

Study of TDS Monitoring Using IoT

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Abstract: With the growing of modern technology and Android Smartphone, Smart RO is gradually changing people's life. Wi-Fi technology, which main purpose is to get notified data wirelessly in a short distance using system on chip with integrated TCP/IP protocol that give any microcontroller access to Wi-Fi network which is providing a necessary technology to create convenience, intelligence and control ability. However, this paper looks into the development of an ANDROID application which is interfaced with RO hardware and subsequently notified TDS value of drinking water on the hardware using Wi-Fi module. In the rapid growing era of developing science & technology, human beings have also started producing those things which are very helpful for people. In this project we are going to develop a system that will measure TDS of an RO system but in a smart way. There will be sensors through which TDS will be measured smartly and information will be displayed on either a Wi-Fi based application or on a web server. The interaction between device and this system will be done through networking and using Micro-Controller. All messages which is programmed and controlled by Arduino Uno microcontroller. Also, the main control system implements wireless Wi-Fi technology to give remote access from computer and smart phone. We are here using android as it is most used today and it is user friendly.

Keywords: TDS METER, ESP8266 WIFI, Arduino Controller, IntelliJ IDEA Software, Arduino Controller Software

1. Introduction

The controller we are going to use is Arduino Uno. The Arduino Uno is a microcontroller board based on the ATmega328 datasheet. It has a 14 digital input/output pins, 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button.

The software we are going to use is Arduino and Android. The Arduino Integrated Development Environment (IDE) which contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino and Genuino hardware to upload programs and communicate with them. It runs on Windows, Mac OS X, and Linux. The program is written in Java and based on Processing and other open-source software.

WIFI technology has been one of most important technologies to home automation or Smart Living. It is a wireless technology that allows electronic devices to connect to a wireless LAN network. WIFI is a technology that uses radio waves to provide network connectivity. In many wireless networks, the data link layer performs error recovery according to some automatic repeat request (ARQ) protocol. Fig.1 shows basic idea of wireless network.

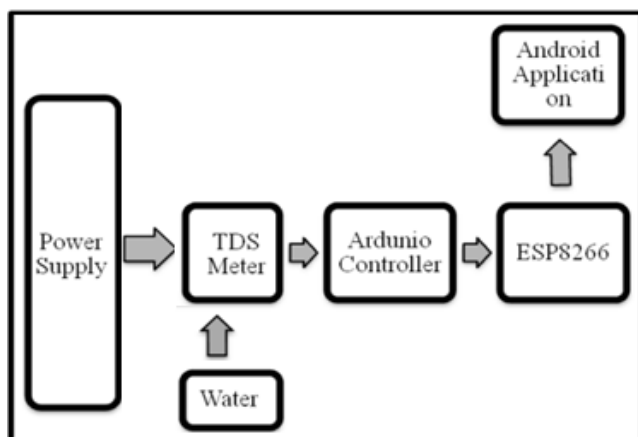


Figure 1: Block Diagram

Power supply unit is the block from where whole system will get supply for work. Supply can be provided by giving external power in volt. The supply will be directly given to the TDS Meter i.e. to measure TDS value of water supplier unit. Arduino Microcontroller is meant to deal with digital information. We can read inputs on Arduino boards which contain inputs like light on a sensor, a finger on a button which turns into an output like activating a motor, turning on an LED. Microcontroller kit is interactive objects that can sense and control physical devices. Atmega328 microcontroller also have 8 (or 6 PDIP package) ADC input channels. All these can be used any analog value that is within reference voltage range.

Here ESP8266 WIFI is used for self-contained system on chip with integrated TCP/IP protocol stack that give any microcontroller access to Wi-Fi network. It is specifically used for mobile devices, wearable electronics and networking applications design. This is low cost Wi-Fi module suitable for adding Wi-Fi functionality to an existing microcontroller via serial connection. This is used in our device to fetch reading from Arduino Controller and it will match IP/PORT of our mobile application.

2. Diagrams

A. Activity Diagram

This activity diagram shows all activities done on android application side. As shown in figure it checks IP-PORT of android application is valid or not? Our Hardware is placed in the RO device so we could check TDS value of water.

