, the ranging accuracy can reach to 3mm. The modules includes ultrasonic transmitters, receiver and control circuit. The basic principle of work: (1) Using IO trigger for at least 10us high level signal, (2) The Module automatically sends eight 40 kHz and detect whether there is a pulse signal back. (3) IF the signal back, through high level , time of high output IO duration is the time from sending ultrasonic to returning. Test distance = (high level time velocity of sound (340M/S) / 2,

- 5V Supply
- Trigger Pulse Input
- Echo Pulse Output
- 0V Ground

Electric Parameter :-

Working Voltage DC 5 V

Working Current 15mA

Working Frequency 40Hz

Max Range 4m

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Min Range 2cm

Measuring Angle 15 degree

Trigger Input Signal 10uS TTL pulse

Echo Output Signal Input TTL lever signal and the range in proportion

Dimension 45*20*15mm

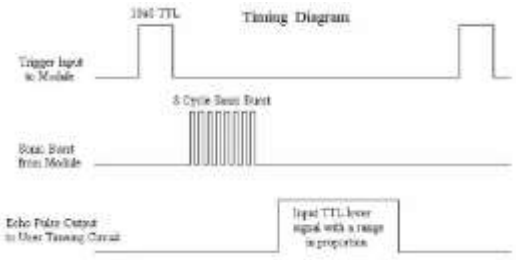
Vcc

Trig Echo

GND

Timing diagram;-

The Timing diagram is shown below. You only need to supply a short 10uS pulse to the trigger input to start the ranging, and then the module will send out an 8 cycle burst of ultrasound at 40 kHz and raise its echo. The Echo is a distance object that is pulse width and the range in proportion .You can calculate the range through the time interval between sending trigger signal and receiving echo signal. Formula: uS / 58 = centimeters or uS / 148 =inch; or: the range = high level time * velocity (340M/S) / 2; we suggest to use over 60ms measurement cycle, in order to prevent trigger signal to the echo signal. **Attention**:-The module is not suggested to connect directly to electric, if connectedλ Electric, the GND terminal should be connected the module first, otherwise, it will affect the normal work of the module. When tested objects, the range of area is nλ to less than 0.5 square meters and the plane requests as smooth as possible, otherwise ,it will affect the results of measuring.



Turbidity sensor

The **arduino turbidity sensor** detects water quality by measuring the levels of turbidity. It uses light to detect suspended particles in water by measuring the light transmittance and scattering rate, which changes with the amount of total suspended solids (TSS) in water. As the TTS increases, the liquid turbidity level increases.

Turbidity sensors are used to measure water quality in rivers and streams, wastewater and effluent measurements, control instrumentation for settling ponds, sediment transport research and laboratory measurements.

This liquid sensor provides analog and digital signal output modes. The threshold is adjustable when in digital signal mode. You can select the mode according to your MCU.

Specification

- Operating Voltage: 5V DC
- Operating Current: 40mA (MAX)
- Response Time : <500ms
- Insulation Resistance: 100M (Min)
- Output Method:
- Analog output: 0-4.5V

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- Digital Output: High/Low level signal (you can adjust the threshold value by adjusting the potentiometer)
- Operating Temperature: 5℃~90℃
- Storage Temperature: -10℃~90℃
- Weight: 30g
- Adapter Dimensions:
- 38mm*28mm*10mm/1.5i
- chess *1.1inches*0.4inches

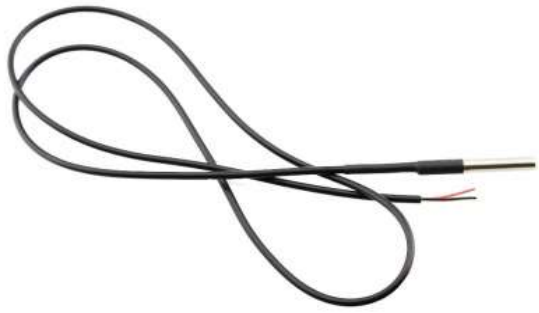
2. WATER TEMPERATURE SENSOR:

Introduction

This is a waterproofed version of the DS18B20 Temperature sensor. Handy for when you need to measure something far away, or in wet conditions. While the sensor is good up to 125°C the cable is jacketed in PVC so we suggest keeping it under 100°C. Because they are digital, you don't get any signal degradation even over long distances! The DS18B20 provides 9 to 12-bit (configurable) temperature readings over a 1-Wire interface, so that only one wire (and ground) needs to be connected from a central microprocessor. Usable with 3.0-5.5V systems.

