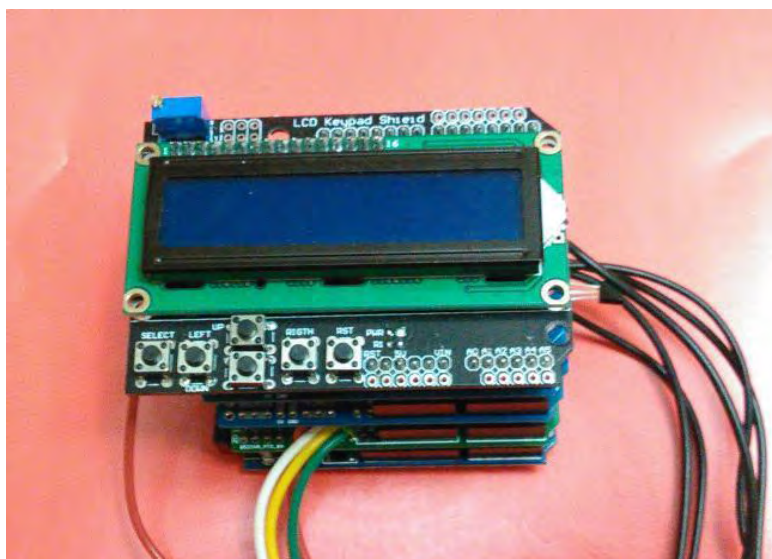


4-in-1 Arduino LCD Shield Kit

PART NO. 2258873



With this project, you will have at least four products in one because this kit consists of an Arduino Uno, an LCD Shield, a USB-A to USB-B cable, and all of materials that you will need to develop the following four projects: a Counter, a Thermometer, a Capacitor Meter and a 4-Channels Voltmeter. The first of them can be developed with the materials supplied while the rest of the meters will be a reality with the help of the appropriate Shield for each of them. That is, a 4-Digit Counter, a Thermometer based on LM35 sensor for measuring in both scales: Fahrenheit and Celsius, a Capacitor Meter with a scale from 100pF - 1uF, and finally a 4-Channels Voltmeter for measuring respectively in each channel a voltage from 0V - 50V. Although you won't use together all the shields, you can stack them for showing your product as a whole.

WARNING:

If you are unsure of the dangers involved with your particular project, consult with someone who is experienced. Always wear eye protection and gloves. FAILURE TO INITIATE AND FOLLOW YOUR OWN SAFETY PROCEDURES MAY RESULT IN BODILY INJURY OR DEATH!

Time Required: 5 hours depending on experience

Experience Level: Intermediate

Required tools and parts:

What you will need:

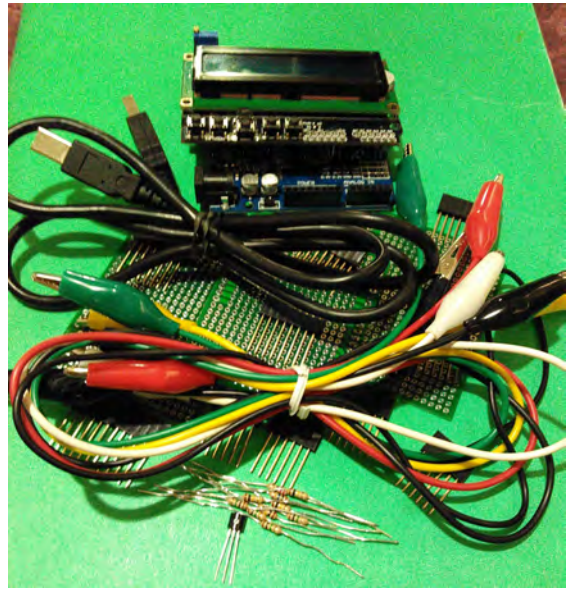
Soldering iron and solder
Wire Cutter
Needle nose pliers
22 AWG wire, 1 meter

Bill of Materials:

