



Summary:

This activity will walk students through assembly of the Adafruit Ultimate GPS Logger Shield. We will solder the pin headers to the GPS shield and install the jumpers to allow us to connect the GPS to the other Arduino Serial ports.

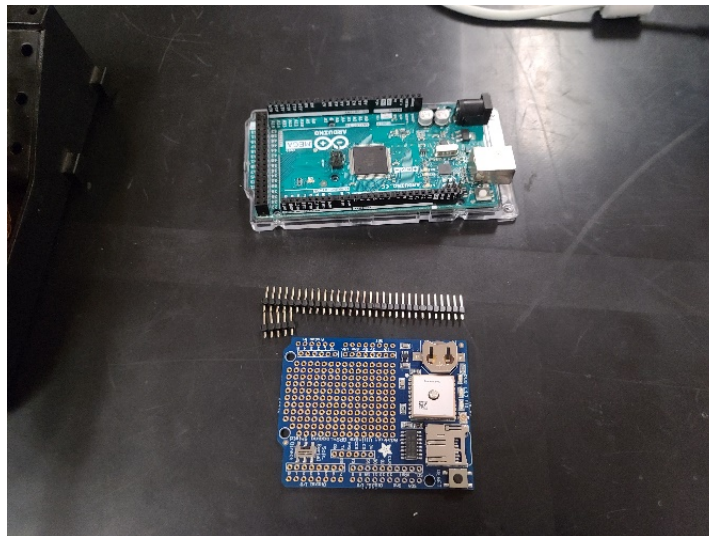
Materials:

Each student should have the following materials, equipment and supplies:

- Arduino Mega microcontroller
- Adafruit Ultimate GPS Logger Shield Kit
- Lock Ring Spreader Pliers
- Soldering Iron
- Solder
- Diagonal cutters
- 2 Short Wire Jumpers or Wire to construct jumpers

Procedure:

1. Turn you soldering on, set the temperature and allow it to heat to the set temperature.
2. Remove the break off header pins and the shield itself from the shield packaging. We will not be using the coin cell battery but be sure not to use it. Also be sure to take all the appropriate cautions when solder. Wear safety glasses, use an antistatic pad and wrist-strap if possible, etc.



3. First, we need to break the header pins into sections of the correct size. The pins that come with the are designed to snap off so that they can be broken into pieces of the correct size.

It is best to use needle nose pliers to do this ensure you get a clean break. Grip the pin where you are where you want to make the break and twist while holding the rest of the head with you hand to break.

- We need to 4 sets of pins for the GPS shield. We need a 2 x 8 pin sections, 1 x 6 pin section, and 1 x 10 pin section. If your pins were broken in shipping or if you accidentally broken the wrong number of pins don't worry, we can use multiple smaller sections to make up a bigger one, just so long as the total number of pins matches the numbers above. For example, I could use a section of 6 pins and 4 pins for my 10 pin header. When you have all your headers broken you should have something like the image below.

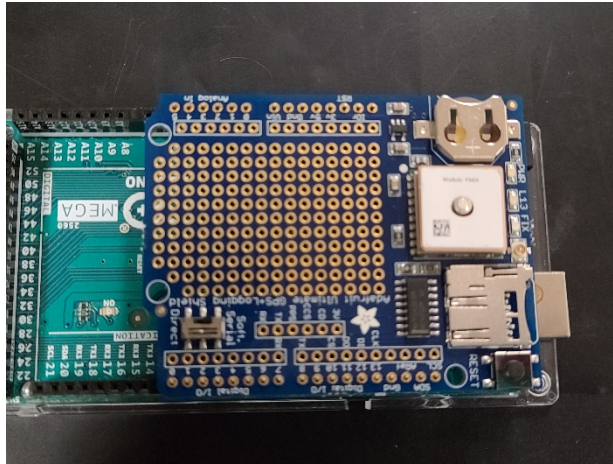


- We are going to use the Arduino to hold the pins while we are soldering them to the shield. Install the pins long side down into the Arduino with the short side sticking up. Install the header as shown in the table below:

