Aquarium Wise Controller Documentation

Release 0.1

Trent Scholl

January 26, 2017

The Aquarium Wise Controller is an Arduino based controller with a 3.2" color touch screen TFT display that can automate every aspect of your Aquarium. It uas a user friendly graphic interface that lets you control and configure power schedules, temperature monitoring and control, lighting cycles, pH level and control, and much much more.

It is also easy to expand to perform almost any task you can think of (with some basic electronics and software development knowledge).

The main documenation for the controller is organized into a couple of sections.

- Hardware
- Software
- User Guide

Hardware

1.1 Getting Started

This documentation will show you all the bits and pieces you'll need to purchase and how to hook it all together.

1.1.1 Bill of Materials

The Aquarium Wise controller is built from many different electronics components that can be sourced from online stores, local stores or eBay. Most of the components can be sourced cheaply from eBay, but be warned that postage times from China are generally 25-30 days. It is recommended you source as many of the components as you can in one shop to avoid losing interest.

If you are unable to find an exact component, many of them can be interchanged with equivalent version.

Here's what you need to get started:

- Arduino Mega 2560 R3
- Atlas Scientific pH Kit
- SainSmart 8 Channel DC 5V Relay Module
- SainSmart 3.2" SSD1289 TFT Touch Screen
- SainSmart TFT LCD Adjustable Shield
- 3 x 10 Position Terminal Blocks
- 8 x Panel Mount Power Sockets (to match your country)
- C14 Power Inlet Socket
- USB B Female to B Male Panel Mount Socket
- Airline
- Airline Connectors
- Jumper Cable
- Hookup Wire
- 3 x 12V Peristaltic Pumps
- 4 Channel Mosfet Switch Board
- Variable Resistors

- 4.7k ohm Resistors

- 330 ohm Resistors

- L7805 5V Voltage Regulator

- Piezo Buzzer

- Heatshrink

- Diodes

- 47uF Capacitors

- NPN Transistors

- Waterproof DS18B20
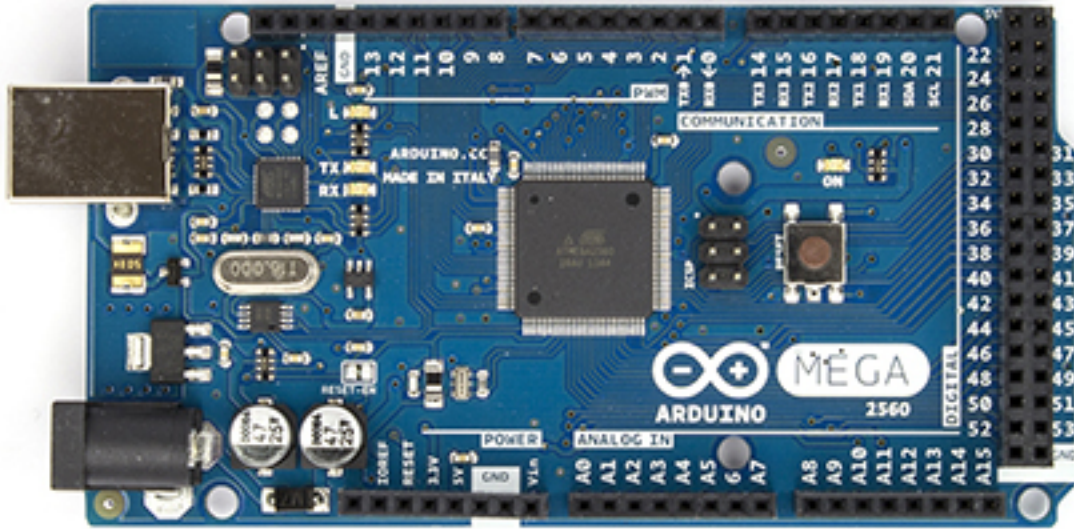
- DS3231 Module

- Breadboard

Addtionally you'll also need:

- A Soldering iron

- Solder

- Wire stripper

- Pliers

- Wire cutters

- Crimper

- Various sized Screw Drivers

- Lots of spare time

1.2 Hardware

Below is a list of the major componentry required to build a working Aquarium Wise Controller.