Qty	Jameco SKU	Component Name
1	2151486	Arduino Uno R3 DIP Edition (Revision 3)
1	222010	CABLE,USB2.0,A/B,6 FEET,BLACK,USB-A MALE TO USB-B MALE
1	2144411	DFRobot LCD Shield for Arduino
3	2152438	Arduino Uno Proto Shield (PCB only)
3	2137756	Pass-Through Female Headers for Arduino Shields - 1x8 and 1x6 Position (2 each)
1	155740	Temperature Sensor Analog Serial 2 Wire 3 Pin TO-92 Box
1	690700	Resistor Carbon Film 220 Ohm 1/4 Watt 5% (In Bags of 10 and 100)
1	691817	Resistor Carbon Film 10M Ohm 1/4 Watt 5% (In Bags of 10 and 100)
4	661992	Resistor Carbon Film 100k Ohm 1/2 Watt 5% (In Bags of 10 and 100)
4	691585	Resistor Carbon Film 1.0M Ohm 1/4 Watt 5% (In Bags of 10 and 100)
1	2185483	Alligator Clip Test Leads - 2 Pack Red and Black
1	2210239	16 AWG Alligator Clip Test Leads - 2 Sets of 5 Colors (10pk)

Step 1 - List of Materials

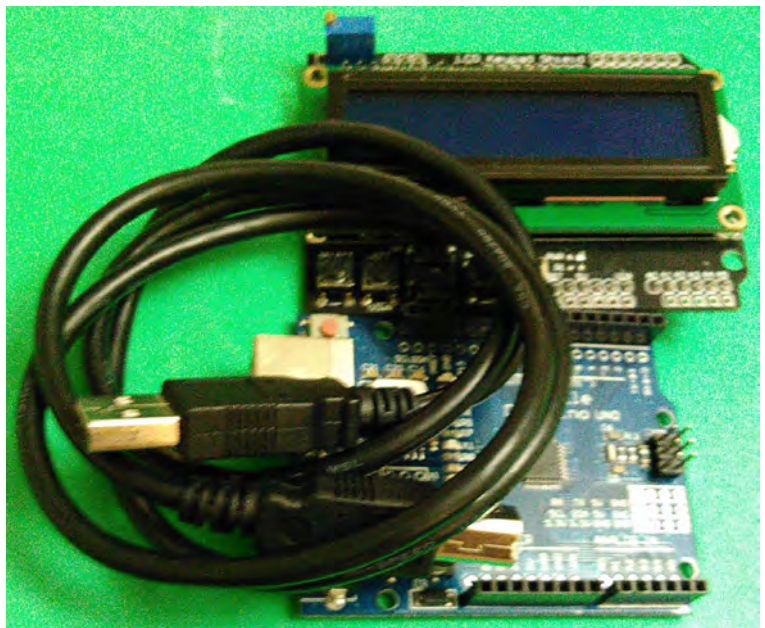
- 1 Arduino Uno R3 DIP Edition (Revision 3)
- 1 USB-A MALE TO USB-B MALE CABLE
- 1 DFRobot LCD Shield for Arduino
- 1 Resistor of 220 Ohms, 1/4 Watt
- 1 Resistor of 10 MOhms, 1/4 Watt
- 4 Resistors of 1 MOhms, 1/4 Watt
- 4 Resistors of 100 kOhms, 1/4 Watt
- 3 Arduino Uno Proto Shield (PCB only)
- 3 Pass-Through Female Headers for Arduino Shields
- 1 Temperature Sensor LM35
- 1 Alligator Clip Test Leads - 2 Pack Red and Black
- 1 16 AWG Alligator Clip Test Leads - 2 Sets of 5 Colors (10pk)



Step 2 - 4- Digit Counter

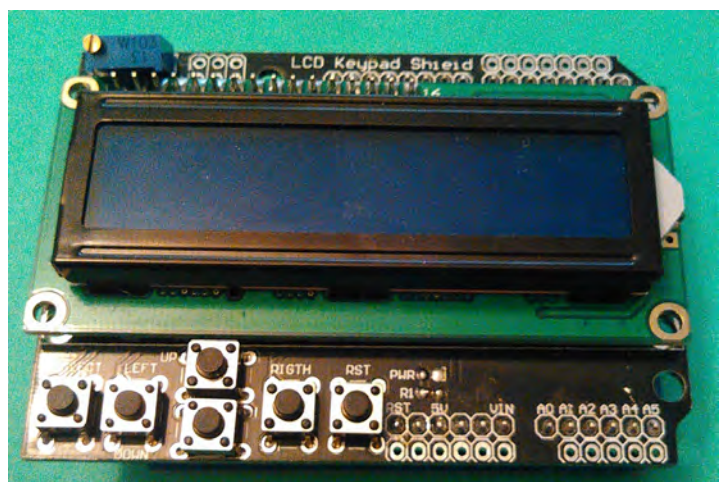
Bill of Materials:

