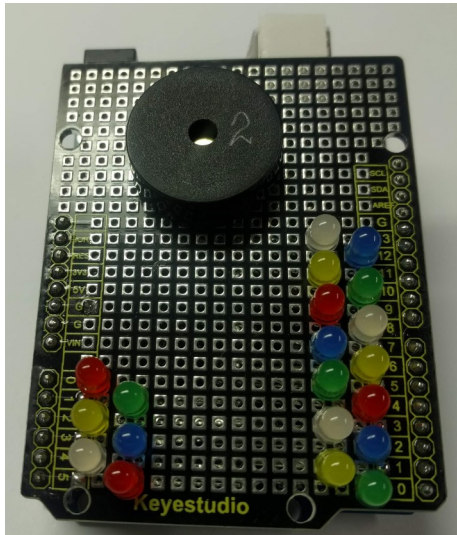


# How to Build a "20 LED & 5 Tunes, Arduino Uno R3 Shield".

Pat McMahon- V4- 10/11/2022

**Design Brief** – You will Build a "20 LED & 5 Tune Shield", to piggy back onto an Arduino Uno R3 Microcontroller.

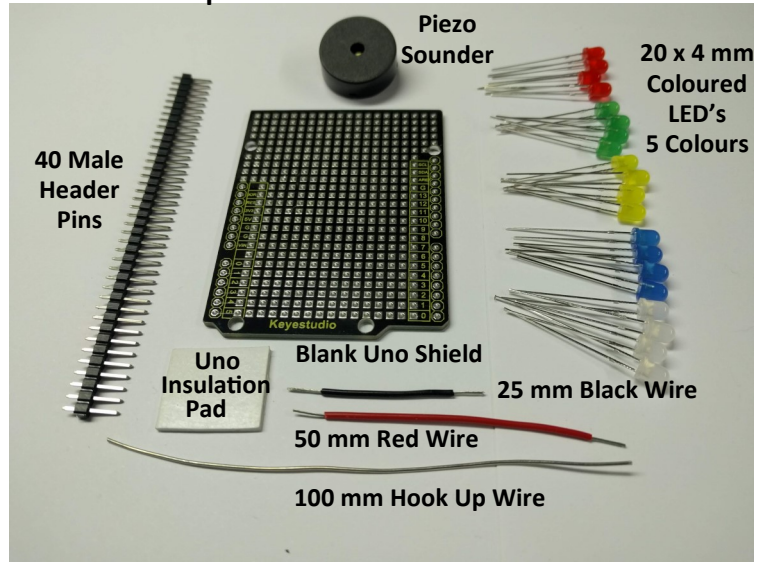
## 20 LED & 5 Tune Uno Shield



Analog Pins

Digital Pins

## Components List of Build

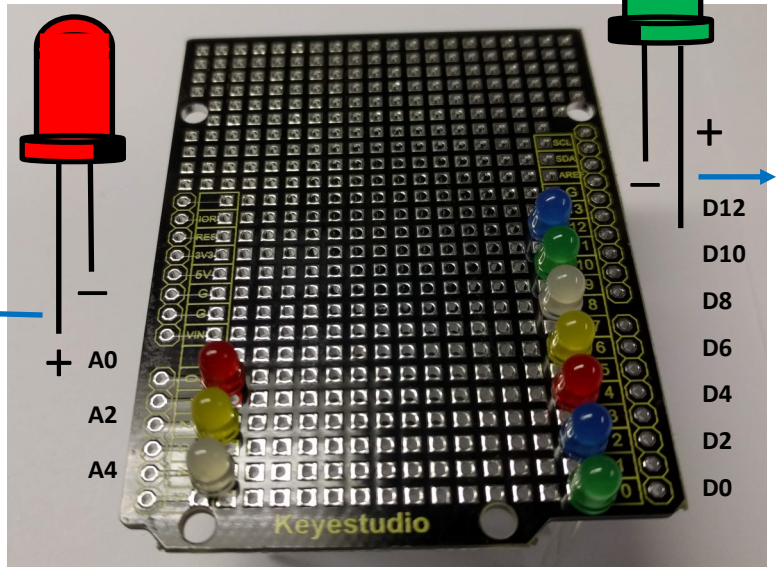


Below are some of the Production Steps, Tick off each box as you complete a task and Document it.