Because each DS18B20 contains a unique silicon serial number, multiple DS18B20s can exist on the same 1-Wire bus. This allows for placing temperature sensors in many different places. Applications where this feature is useful include HVAC environmental controls, sensing temperatures inside buildings, equipment or machinery, and process monitoring and control.

Model:STH01102S



Features

- 9 to 12 bit selectable resolution.
- one digital pin for communication.
- Multiple sensors can share one pin.
- Query time is less than 750ms.

Specification

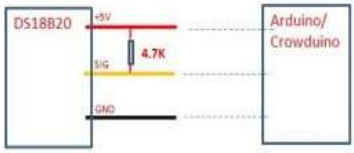
- 3.0V to 5.5V input.
- Temperature range: -55 to 125°C (-67°F to +257°F).
- ±0.5°C Accuracy from -10°C to +85°C.
- Red wire - VCC.
- Black wire - GND.
- Yellow wire - DATA.
- Stainless steel tube 6mm diameter by 30mm long.
- Cable length: 90cm.

Usage

Here, we will show how to use the waterproof temperature sensor (DS18B20) with your Arduino. This sensor uses the one wire protocol to talk with the microcontroller. So, it requires only one digital port to communicate.

Hardware

The sensor has 3 wires: red (VCC), black (GND) and white (DATA). Connect the red to +5V, the black to GND and the white to the digital pin D10. Then, put a 4.7kohm resistor between the white wire and the +5V.



3. WIFI ESP8266

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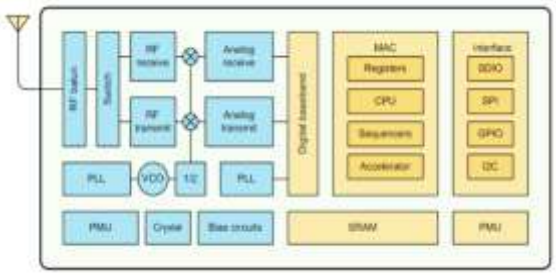
Operation Principle

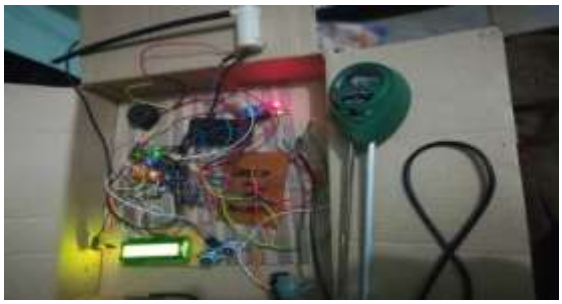
Expressive Systems' Smart Connectivity Platform (ESCP) is a set of high performance, high integration wireless SOCs, designed for space and power constrained mobile platform designers. It provides
unsurpassed ability to embed Wi-Fi capabilities within other systems, or to function as a standalone application, with the lowest cost, and minimal space requirement.

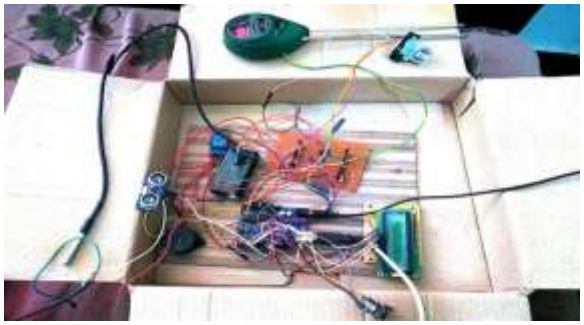


ESP8266EX offers a complete and self-contained Wi-Fi networking solution; it can be used to host the application or to offload Wi-Fi networking functions from another application processor. When ESP8266EX hosts the application, it boots up directly from an external flash. In has integrated cache to improve the performance of the system in such applications.

ESP8266EX also integrates an enhanced version of ten silica's L106 Diamond series 32-bit processor, with on-chip SRAM, besides the Wi-Fi functionalities. ESP8266EX is often integrated with external sensors and other application specific devices through its GPIOs; sample codes for such applications are provided in the software development kit (sdk).

4. RESULTS





5. CONCLUSION

This paper will demonstrate the successful implementation of an internet-based approach to measuring water quality and usage on a real-time basis. A flow sensor for measuring of quantity supplied, eliminating the drawbacks of traditional water metering systems. Future enhancements can include prepaid billing and automatic treatment of water based on the nature of contamination. Water metering system will be used for automated billing, eliminating the drawbacks of traditional water metering systems. This novel idea can be further extended to other areas like oil and natural gas monitoring systems.

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