- 1 Arduino Uno R3 DIP Edition (Revision 3)
- 1 USB-A MALE TO USB-B MALE CABLE
- 1 DFRobot LCD Shield for Arduino



Step 3 - Completing the Counter

For completing the project, you only need to mount the LCD shield on the Arduino Uno by matching each of the corresponding pins.



Step 4 - Uploading the Code

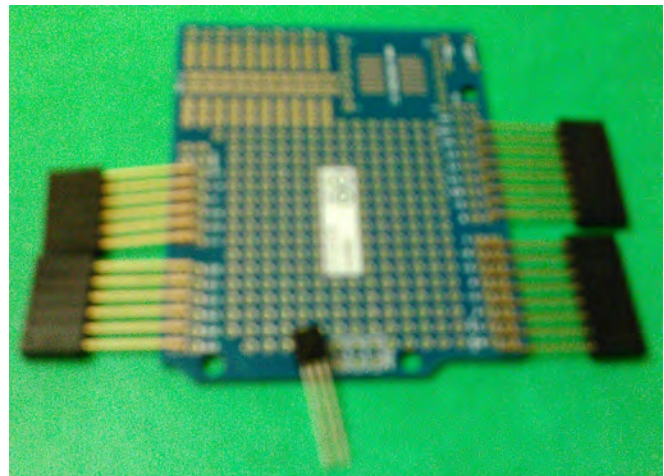
In this step, you will be capable of watching the numbers generated by your 4-digit Counter and you will move from one digit to four digit. Upload your code stored at: <http://pastebin.com/GWim19yr>



Step 5 - Thermometer Shield

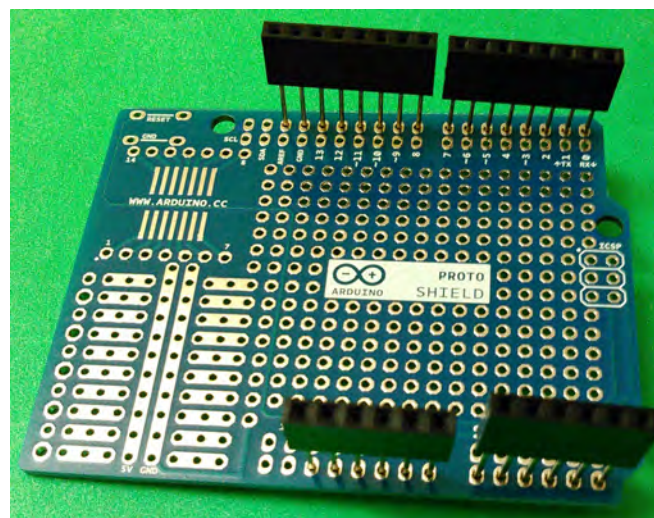
Bill of Materials:

- 1 Arduino Uno Proto Shield (PCB only)
- 1 Stacking Headers for Arduino Shields - 1x8 & 1x6 (2 ea.)
- 1 Temperature Sensor LM35