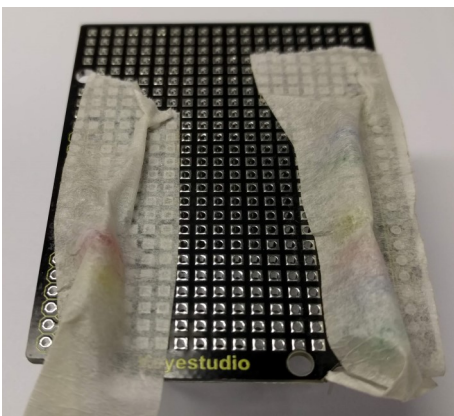
- Suggested LED even colour distribution. Circled outer ring of LED's in column 1 & 2, inner uncircled in 3 & 4 from the outer edge, positives facing outwards.**

Red LED's -	<b>(A0)</b>	A5	<b>(D4)</b>	D9
Green LED's -	A1	<b>(D0)</b>	D5	<b>(D10)</b>
Yellow LED's -	<b>(A2)</b>	D1	<b>(D6)</b>	D11
Blue LED's -	A3	<b>(D2)</b>	D7	<b>(D12)</b>
White LED's -	<b>(A4)</b>	D3	<b>(D8)</b>	D13

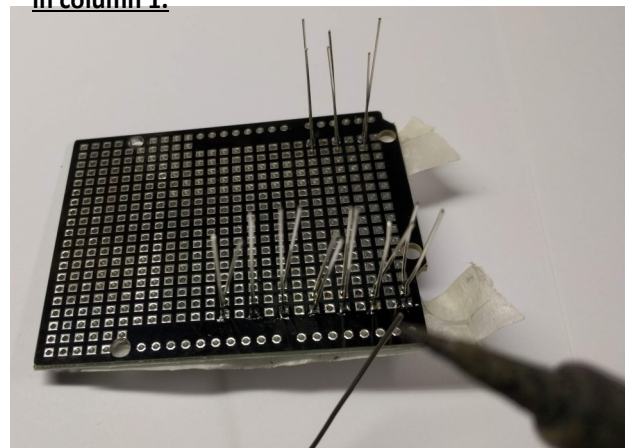
Insert ○ LED's only, starting on the left side at A0. Insert the Red LED with the long positive leg facing to the outside of the shield. Insert A2, A4 the same way. On the right side insert only ○ LED's, D0 up to D12 with the long positive leg facing outwards. Check ALL long positive legs are facing outward.



- Place two pieces of masking tape over the seated LED's, so you can flip the shield over for soldering.**

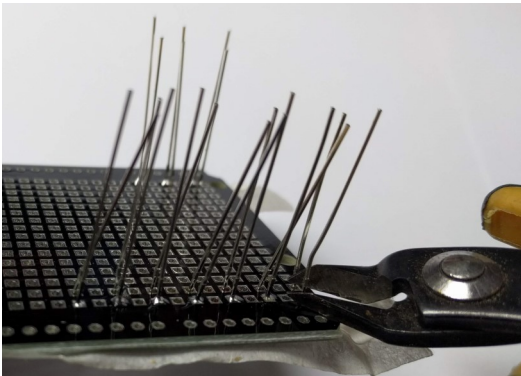


- Flip and Solder all the outside positive long legs ONLY, in column 1.**

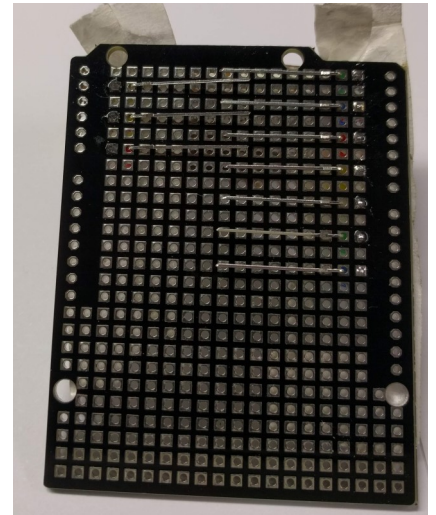




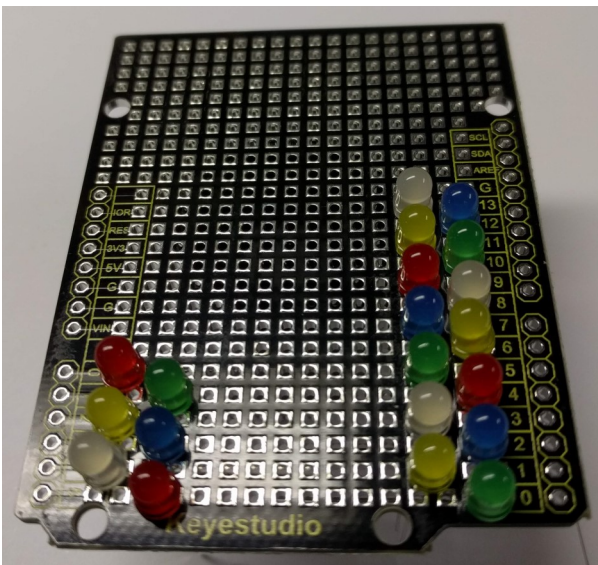
- Carefully trim ALL the long positive LED's legs ONLY.**