1.2.1 Arduino Mega 2560 R3

The Arduino Mega 2560 is a microcontroller board based on the ATmega2560. Although it is recommended that you purchase an official board from an Arduino reseller, there are many cheaper clones available that are suitable to use for the Aquarium Wise Controller.

It is important that you purchase the Arduino Mega 2560 R3 or equivalent clone as all of the documentation and software is designed specifically for it.

1.2.2 SainSmart 3.2" SSD1289 TFT Touch Screen
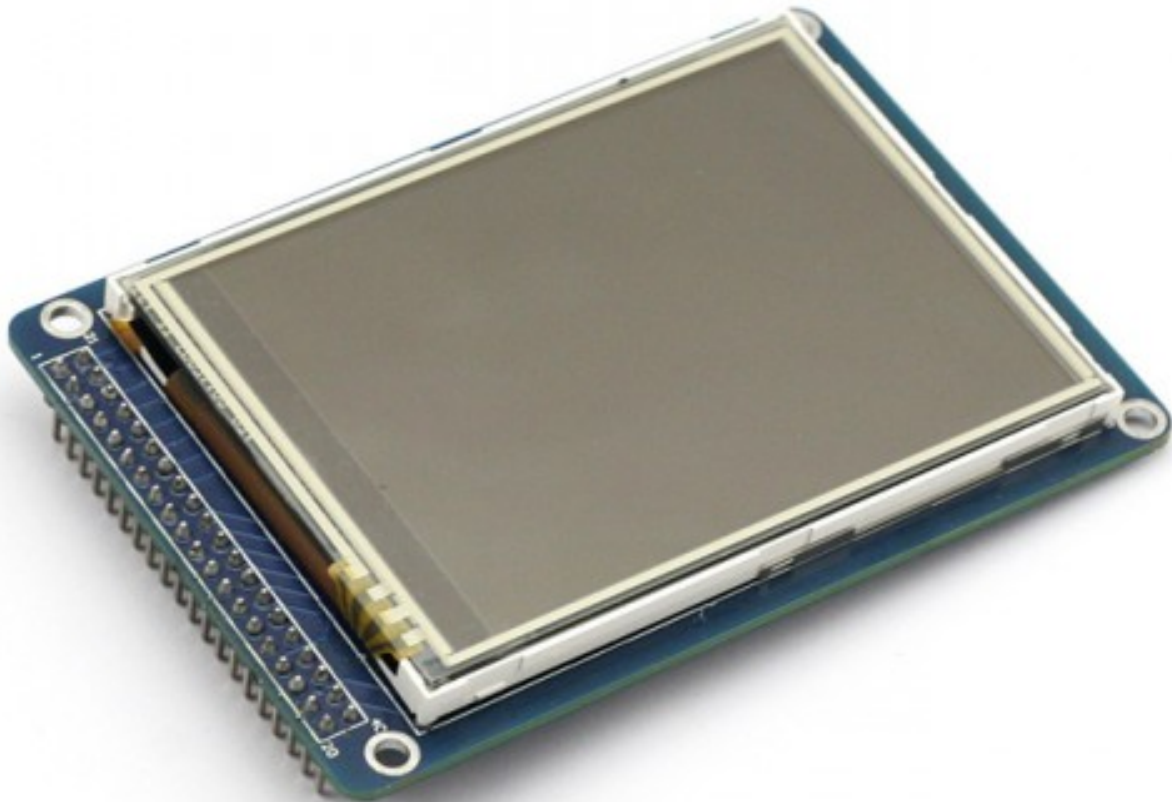
The SainSmart 3.2" TFT Touch screen is a LCD screen module with a SSD1289 controller. It also includes and SD card reader - however, this is not currently used by any of the functionality in the Aquarium Wise Controller.

This component can be replaced with any 320 x 240 LCD module that is supported by the UTFT library. The modifications required for using a different screen can be found in the Software section of this documentation.

1.2.3 SainSmart TFT LCD Adjustable Shield

Although not required, the SainSmart TFT LCD Adjustable Shield makes the process of hooking up the 3.2" TFT to the Arduino much simpler. Some modifications are required if you wish to use it as a straight plug-in for the Arduino. These modifications are located further in to the documentation.

1.2.4 Atlas Scientific pH Kit

The Atlas Scientific pH Kit comes with everything you need to get your Aquarium Wise controller up and monitoring pH levels in your aquarium.