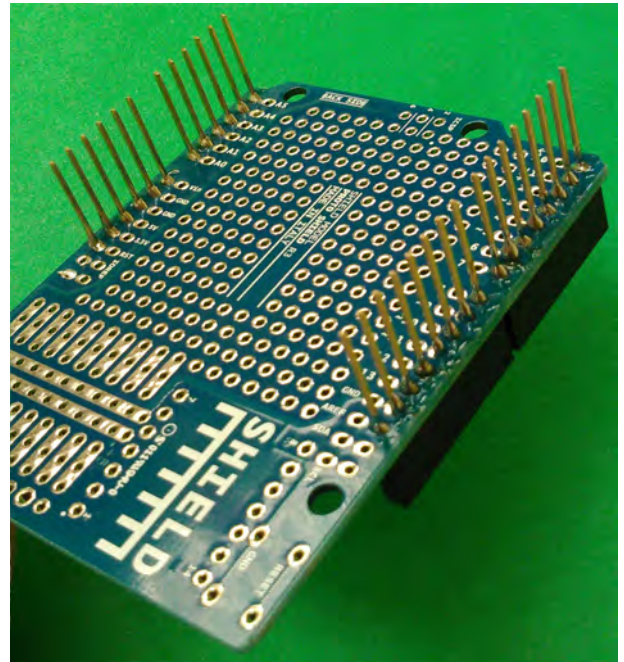
Step 6 - The Arrayment of Components

In this step, you are going to match the Pass-Through Female Headers and their corresponding pins with the PCB. Note that's imperative that the photo in this step be observed so that you can insert the pins correctly. That is, you should insert the two 1x6 Pass-Through Female Headers in the side of the Analog holes beginning with the Analog holes and then the near six holes. Next, insert the two 1x8 Pass-Through Female Headers in the side of the Digital holes beginning with the Digital holes: D8, D9, ... and then D7, D6, ...



Step 7 - Soldering the Pass-Through Female Headers

In this step, you will insert the corresponding pins of the Pass-Through Female Headers into the PCB holes and then you will solder them.



Temperature Sensor
LM35

Step 8 - Knowing the LM35 Sensor

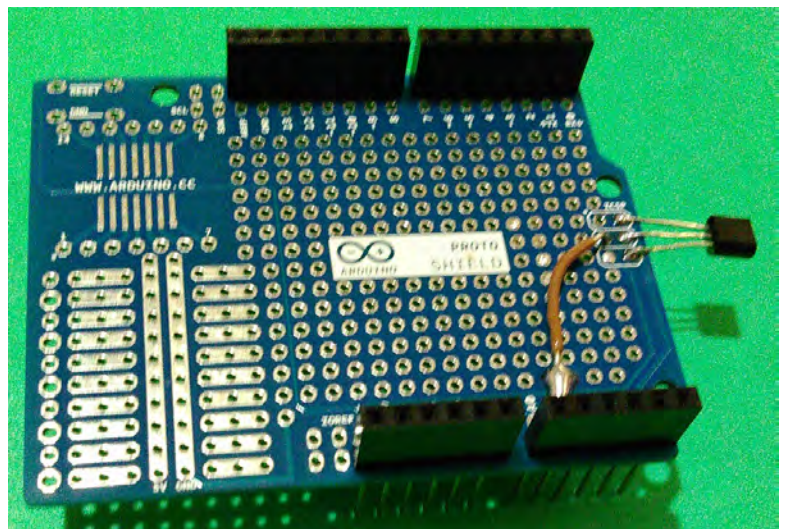
When the LM35 sensor is seen at the front, it shows its three pins: first, a +5V pin; second, a sensor pin; and third, a GND pin.



+5V A1 GND

Step 9 - Completing the Thermometer Shield Kit

Now, you are going to install the LM35 sensor connecting to +5V and GND its left & right terminal respectively seen it at the front while its middle end is connected to A1. Observe the previous step.



Step 10 - Uploading the Arduino Thermometer Code

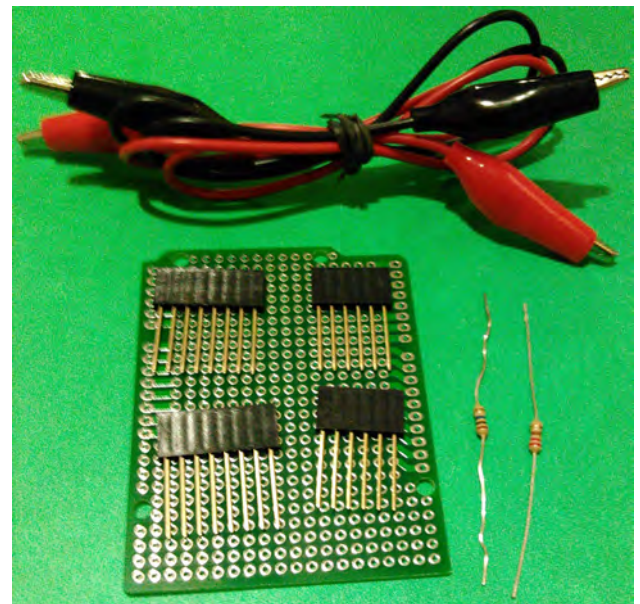
Once you finished the thermometer shield, stack it on the Arduino Uno and then stack the LCD shield on it. Next, upload the code from: <http://pastebin.com/4fbV3fZr>