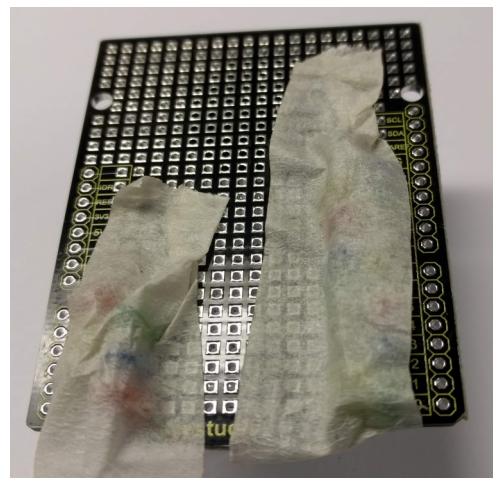
- Bend ALL the short negative legs towards the centre.**



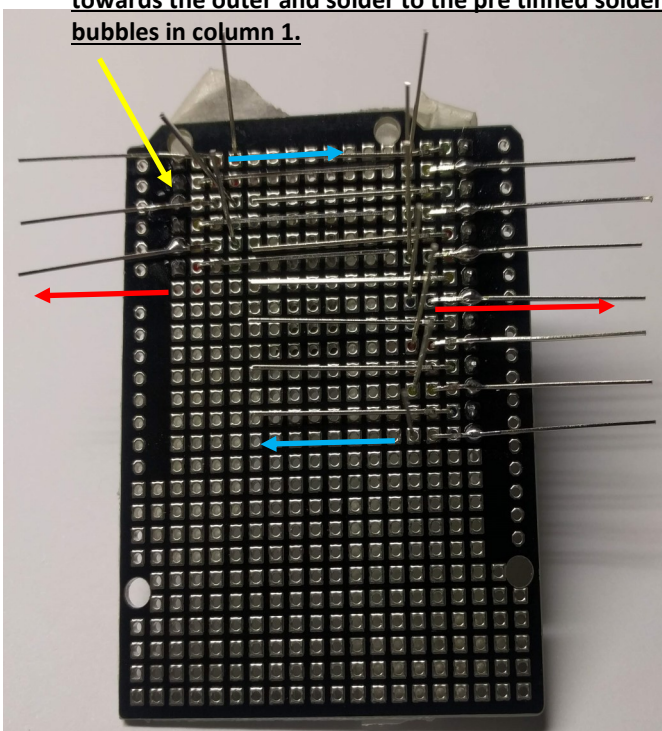
- Insert the remaining un circled LED's, A1 to D13, in columns 3&4, ensuring ALL long leg positive legs are facing outwards.**



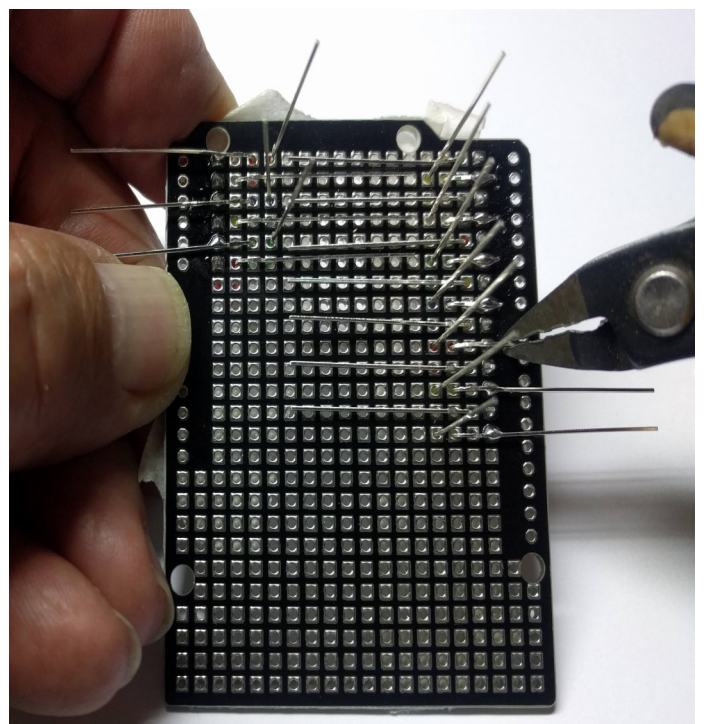
- Cover the LED's with masking tape again so you can flip and solder the column 3, positive legs.**