The software is writen specially to work with the Atlas Scientific pH stamp, but can be easily modified to us a DIY pH solution. However, it is highly recommended to use the Atlas Scientific kit.

Datasheet

1.2.5 SainSmart 8 Channel DC 5V Relay Module
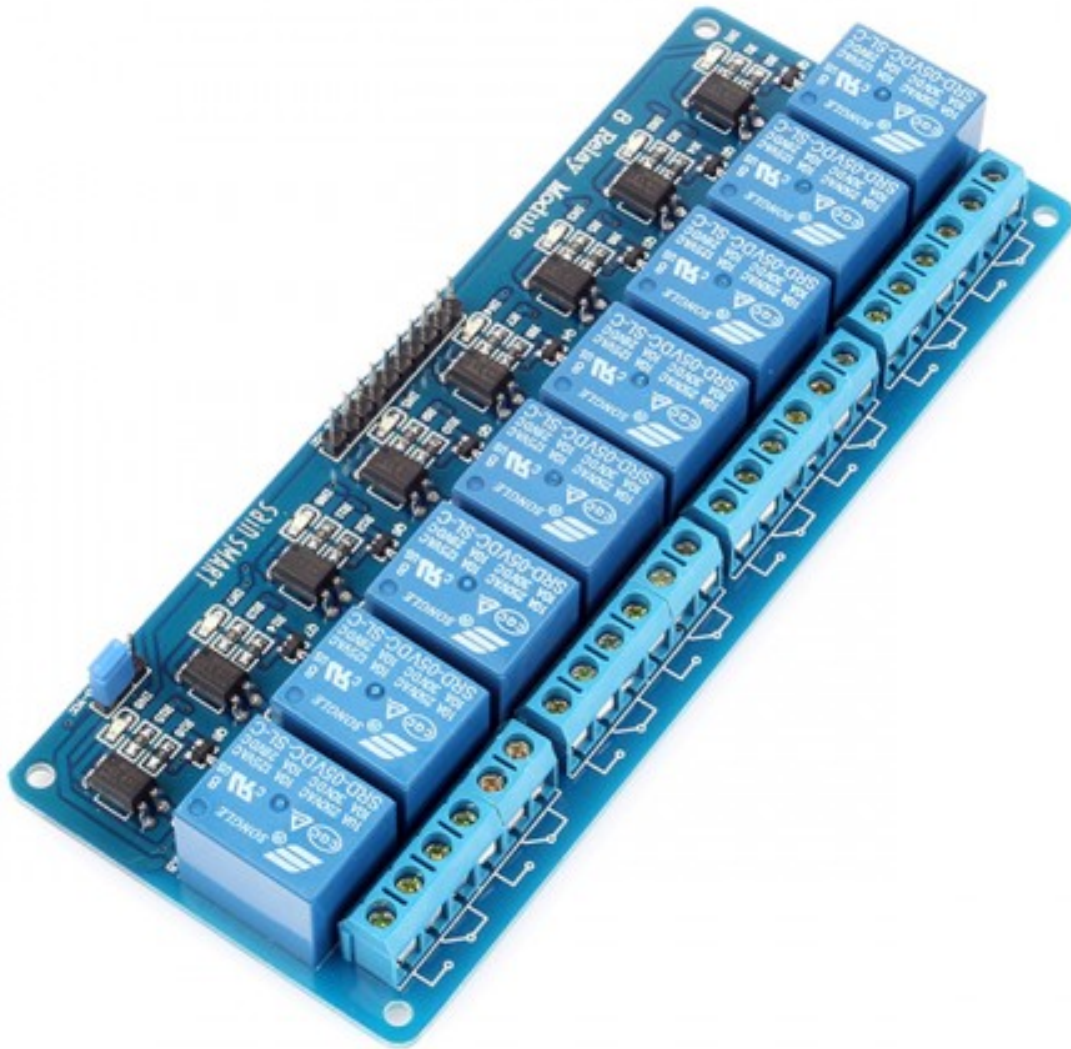
The SainSmart 8 Channel Relay Module is used to control the power outlets for lights, filters, heaters, etc.. Any relay board can be used in place of the SainSmart board - some software changes may be required depending on what signal the relay board is expecting (Some expect HIGH for off and others expect LOW for on).