Step 11 - Capacitance Meter Shield

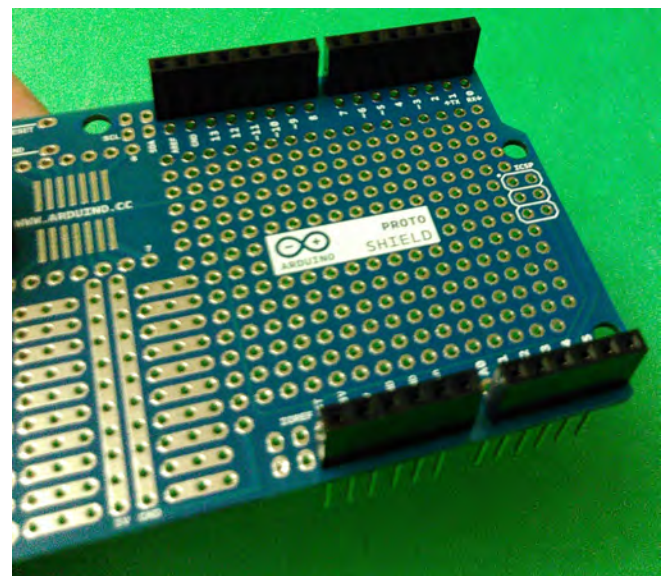
Bill of Materials:

- 1 Arduino Uno Proto Shield (PCB only)
- 1 Stacking Headers for Arduino Shields - 1x8 & 1x6 (2 ea.)
- 1 Resistor of 220 Ohms
- 1 Resistor of 10 MOhms
- 1 Alligator Clip Test Leads - 2 Pack Red and Black



Step 12 - Continuing with the Capacitor Meter Shield

Carry out the step 6 and 7 again and reserve.

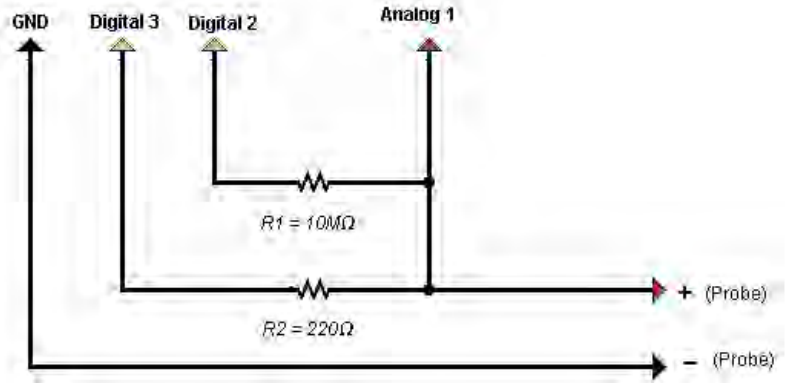


Step 13 - Schematic Diagram of the Capacitor Shield Ki

Check the diagram of your shield and do the connections showed on it.

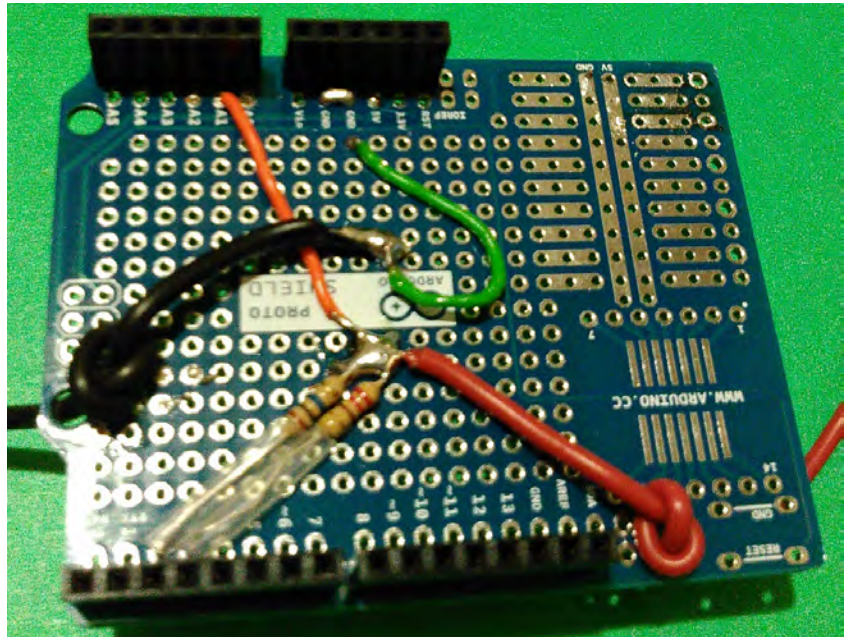
Arduino Capacitor Meter Shield

Range: from 100pF to 100nF



Step 14 - Completing the Capacitance Meter Shield

For completing the shield, follow the instructions in the previous step. That is, connect an end of each resistor to A1 where you will also draw the positive terminal of probe of this shield. Now, connect the remaining terminal of the resistor of 10 MOhms to D2 while the remaining lead of the resistor of 220 Ohms to D3. Finally, draw the negative terminal of probe from GND.



Step 15 - Installing the Capacitor Meter Shield

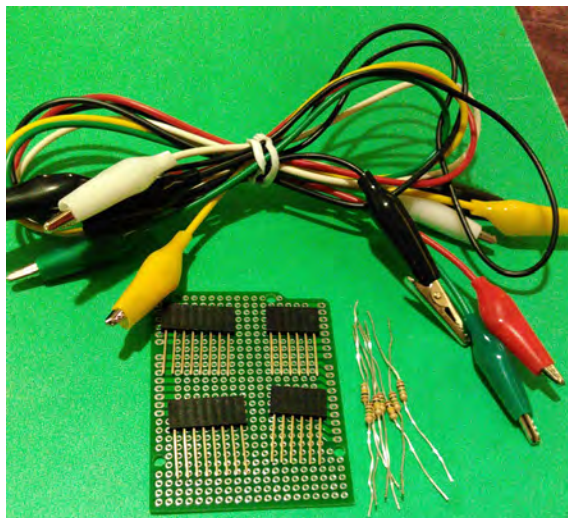
Once you finished the capacitor meter shield, stack it on the Arduino Uno and then stack the LCD shield on it. Next, upload the code from: <http://pastebin.com/VvKrRwVk>



Step 16 - 4 Channels Voltmeter Shield

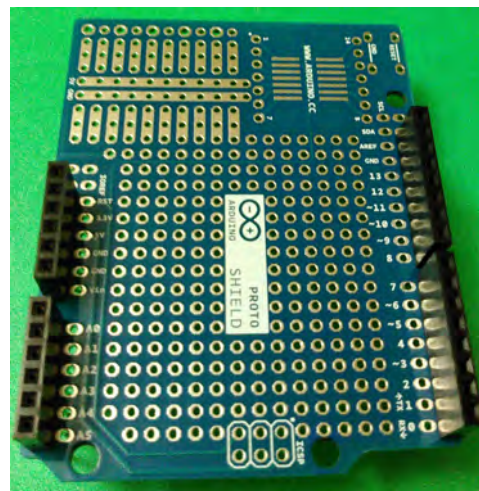
Bill of Materials:

- 1 Arduino Uno Proto Shield (PCB only)
- 1 Pass-Through Female Headers for Arduino Shields - 1x8 & 1x6 (2 ea.)
- 4 Resistor of 100 kOhms
- 4 Resistor of 1 MOhms
- 1 16 AWG Alligator Clip Test Leads - 2 Sets of 5 Colors (10pk)



