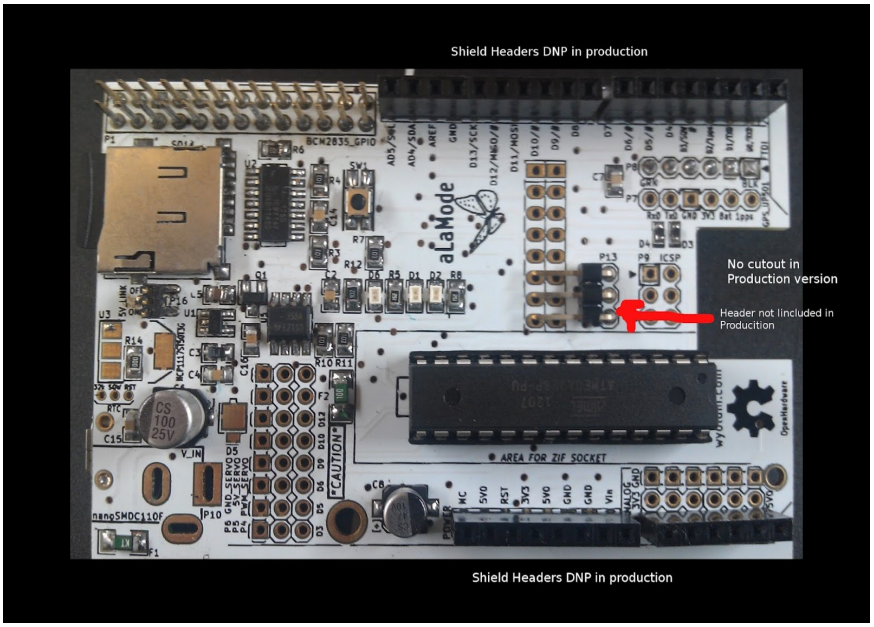
Kevin Osborn September 6, 2012



Alamode *a stackable Arduino compatible for the Raspberry Pi.*

The Arduino IDE makes interfacing with the real world easy. Arduino already has hundreds of libraries for interfacing with motors, sensors, and displays. Alamode is an Arduiino compatible development board that extends that ease to the Raspberry Pi. With Raspberry Pi 'A la Mode, you can write a program on the Pi in any language you want to control or monitor your Arduino application, making Internet integration and control super easy. In addition you can even program the AlaMode directly from the Pi. Or, turning things around, think of Raspberry Pi as a highly capible ethernet and display shield for the Alamode!

Here are the features including a few extra goodies:

- Flexible power. Can be powered directly from the Pi, standalone with a battery or wall-wart, or USB power. This is important if your shield takes more power than the Pi can provide or if you want to undock it for standalone operation.
- Programmable via the Pi's UART on the GPIO pins, or an FTDI USB-Serial adapter or ISP.
- Header for connecting Fastrax UP501 GPS.
- DS3234 Real time Clock. The Pi doesn't have it's own battery backed RTC. You can set a program in the AlaMode to report the time to the Pi via serial or I2C
- Micro-SD card slot. Useful for datalogging, and big-memory for your Arduino applications
- Row of Servo Headers connected to the PWM pins with a configurable power and ground rail

Alamode Manufacturing test plan

Overview

This process requires an assembled Alamode with Uno bootloader and test code loaded on the Unit Under Test (UUT).
A tester is supplied with a Seeed TFT touch shield to display test results. The tester has a ribbon cable with connector for plugging in to the Alamode UUT, and a USB serial connection to a host computer for logging if necessary.

Functionality to be tested

1. Power on (do the 5V and 3.3V light)
2. RTC set/read functionality
3. SD read/write functionality (requires formatted micro card to be inserted)
4. Serial communication over the GPIO port
5. I2C Communication between the host (tester or Raspberry Pi) and UUT

Incidentally, general system operation is also tested.

Automated tester

RTC, I2C, SD, GPIO serial and general operation are tested by plugging the Automated test unit into the GPIO connector of the Alamode UUT.

Photo dipicts correct orientation of GPIO connector. The serial test indicates failure.

The test unit consists of a Sparkfun Arduino Mega Pro 3.3v, Alamode adapter shield (bottom) and SeeedStudio TFT touch screen for test status reporting. The Mega 3.3v platform was selected because:

1. Raspberry Pi GPIO interface requires 3.3v interfaces
2. The extra serial ports allow us to both test the GPIO Uart functionality and report status to a host computer.

The Automated tester can be powered by the included Adafruit FTDI Friend USB-serial adapter configured for 3.3V operation. Some FTDI cables use 5V Vcc and should not be used. Power could theoretically also be applied to the DC in port, but this has not been tested. If the USB cable connected to the FTDI friend is connected to a host computer, status will also be reported via the associated virtual comm port at 9600 baud.