1.2.6 DS3231
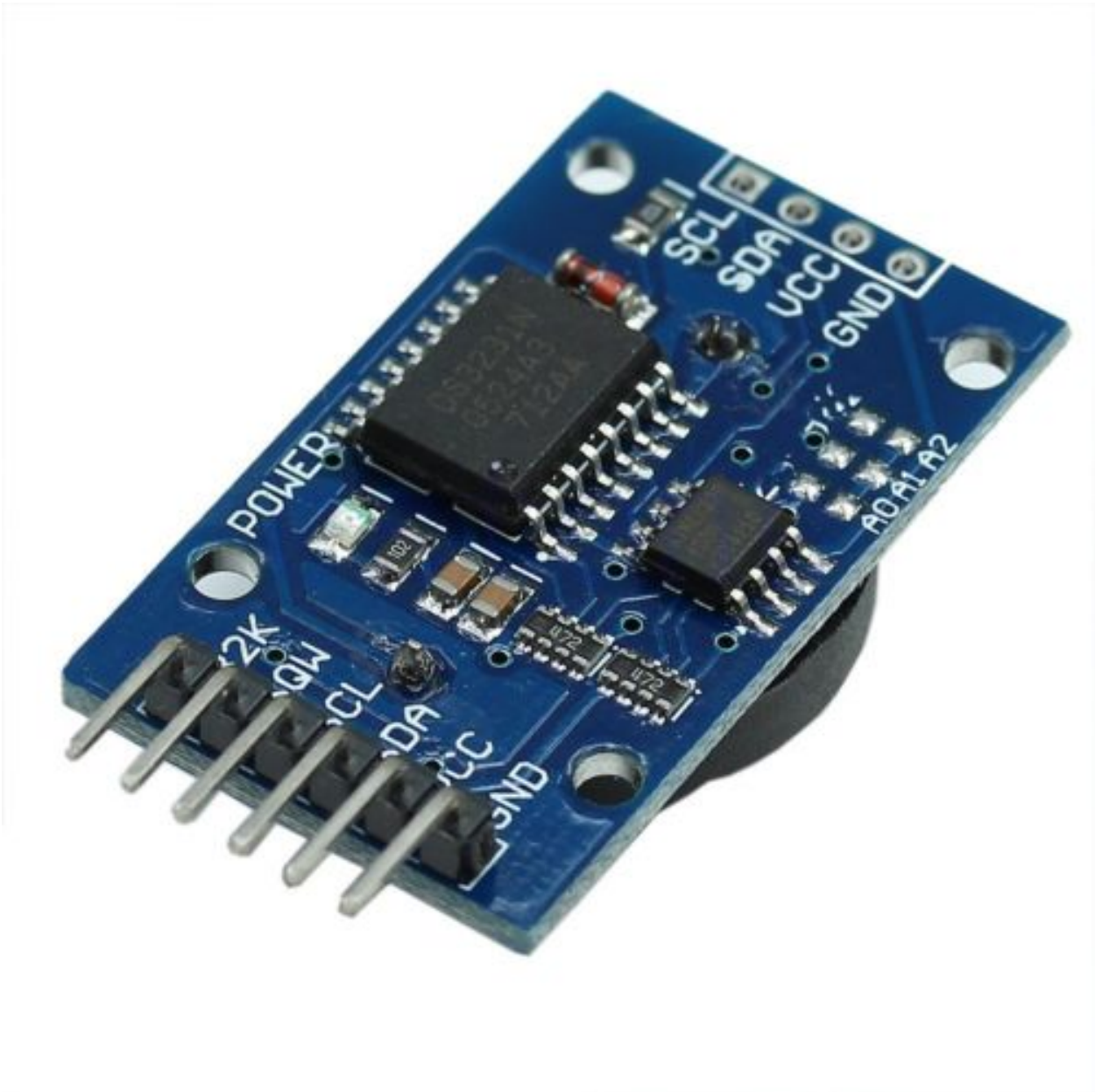
The DS3231 is a low-cost, extremely accurate I²C real-time clock (RTC) with an integrated temperature-compensated crystal oscillator (TCXO) and crystal.

