

Sparkfun USB Host shield hack

Getting 'Sparkfun USB Host shield' to work with
'Arduino Leonardo' using 'USB Host Shield 2.0' +
'PTP 2.0'



First of all, some references where to get required stuff and also information used to create this little guide

<http://arduino.cc>

<https://www.sparkfun.com/products/9947>

<http://www.circuitsathome.com/ptpusb-control-camera-data>

https://github.com/felis/USB_Host_Shield_2.0

https://github.com/felis/PTP_2.0

Forums/Tutorials

<http://arduino.cc/forum/index.php/topic,123492.0.html>

<http://hardwarefun.com/tutorials/using-usb-host-shield-with-arduino>

Overview

This guide is intended for those who wish to get Sparkfun USB host shield to work with Arduino Leonardo, the reason I chose to write this little guide is that it was quite hard to find all the information needed to get this to work. My goal was to be able to control my

Canon EOS 7D camera hence the extra library (PTP 2.0) mentioned in this guide so this library is optional.

Note from arduino.cc site (<http://arduino.cc/en/Main/ArduinoBoardLeonardo>) regarding SPI on the ICSP header: *"Note that the SPI pins are not connected to any of the digital I/O pins as they are on the Uno, They are only available on the ICSP connector. This means that if you have a shield that uses SPI, but does NOT have a 6-pin ICSP connector that connects to the Leonardo's 6-pin ICSP header, the shield will not work. "*

The statement above is true but can be overridden by some manual wiring or soldering and that is exactly what this document covers! but if you'd like to go the easy way, get Arduino UNO R3 or the TransmogriShield by Sparkfun
<https://www.sparkfun.com/products/11469>

Prereq

Sparkfun USB Host shield headers soldered as shown in "**Photo1**" further down!

Software required

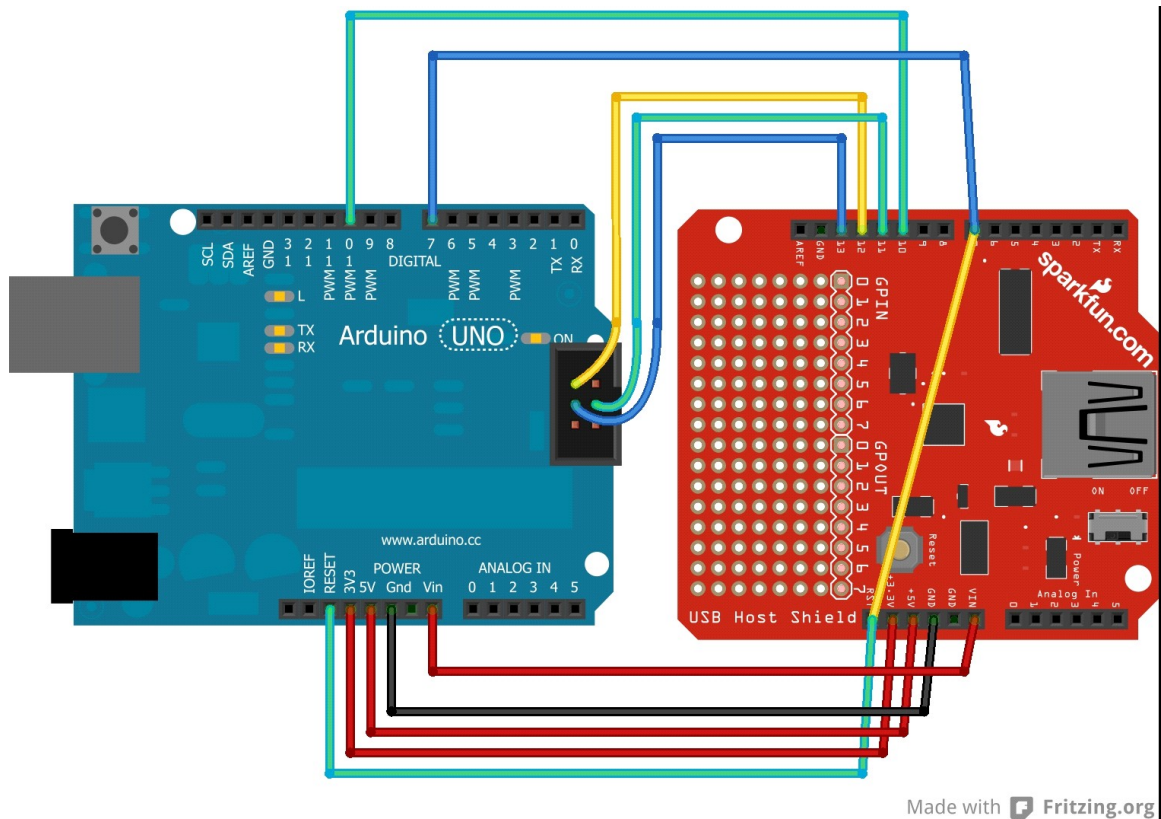
- Arduino IDE 1.0.2
- USB Host shield 2.0 library