The Alamode Automated tester is programmed with AlamodeTester.ino. Note that programming of the 3.3v 8mhz Arduino Mega Pro requires the installation of a board support package located here: http://dlnmh9ip6v2uc.cloudfront.net/datasheets/Dev/Arduino/Boards/mega-pro-3.3V-v10_.zip

The library for the SeeedStudio TFT shield should also be installed. An updated version is in the github repository for this project. See Appendix 1.

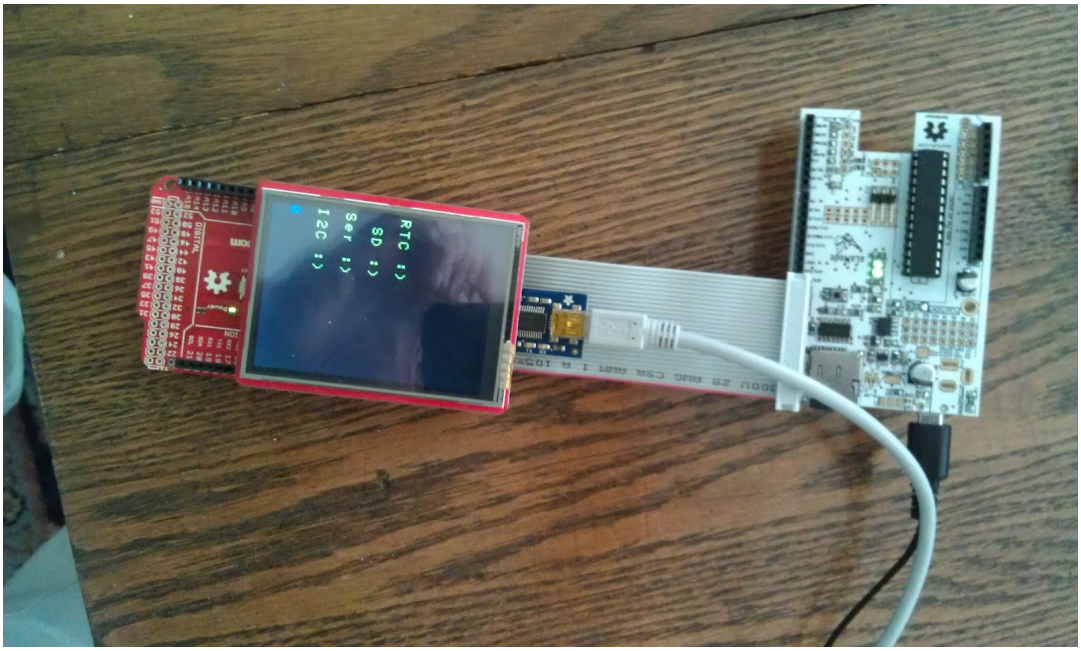
The tester is pre-programmed, and this information is provided in case Seeed wishes to enhance the test code. It can be re-programmed via the FTDI interface.

Preparation of the Unit Under Test (UUT)

1. Power the tester through the 3.3v FTDI port (AdaFruit FTDI friend included with tester)
2. Load the UUT with the UNO bootloader and upload the AlamodeTest.ino code through the Arduino IDE version 1.0.
3. Insert formatted fat 16 microsd card into the slot on the UUT (one is supplied with the tester)

Test Sequence

1. Plug the Ribbon cable from the Tester into the Alamode GPIO connector (P1). Pin 1 indicated by the red stripe on the cable should be aligned with the outer corner of the UUT board.



2. Apply power to the USB connector on the UUT.
3. LEDs on the UUT D1 (5V power indicator) and D2 (3.3V power indicator) should light. Failure of either of these either indicate a power supply problem, or incorrectly installed LEDs
4. After a few seconds, the tester display will indicate the status of all the tests. a red :(frown indicates failure, a green :) smile indicates success.
5. If the I2C test fails, then RTC, and SD will also fail because those test results are communicated via I2C. This probably indicates a problem with the Voltage translation chip (U6 - TXS0108), or a general system failure.
6. After the completion of a successful test the USB connector can be unplugged from the UUT, followed by the Ribbon cable. The next unit can now be tested (don't forget to transfer the SD card).
7. If the SD card isn't properly inserted, the SD test will fail. Reinsert the SD card and then push the reset button on the UUT. This will reinitialize the test code and after a few seconds, the tests should all read green.

Here is a video giving a run through of operation of the automatic tester.

http://www.youtube.com/watch?v=49R9GfPw5Fc

Appendix 1 - Project Resources.

Code repository: git://github.com/wyolum/alamode.git
Zipped: