APPLICATION NOTE

4D SYSTEMS

TURNING TECHNOLOGY INTO ART

Application Note: 4D-AN-M5001

Serial - Interfacing a 4D-Display to Arduino

Document Date: 23rd February 2013

Document Revision: 1.1

Description

This application note is intended to provide users of Arduino boards and beginners, information on how to interface any 4D display module. In order to carry out this application note the following items are required:

- Any 4D Systems Workshop 4 supported Display Module
- Arduino Board (Such as Duemilanove, Duo, etc)
- 4D Arduino Adapter Shield and 5 wire F-F Cable
- 4D Programming Cable
- USB cable for Arduino

Content

Application Overview

There are many product applications which require a display to be driven by a host controller. One of those hosts could be an Arduino.

Through this application note, we will show a simple sketch for the Arduino board to print "Hello World" on the 4D Systems display, configured as a Serial display using Workshop 4, utilising the Arduino library written by 4D Systems.

Further, this application note is applicable to any 4D Systems display configured using the Serial Environment of Workshop 4, using the SPE application from 4D Systems.

At the end, the user may modify the sketch to include other serial functions for further experiment or code practice. The simplicity and ease for Arduino users to drive any 4D Systems display is the goal of this application note.

This Application Note is an introduction to using the Arduino Serial Library produced by 4D Systems.

Setup Procedure

Foremost, the 4D Workshop 4 IDE has to be downloaded and installed. This is available from the 4D Systems website through the following link:

http://www.4dsystems.com.au/prod.php?id=172

Documentation regarding Workshop 4 and its environments, such as Serial, can also be downloaded from this site.

In the same manner, the Arduino IDE would need to be downloaded and installed. Depending on which OS you're using the appropriate links are available from the following page on the Arduino website:

http://arduino.cc/en/main/software

Simulation Procedure

Converting any 4D Display to a Serial display

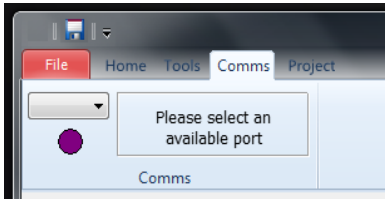
In this example, the uLCD-32PTU module was used. Almost any 4D Systems display may be used provided it features in the module list in Workshop 4.

The first step is to open a new project in Workshop 4 (WS4).

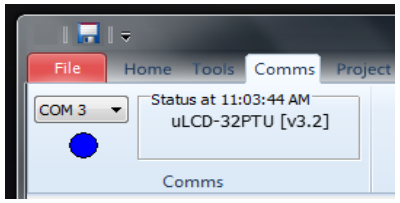
Select the appropriate display you want to use. For this example we used the uLCD-32PTU. Please select the model accordingly to what you have.

Select the serial environment

Connect the display module using a 4D programming cable to the USB port. Click COMMs tab on WS4. Ensure that the "Indicator Dot" is blue otherwise select appropriate COM port (usually COM3 or higher) then click the dot and wait until it is blue indicating that communications with the module was established.

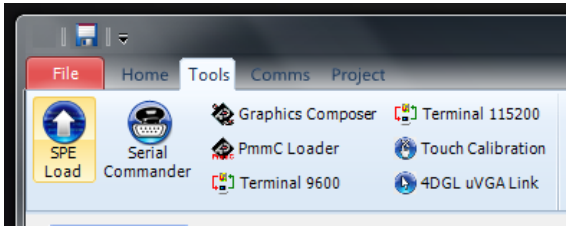


Not Connected



COM connected

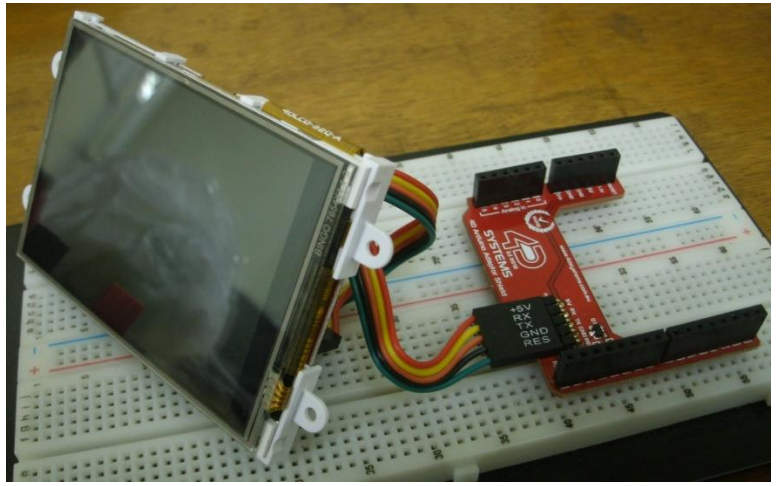
Open Tools menu and click SPE Load. This procedure would load the necessary firmware and configuration to convert the display in Serial (SPE) mode.