- Bend down ALL the short Negative Legs of the LED's in column 4 on both sides inwards to the centre. Pre Tin the Doughnut Pads of all the remaining pads in column 1. Then bend ALL the long leg positive legs in column 3 towards the outer and solder to the pre tinned solder bubbles in column 1.**

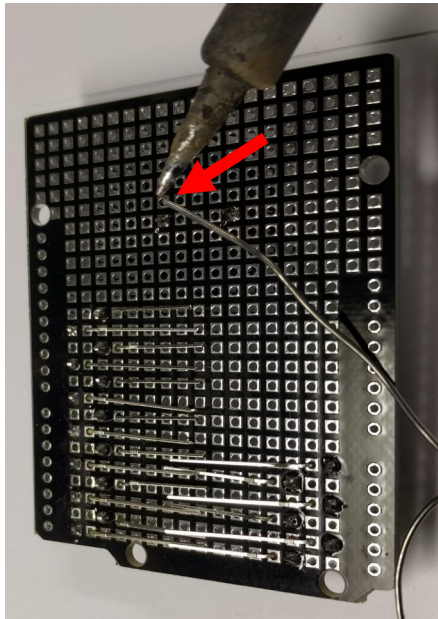


- Trim the excess long leg positives ONLY, facing outwards.**

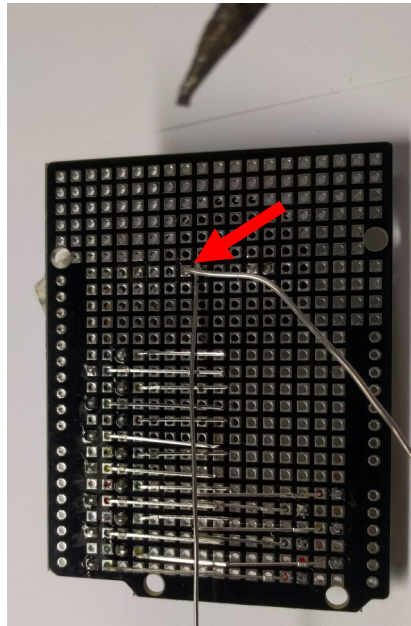




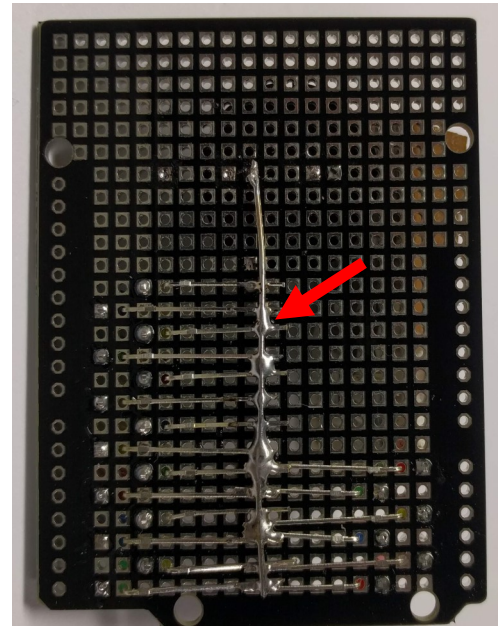
- Using the colour sketch on page 4, insert the Piezo Sounder on top, into holes 7 down from the top, and 7 & 11 across from the right and solder.



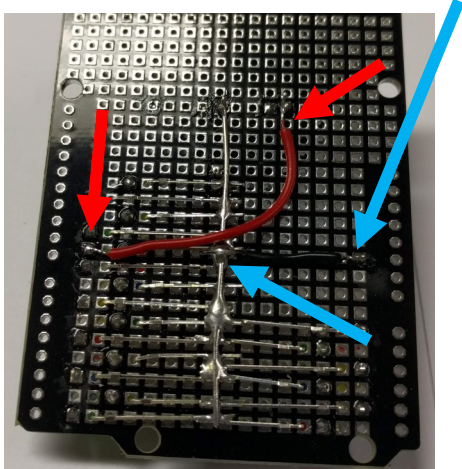
- Solder the Hook Up Wire from the left, now negative side of the Piezo Sounder, pulling it down over all the negative LED legs.



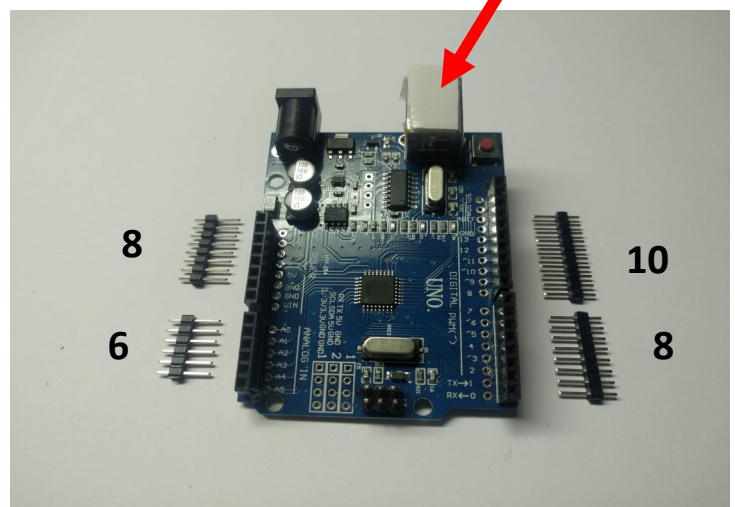
- Solder the Hook Up Wire to all the negative LED legs, then trim any excess.



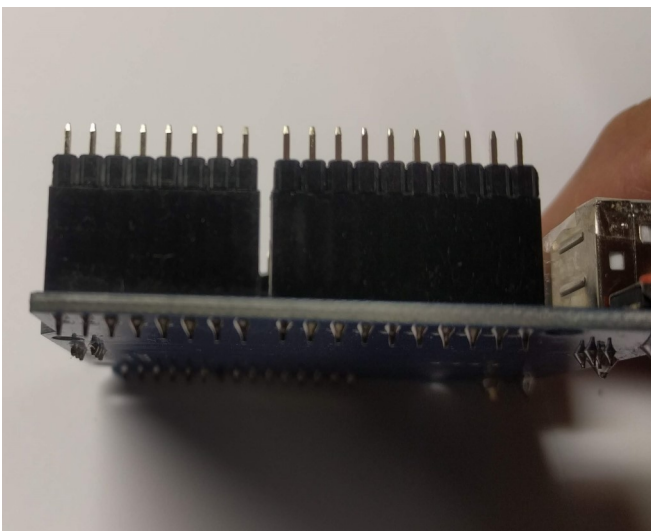
- Solder the red insulated wire to the right leg of the Piezo Sounder and the other end to D9. Solder the black negative wire from the centre Hook Up wire to Gnd.



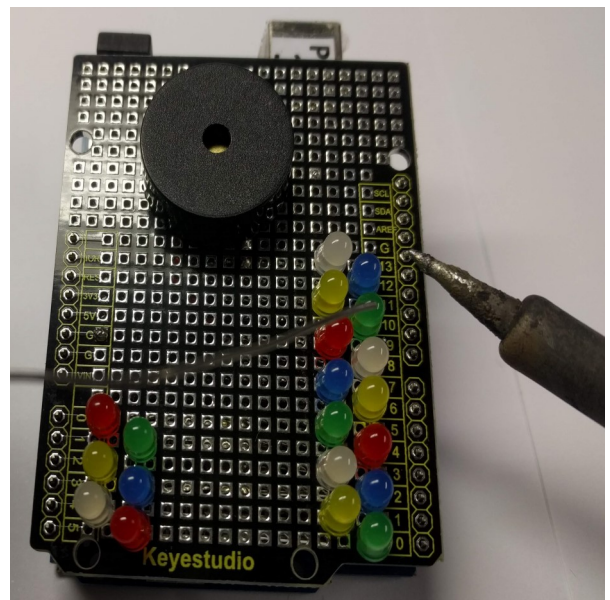
- Carefully snap the 40 pin header into 10, 8, 8 & 6 segments. Stick the Insulation Pad on the UNO to stop shorting of the Shield.



- Insert the header pins into the UNO with the long side down, short side up.