Purchasing a pre-made PCB with components is the simplest and quickest way to get your RTC up and running.
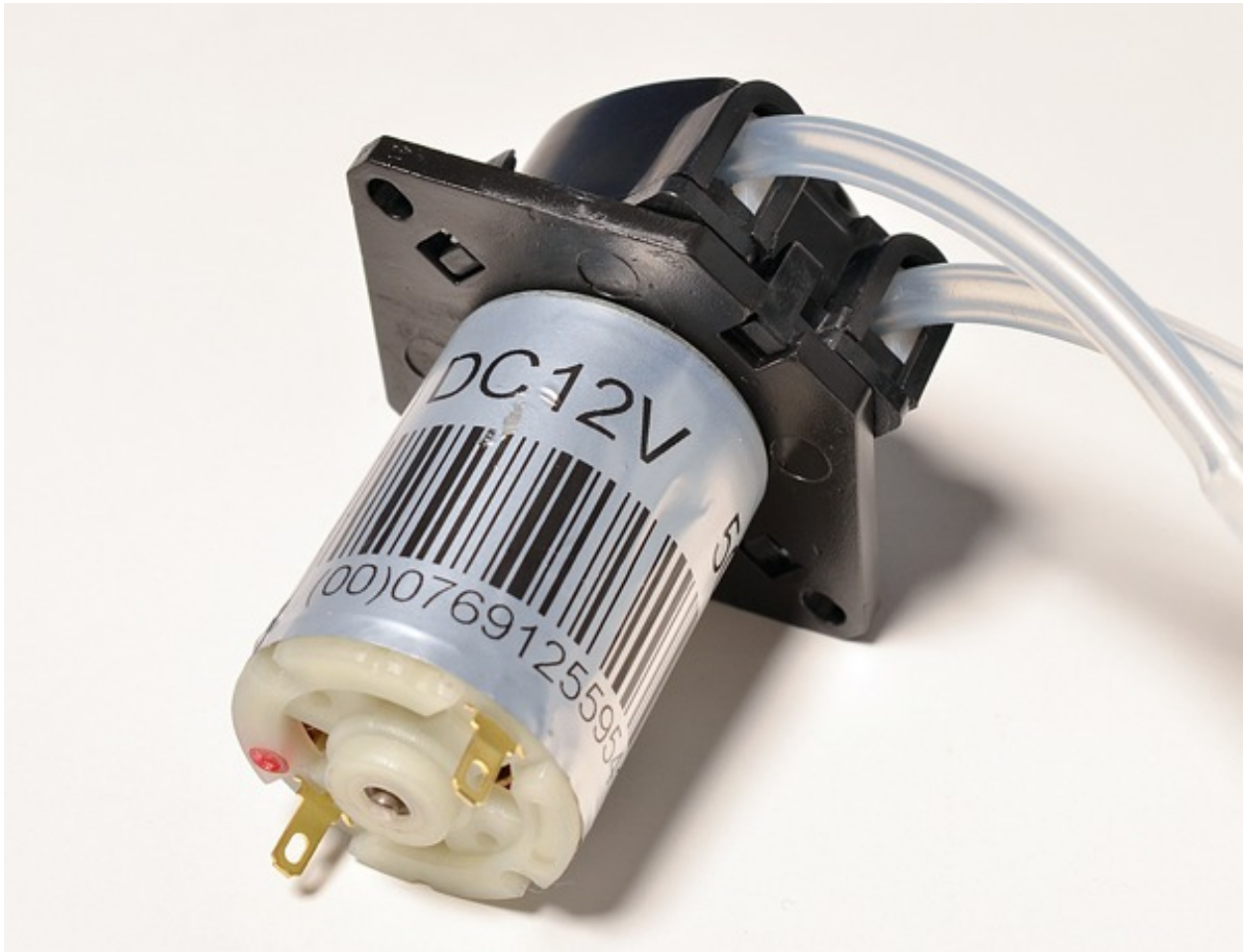
Datasheet

1.2.7 DS18B20

The DS18B20 is a digital thermometer that communicates over a 1-Wire bus. These are used to monitor water and ambient temperature.

Datasheet

1.2.8 Peristaltic Pump

A Peralistic Pump is a displacement pump that is used to pump fluids, in our case, liquid fertilizers or other aquarium chemicals. This documentation explains how to use 12v pumps, but different voltages can be used with minor modifications.

Software

User Guide