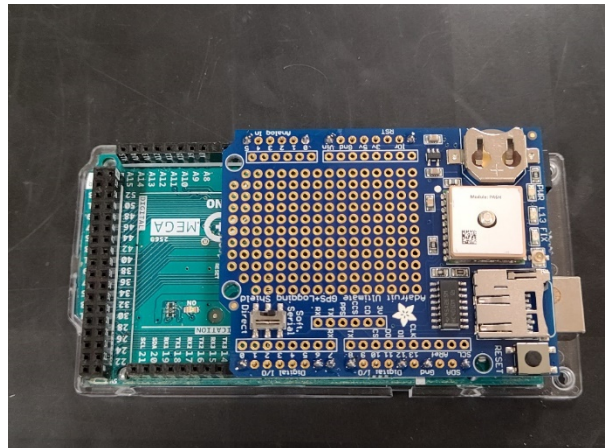
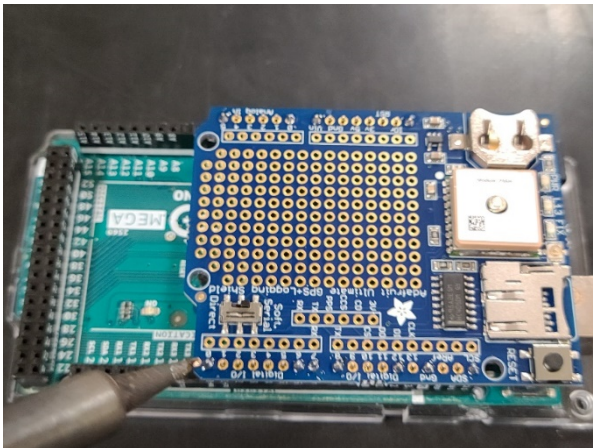
6 pin header	A0-A5
8 pin header	V _{in} , GND, GND, 5V, 3.3V, RESET, IOREF, Blank (The unlabeled pin at the end)
10 pin header	8-13, GND, AREF, SDA1, SCL1
8 pin header	0-7

- Once you have all the pins installed to the Arduino install the shield on top so that the short end of the pins go through the shield and you can solder the pins on the top of the shield.

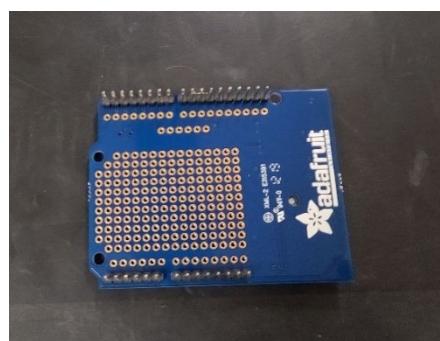
NOTE: The correct orientation is with the SD Card slot of the shield on top of the USB port of the Arduino shown in the image below.