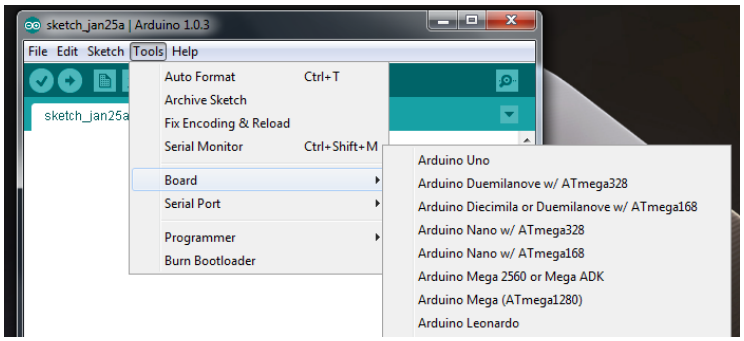
Disconnect the module and programming cable from the PC

Connecting the Display to the Arduino

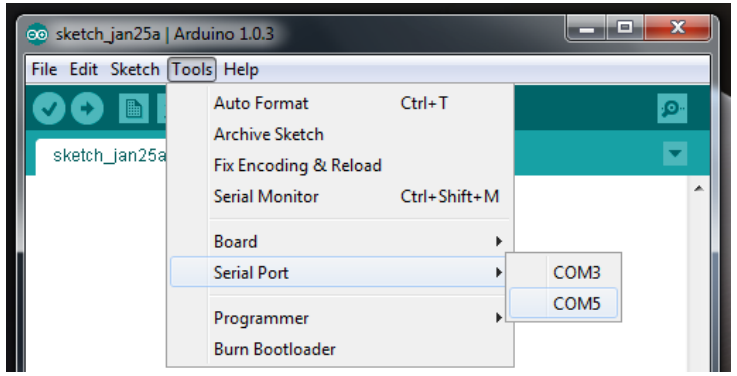
Connect the Display using the 5-pin F-F cable provided, to the 4D Arduino adapter shield. Please take care to connect the 5-pin connector with the proper pin orientation on both the Display side and on the 4D Arduino adapter shield. **Do not connect the shield to the Arduino at this point.**



Open the Arduino IDE and select your Arduino board model. In the "Tools " menu select "Board" submenu and a list will show all available models.

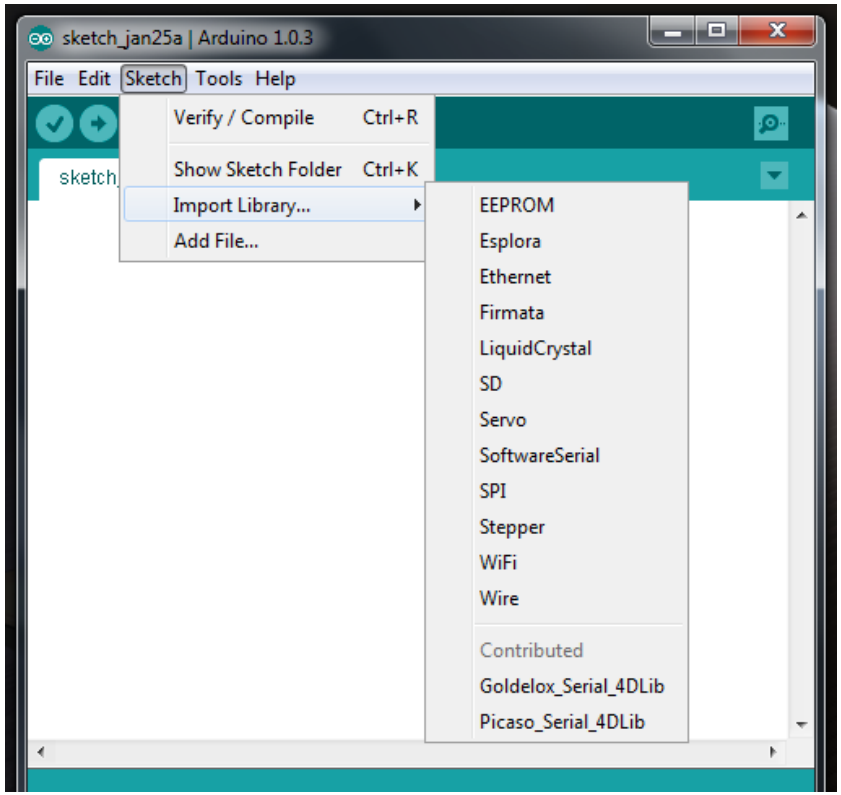


Next, check the serial port connection, to do that, go to the Tools -- Serial submenu. Ensure that the correct COM port is used for the Arduino.