Step 17 - Continuing with the Voltmeter Shield

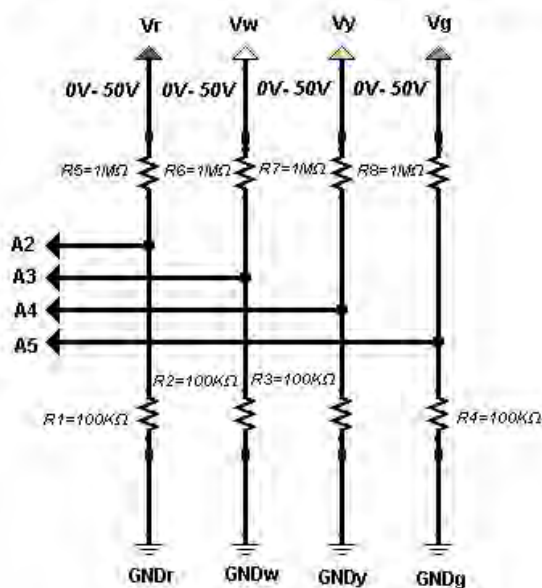
Repeat the step 6 & 7 again and reserve.



Step 18 - Diagram of the Voltmeter Shield

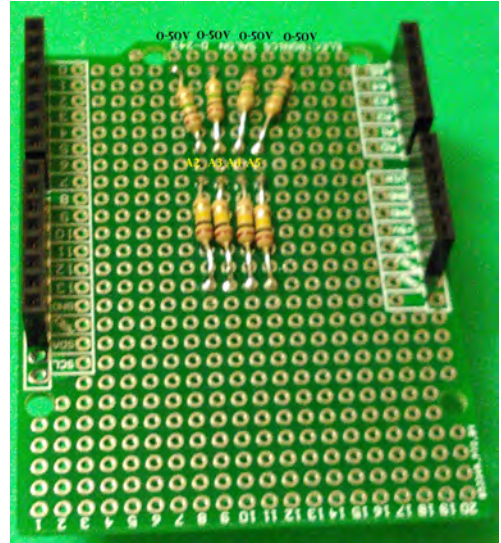
With this diagram, you can complete the right shield for generating voltages from 0V- 50V in 4-channels. That is, you can measure up to 4 voltages (V_r , V_w , V_y , and V_g) of 50V each one. Also note that A2 to A5 will be the connections to your Arduino board.

4-Channels Arduino Voltmeter Shield



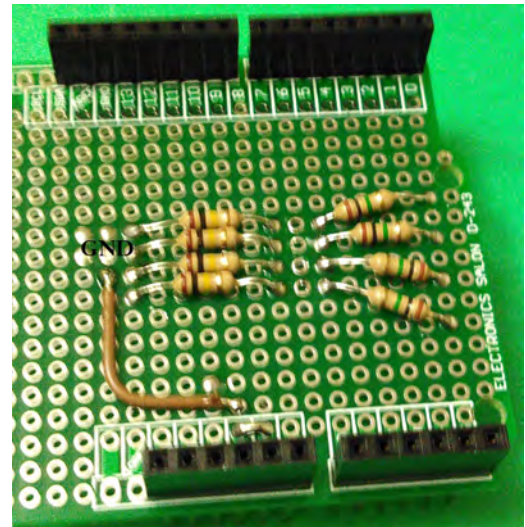
Step 19 - Installing the Resistors

For installing the resistors, connect an end of the resistor of 10 MOhms to an end of the resistor of 100 kOhms leaving free the other terminals of each resistor and so form 4 sets. That is, 4 common points between the resistors where you will also connect respectively to A2, A3, A4, and A5 being these the connections interface to your Arduino board.



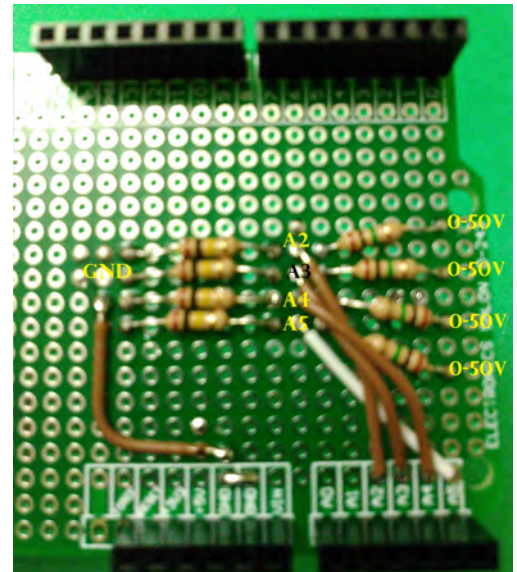
Step 20 - Connecting to GND

Connect all the resistors of 100 kOhms to GND, those terminals of the resistors that you left free.