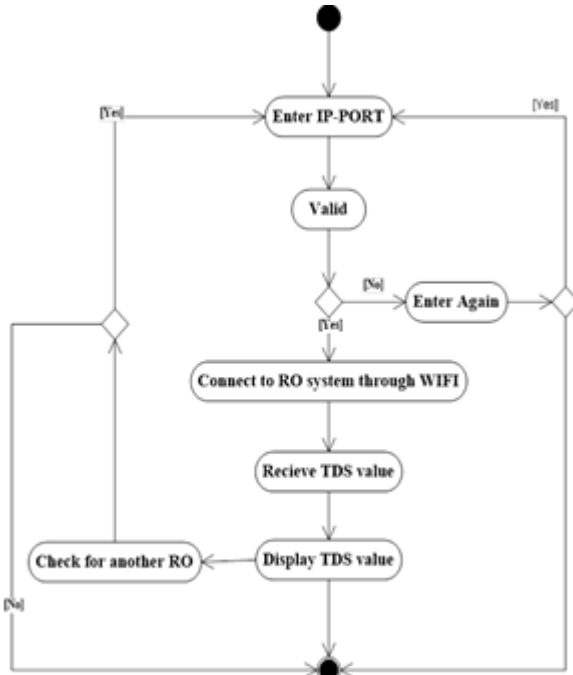


Figure 2: Activity Diagram

- 1) If (yes) in application
 - a) Connect to RO system through WiFi
 - b) It will receive TDS value
 - c) Display TDS value
- 2) If (no) in application
 - a) Enter IP-PORT detail again
- 3) Enter all details further for checking TDS values for another RO system.

B. Pin Diagram

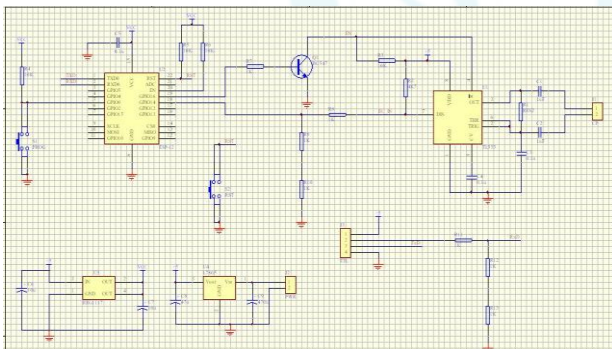


Figure 3: PCB

3. Components

Here, we discussed a list of important part in detail. The major part of this paper is divided in to two-part android and embedded system. First we discuss about embedded component likes WiFi module and microcontroller and transistor and Timer IC.

A. Arduino Microcontroller

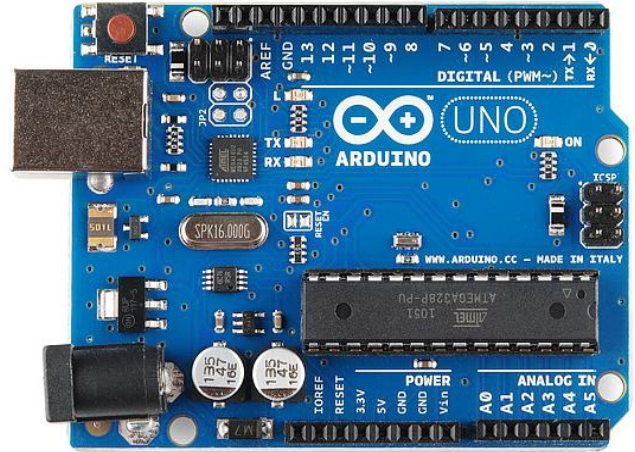


Figure 4: Arduino Controller

Arduino is an open-source electronics platform for both hardware and software. Arduino is an electronics bread boarding platform based on very flexible, easy-to-use use both hardware and software. One can read inputs on Arduino boards which contain inputs like light on a sensor, a finger on a button which turns into an output like activating a motor, turning on an LED.

Arduino boards use printed circuit expansion boards which are also called as shields, which plug into the normally supplied Arduino pin headers. Shields provide motor controls for 3D printing and other applications, Global Positioning System (GPS), Ethernet, liquid crystal display (LCD), or bread boarding (prototyping). Several shields can also be made do it yourself (DIY).