Verify if the Picaso Serial library is installed. Otherwise, go to My Documents or Public Documents and look for the 4D Labs folder. Open the Picasso Serial folder, then open the Arduino folder then right click on the Picaso_Serial_4DLib folder, copy and paste to your Arduino Library folder (usually located at ...\My Documents\Arduino\Libraries\)

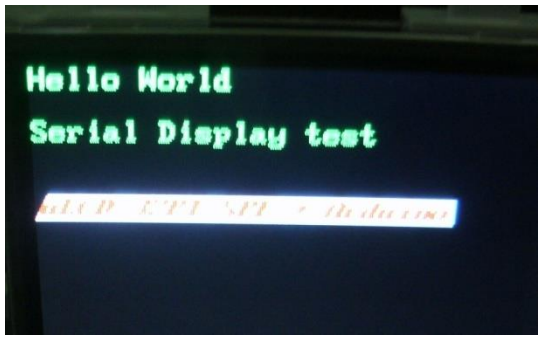
For Goldelox displays, copy the Goldelox_Serial_4DLib folder to the Arduino libraries folder. To verify if the 4D library is installed, on the Arduino IDE, open Sketch -- Import Library. Please see below for details:



Simulating the "Hello World" Sketch

Open the Arduino IDE and open the Hello World sketch.

Compile then download to the Arduino board. After the download has successfully completed, attach the 4D Arduino adapter shield to the Arduino board. Press the reset button the Arduino, and that's it! The display should look something like this below:



Code Practice

Comments have been inserted in the sketch as guide for the user. It is also recommended to study the Picaso Serial Environment Command Set for more details and complete list of commands available. The document is available and can be downloaded from the 4D Systems website from this link:

http://www.4dsystems.com.au/prod.php?id=172

The sketch could be modified or extended further for code practice and further experimentation using the other functions available when using the Arduino Serial Library provided by 4D Systems.
Please open the library to see the full listing of functions available.

Sketches for both Picaso and Goldelox display are included with this App Note.

Proprietary Information

The information contained in this document is the property of 4D Systems Pty. Ltd. and may be the subject of patents pending or granted, and must not be copied or disclosed without prior written permission.

4D Systems endeavours to ensure that the information in this document is correct and fairly stated but does not accept liability for any error or omission. The development of 4D Systems products and services is continuous and published information may not be up to date. It is important to check the current position with 4D Systems.

All trademarks belong to their respective owners and are recognised and acknowledged.

Disclaimer of Warranties & Limitation of Liability

4D Systems makes no warranty, either expresses or implied with respect to any product, and specifically disclaims all other warranties, including, without limitation, warranties for merchantability, non-infringement and fitness for any particular purpose.

Information contained in this publication regarding device applications and the like is provided only for your convenience and may be superseded by updates. It is your responsibility to ensure that your application meets with your specifications.

In no event shall 4D Systems be liable to the buyer or to any third party for any indirect, incidental, special, consequential, punitive or exemplary damages (including without limitation lost profits, lost savings, or loss of business opportunity) arising out of or relating to any product or service provided or to be provided by 4D Systems, or the use or inability to use the same, even if 4D Systems has been advised of the possibility of such damages.

4D Systems products are not fault tolerant nor designed, manufactured or intended for use or resale as on line control equipment in hazardous environments requiring fail – safe performance, such as in the operation of nuclear facilities, aircraft navigation or communication systems, air traffic control, direct life support machines or weapons systems in which the failure of the product could lead directly to death, personal injury or severe physical or environmental damage (‘High Risk Activities’). 4D Systems and its suppliers specifically disclaim any expressed or implied warranty of fitness for High Risk Activities.

Use of 4D Systems’ products and devices in 'High Risk Activities' and in any other application is entirely at the buyer’s risk, and the buyer agrees to defend, indemnify and hold harmless 4D Systems from any and all damages, claims, suits, or expenses resulting from such use. No licenses are conveyed, implicitly or otherwise, under any 4D Systems intellectual property rights.