Hardware required

- Arduino Leonardo
- Sparkfun USB Host shield (DEV-09947), the newer one (old version not tested)
- Some Female and Male jumper wires
- USB cable (obviously)
- 7-9V DC Power supply that can provide at least 500mA for extra power (the USB host shield needs it)

Lets get it on

Here is a quick schematic (which is not very professional) as reference created using Fritzing (<http://fritzing.org/>), this is how the **Arduino Leonardo** and **Sparkfun USB Host shield** should be connected.



Normally, the USB Host shield should be stacked on top of the Arduino but this schematic only shows the least required wires for this to work, note that if you do stack the USB Host shield you need to cut D11,D12 and D13 pins from the USB Host shield because these will be wired to the SPI interface of the Arduino Leonardo as shown above!

Ok, lets continue with some photos along with some short comments before explaining the wiring in detail, please note that the colors of all wires match the schematic above!.

Photo1:

6x and 8x headers soldered

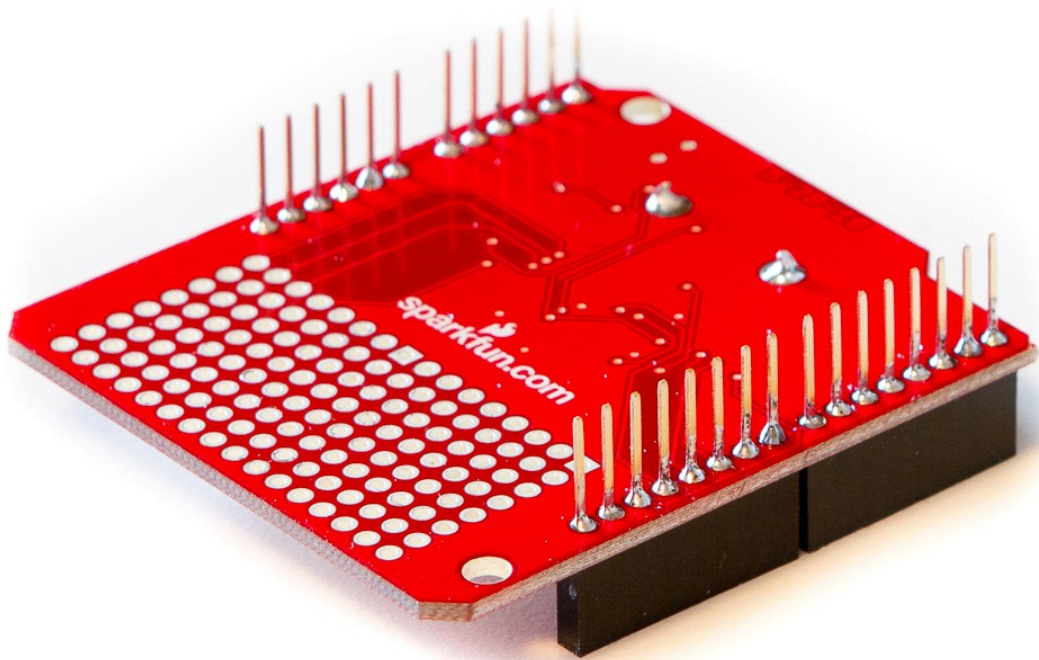


Photo2:

General overview (complete setup)

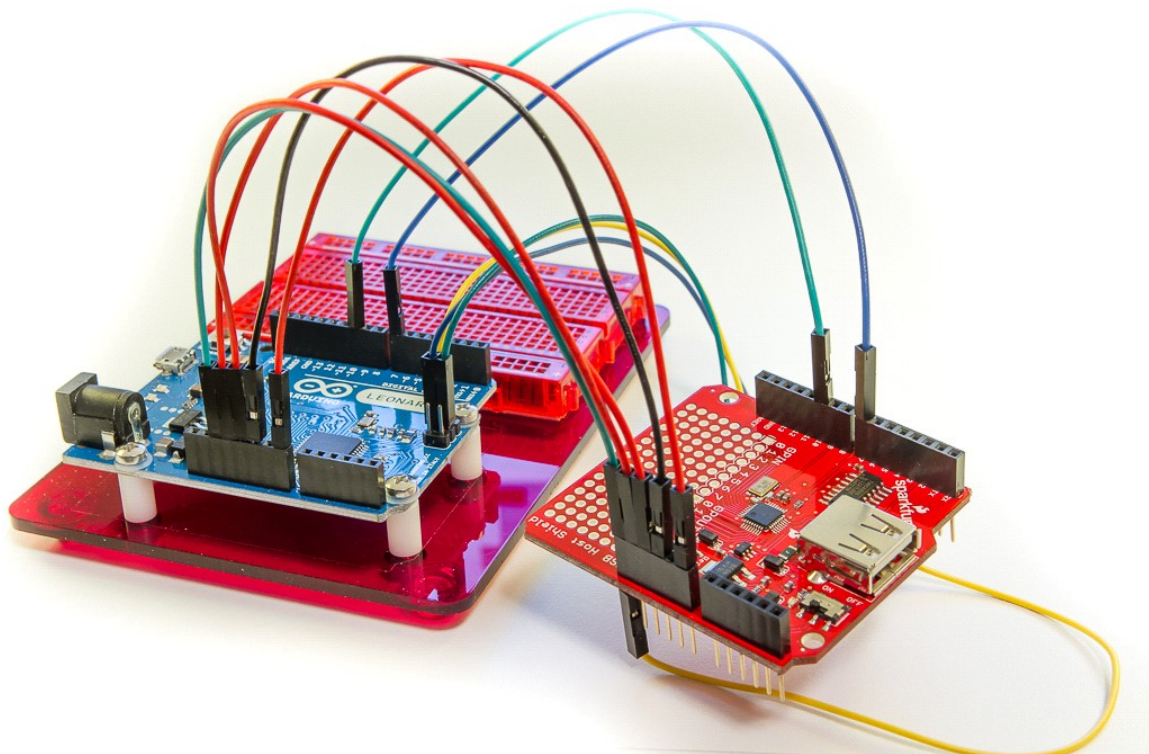


Photo3:

General overview (complete setup)