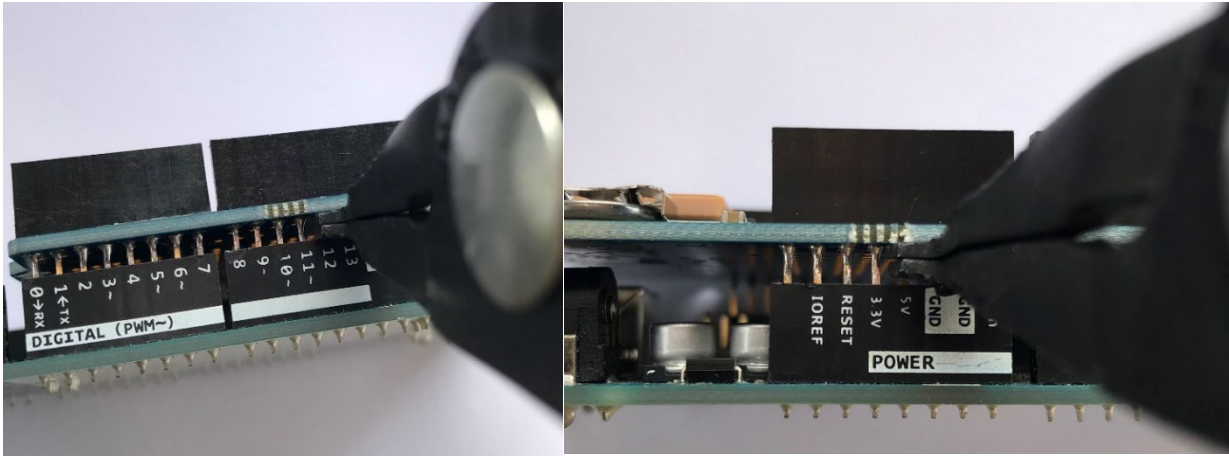


- Now we want solder a few pins on each header to hold the header in place when we remove the shield from the Arduino. We want to take care not to excessively heat the pins because the heat will be conducted through the pins to the Arduino.

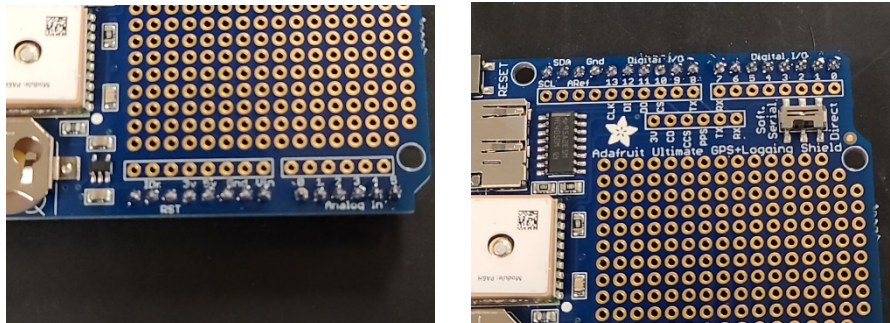


- After we soldered a couple pins of each header we can remove the shield from the Arduino. To prevent bending the pins use the ring pliers to push the shield and Arduino apart from both sides of the shield. After we remove be sure to check that all of pins are still in place.





- Now solder the remaining pins. Be sure to check that you have no cold solder joints or bridges across adjacent pins. Also, you should remember to clean off the board using alcohol.

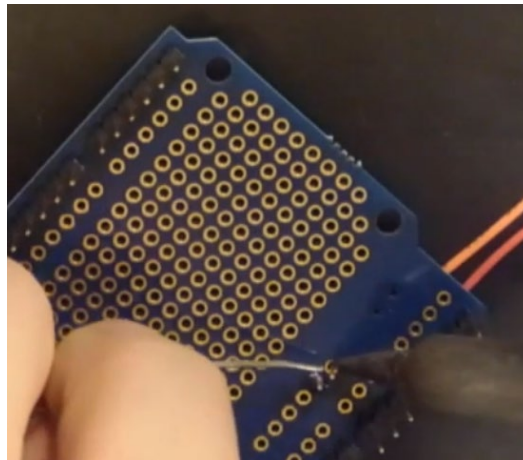


- Check that you pins are correctly lined up by installing the shield on to the Arduino.



- Next, we need install jumpers to so the TX and RX connections on the breakout by the Soft. Serial/Direct switch that will allow us to connect the GPS to the other Serial ports of the Arduino. To do this we just need to solder some wire leads to pins.

12. To make the jumpers just cut 2 lengths of solid core wire ~3 in. long and strip a short amount off both ends. Stranded wire will be difficult to push in to the Arduino headers, but if that is all available you can add some solder the loose end to make it stiff.
13. Solder 1 wire to the TX and 1 to the RX pin of the GPS shield. After the wires are soldered don't forget to trim the excess lead.
NOTE: If possible use 2 different color wires to make identifying the TX and RX lines easier.



14. Now your shield is complete and ready to use. **NOTE:** We want the TX of the GPS connected to the RX of the Arduino and the RX of the GPS connected to the TX of the Arduino. If you are having issues with the GPS make sure you do not need to swap your pins.