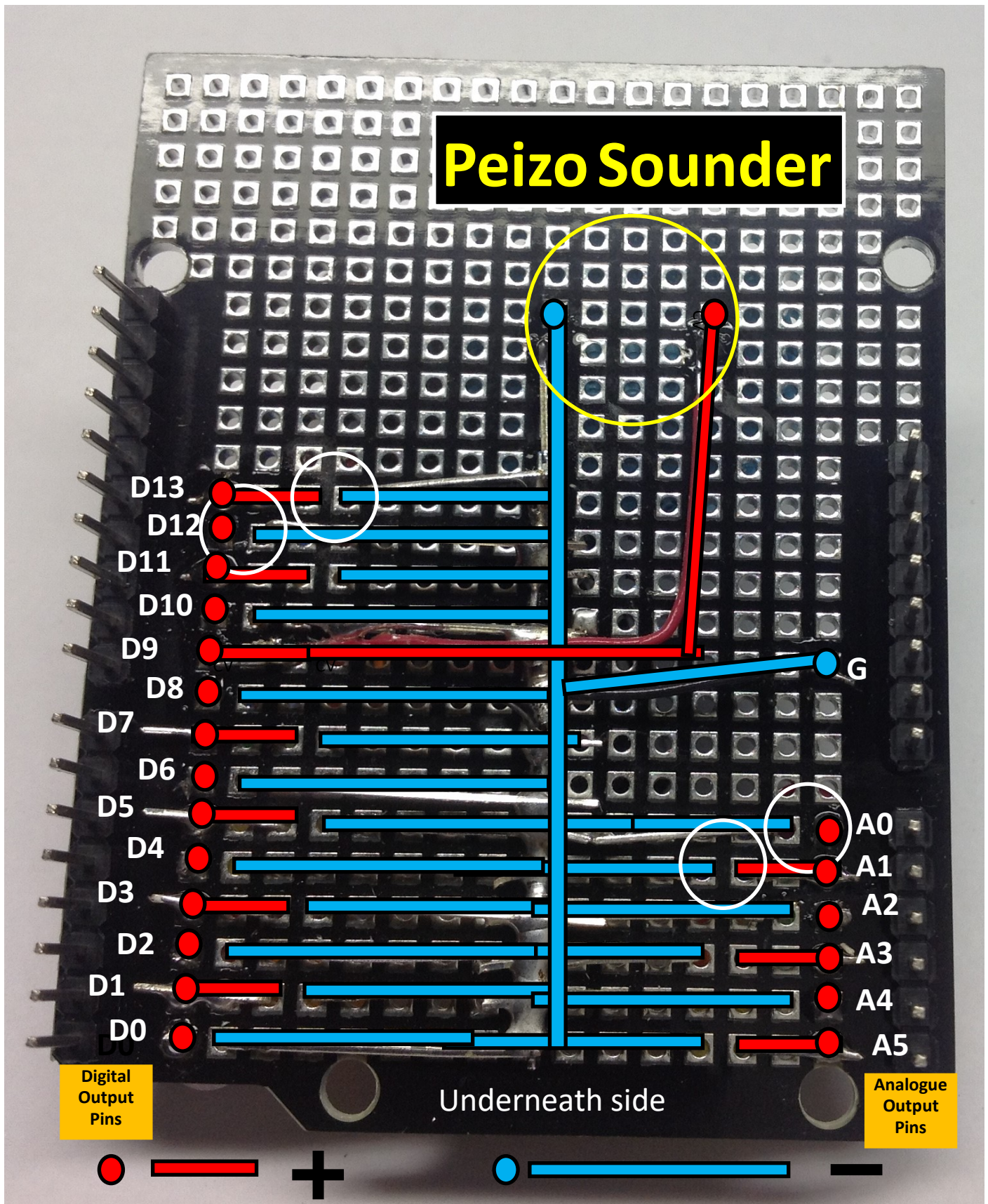


- Place the Shield on top of the UNO pins and solder ALL the 32 pins from the top.





Below is a photo of the soldering underneath to try to make it clearer, with Positives (+’s) Red & Negatives (–’s) Blue.



**IMPORTANT-** With the Shield REMOVED from the Arduino UNO, attach the Upload Cable and either using Pat’s “20 LED’s & 5 Tunes Arduino Sketch” or your own sketch, test your model’s operation.

Note – D0 and D1 are the Transmit (Tx) and Receive (Rx) pins so when the Uno is powered up they will stay on and not flash. This is why we need to REMOVE the shield from the UNO when uploading the sketch, replace when finished.

Congratulations on Building and Programming your own “20 LED & 5 Tune Arduino R3 Uno Shield”.