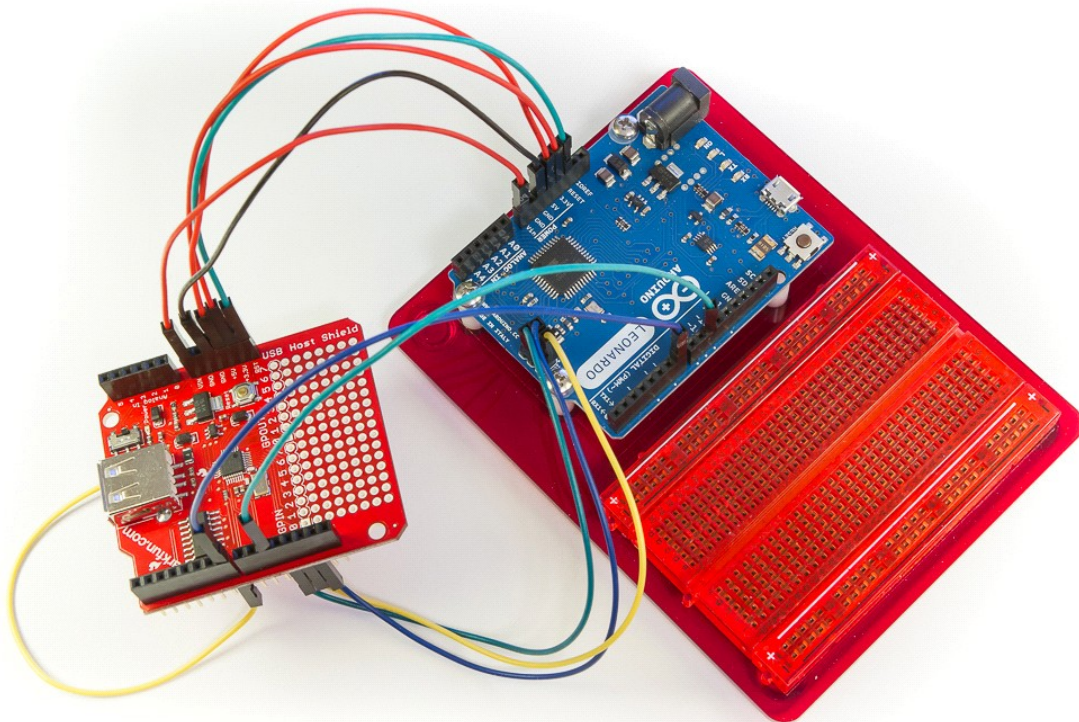


Photo4:

General overview (complete setup)

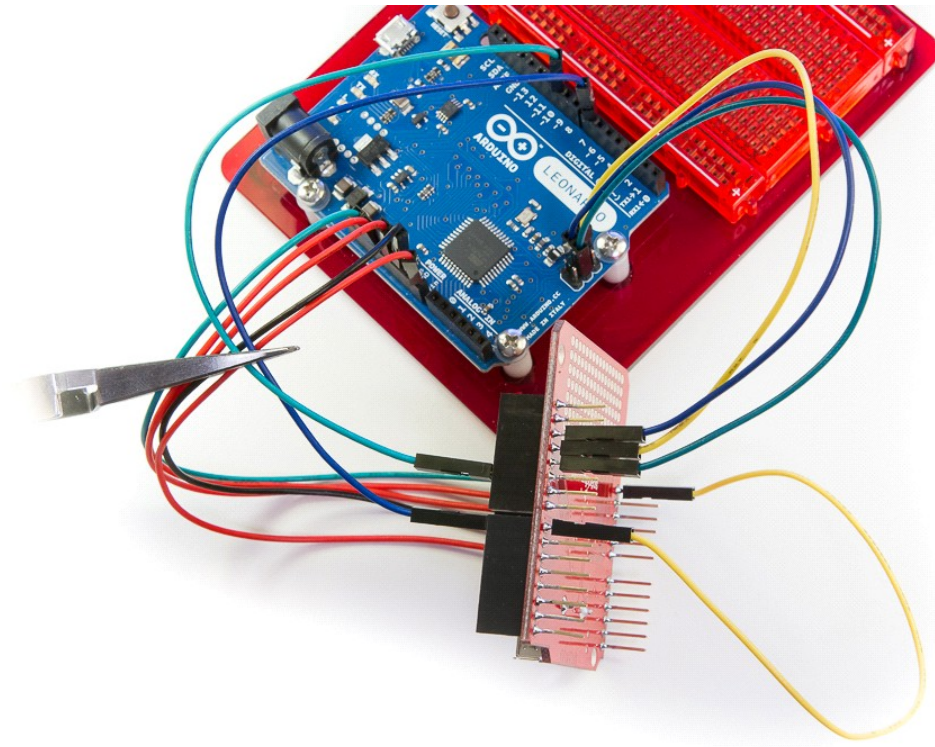


Photo5:

Bottom side of the USB Host shield showing the rightmost (yellow) wire, this wire is connected between **D7** and **RST (Digital Input 7 to Reset)** on the USB Host shield