B. ESP 8266



Figure 5: ESP8266

ESP8266 Wi-Fi is a self-contained system on chip with integrated TCP/IP protocol stack that give any microcontroller access to Wi-Fi network. ESP8266 is self-contained Wi-Fi network solution that includes software applications. ESP8266 specifically used for mobile devices, wearable electronics and networking applications design. This is low cost Wi-Fi module suitable for adding Wi-Fi functionality to an existing microcontroller via serial connection.

Connections required connecting to the ESP8266 module need to take care about some important things related to power:

- a) ESP8266 needs 3.3V power supply.
- b) ESP8266 requires communicating via serial at 3.3V inputs, so one need conversion to communicate with a 5V microcontroller like Arduinos.

C. Transistor- BC547



Figure 6: Transistor- BC547

The BC548 is a general-purpose NPN bipolar junction transistor which can be used in two different modes which are forward biased mode and the reverse biased mode. BC547 is specially used for amplification and switching purposes which have a largest current gain of at least 800 and inputs equivalent transistors are BC548 and BC549. A transistor, stands for transfer of resistance, is commonly used to amplify current where a small current at its base controls a larger current at collector & emitter terminals.

D. Timer IC-555

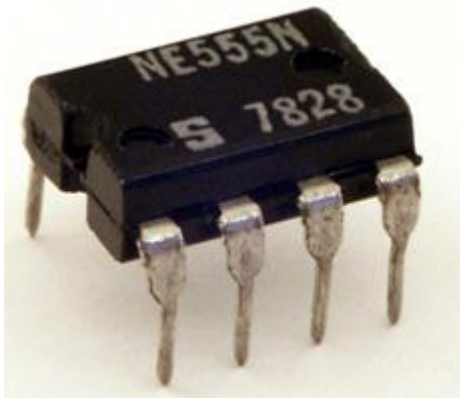


Figure 7: Timer IC-555

The 555 timer IC is an integrated circuit which is used in a variety of timer, pulse generation, and oscillator applications. 555 timers is accurately stable circuit which is functioning as a particular time delay generator. When the 555 timer IC used as an oscillator the frequency and duty cycle are evolving controlled by mainly two external components which are resistor (R) and capacitor (C).

It is basically a monolithic timing circuit which produces accurate and highly stable time delays as well as oscillation. It also produces High temperature stability.

4. Simulation Software

In this we are using following software for the implementation of android IntelliJ Idea 13.1 software, for coding Arduino software.

a) IntelliJ IDEA



Figure 8: IntelliJ IDEA

IntelliJ IDEA Community Edition is the open source version of IntelliJ IDEA, a premier IDE (Integrated Development Environment) for Java. IntelliJ IDEA released in both Ultimate Edition and Community Edition.

IntelliJ focused on productivity which provides Full Java EE support, XML and Groovy code, deep code understanding, best debugger, refactoring, code inspections and intentions, super-fast navigation as well.

b) Arduino Controller



Figure 9: Arduino Controller

The Arduino Integrated Development Environment also known as Arduino Software (IDE) has a text editor for writing code, a text console, a toolbar with buttons for common functions. It also has a number of menus as option. It connects to the Arduino and Genuine hardware to upload programs and communicate with them.

Arduino programs are written in C or C++. The Arduino IDE comes with a software library called “Wiring” from the original Wiring project, which makes many common input/output operations much easier.

email-using-arduino-and-esp8266-wi-fi-module

5. Conclusion

The benefit that we are going to provide through our project is that the user can easily know about the fault with their system and also know about the TDS value of their RO system. The users can easily know faults with their system with concerning any technician. This allows a set of actions to be executed with minimum time and also saves money.

Until now there were no similar apps available on the Play Store platform for either mobile or desktop devices. Our system is designed to help users solve the problem with RO easily and in a minimum amount of time. The application that we will develop will be user friendly. User has to enter IP and Port of the Wi-Fi present into the system only once and then can use it whenever needed.

Using this system will give pure drinking water to the users as purity is a must for all. The app will display TDS value of the RO water at regular intervals of time.

6. Acknowledgment

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