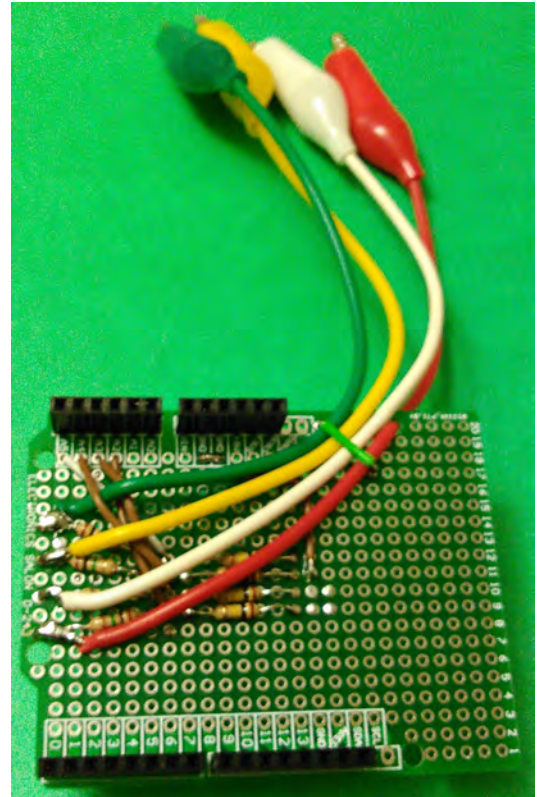
Step 21 - Resistors to A2, A3, A4, & A5

The common point of the resistors should be connected to A2, A3, A4, and A5 being these connections the interface for your Arduino board.



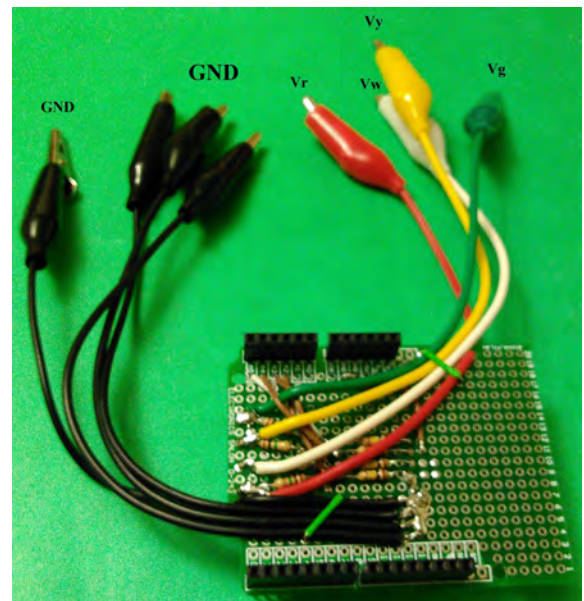
Step 22 - Installing The Color Alligator Clips

The terminals that left free of those resistors of $1M\Omega$ connect them to red, white, yellow, and green alligator clips being these the voltages: $V_r(0V-50V)$, $V_w(0V-50V)$, $V_y(0V-50V)$, and $V_g(0V-50V)$ while the others corresponding leads of the resistors are those connected to A2, A3, A4, and A5 respectively.



Step 23 - Installing The Black Alligator Clips

For installing the black alligator clips, connect them to GND. Once connected the last alligator clips, you will have completed all the outputs of voltage: $V_r(0.50V)$, $V_w(0V-50V)$, $V_y(0V-50V)$, $V_g(0V-50V)$.



Step 24 - Uploading The Arduino Voltmeter Code

Once finished the voltmeter shield, stack it on the Arduino Uno and then stack the LCD shield on it. Next, upload the code at: <http://pastebin.com/3XEFV0uu>