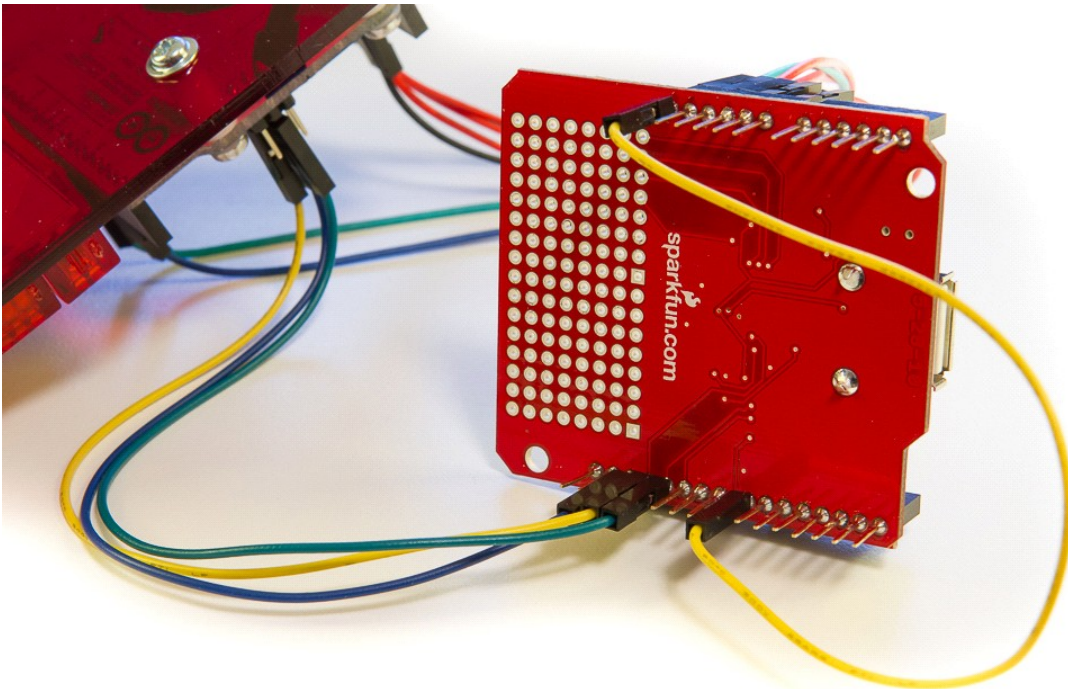


Photo6:

Shows the wiring of SPI using the 6 pin header on the Arduino Leonardo.

Yellow wire: Pin 1 MISO (wired to Pin 12 on the USB Host shield)

Blue wire: Pin 3 SCK (wired to Pin 13 on the USB Host shield)

Green wire: Pin 4 MOSI (wired to Pin 11 on the USB Host shield)



Wiring

The required wiring for Arduino Leonardo and Sparkfun USB Host shield in this setup is listed as ' from **Arduino** to **USB Host shield** '.

- Power (Bottom Left) - according to Photo2 above (as if stacked)**

- from **Reset** to **Reset**

- from **Reset** to **D7**

- from **3.3V** to **3.3V**

- from **5V** to **5V**

- from **GND** to **GND**

- from **VIN** to **VIN**

- Digital pins (Top) - according to Photo6 above (as if stacked)**

- from **D7** to **D7**

- from **D10** to **D10**

- SPI pins (2 by 3 pins located middle right) - according to Photo6 above

from SPI Pin 1 to D12

from SPI Pin 3 to D13

from SPI Pin 4 to D11

Blue markings: These can be stacked normally.

Green markings: These cannot be stacked due to hardware limits and also to prevent shorting circuits.

Orange marking: This can be stacked but chose to indicate this one just to show that this is part of the hack to get things working.

Testing it

Open up the example project '**board_qc**' provided with the USB Host Shield 2.0 library.

Add a small delay before Serial.begin(...) and a while(!Serial) loop after Serial.begin(...) like below:

```
void setup()
{
  delay(5000);
  Serial.begin( 115200 );
  while(!Serial){};
  ...
}
```

The delay is for convenience for bringing up the serial console in time, and the while loop is required for the Arduino Leonardo to initialize the serial communication over USB in time.

Upload and hope it works and if it does, try PTP 2.0 library with your EOS camera if you have one, the project 'EOSCapture' should work!

Troubleshooting

- If the revision cannot be read, make sure pins from D10 to D10 are properly connected
- If SPI long test fail to read, make sure that wire from Arduino D7 to USB Host shield D7 are connected and also that wire from USB Host shield D7 is connected to USB Host shield Reset (RST).
- If you run any other code that checks OSC using Usb.Init() and it fails, check the wiring mentioned above!

- If there's still issues, make sure you have connected external power supply and that it has at least 7V but not more than 12V and can handle at least 500mA, I used a variable DC power supply set to 9V which can handle up to 1500mA (but be careful not to draw that much of current through the Arduino or the USB Host shield).

Disclaimer

I will not take any responsibility for any damages caused by following or failing to follow this guide, use a Multimeter and check things as you go and if you are not 100% sure, ask people in the forums or stop what you are doing :)

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Document version

0.1