Vandaluino2 Board Assembly

You will receive an Arduino, cord, and an assembly parts kit. Confirm that you have all the required parts in your kit before starting assembly. If you are missing a piece or are unsure what a piece looks like, consult your instructor.

Assembly Kit Contents:

- Vandaluino2 board
- One set of feather board header pins (One is 16 pins and the other is 12 pins)
- Five single row 8-pin headers (to plug into your Arduino)
- One single row 6-pin header (to plug into your Arduino)
- One 18-pin double header (there are two rows of 18 pins)
- Two standard LEDs (color does not matter)
- Two 1K Ohm resistors (gold, red, black, brown bands in that order)
- Fourteen 10K Ohm resistors (gold, orange, black, brown bands in that order)
- One 100 Ohm resistor (brown, black, brown, gold bands in that order)
- Eight 390 Ohm resistors (orange, white, brown, gold in that order)
- Four push buttons
- One dipswitch (rectangle with eight switches on it)
- Four RGBW LEDS (small rectangles with yellow half circle)
- Twenty-two break off male header pins (yours may be a set of 22 attached or smaller subsets with a total of 22 pins)
- One 7-segment display
- Seven grove connectors (white piece with four pins inside of it)
- One potentiometer (it has a long black knob)

Assembly Instructions:

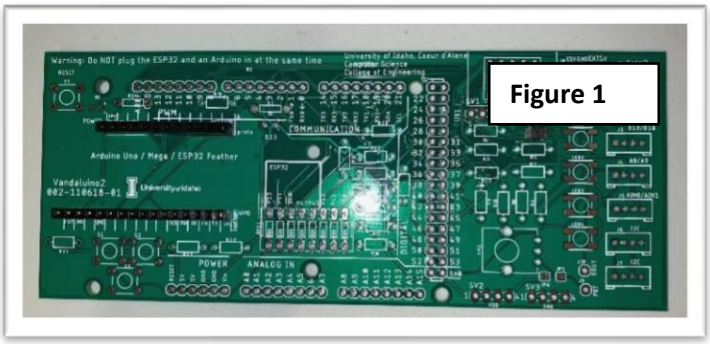
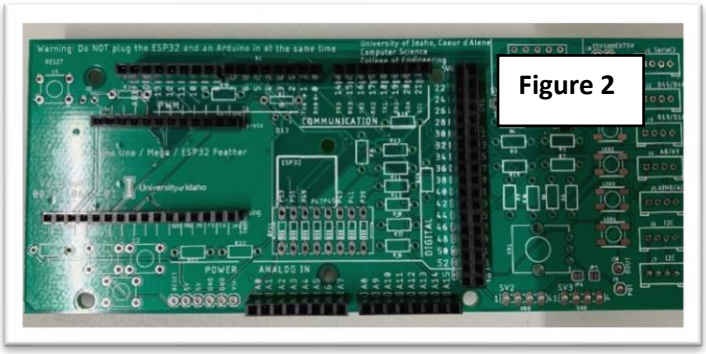


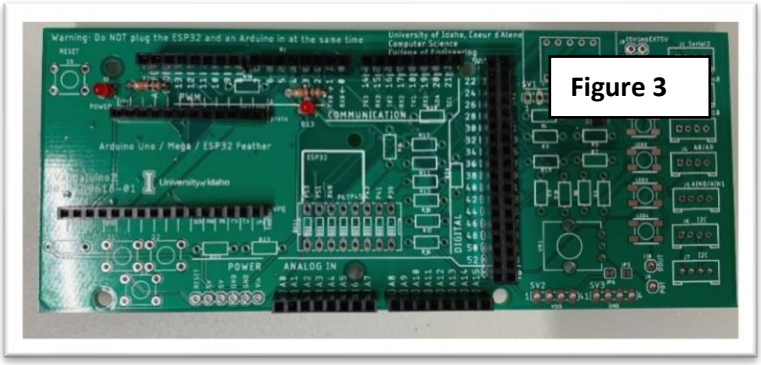
Figure 1

Follow these directions in the order they are given. The process is intentional for two reasons: to reduce the number of times the new board is removed from the Arduino, and to run test code during the build for debugging. Start with the header pins for the ESP32 Feather board. One will be a single row of 16-pins and the other will be a single row of 12-pins. Place them above and below the board logo on the left-hand side as shown in **Figure 1**. When soldering the pieces, solder one pin on each end of the piece first to confirm the piece is straight before soldering the remainder of the pins. If the piece is not placed

correctly, heat up the solder and adjust the piece. Once the piece is oriented correctly, solder the remaining pins.



Next, put on the header pins that attach the board to an Arduino: the 18-pin double header, the five single row 8-pin headers and the one single row 6-pin header. The double row 18-pin header will be the most difficult to insert due to having to line up all 36 pins into their corresponding holes. It is easiest to wiggle one side in and coax the rest of the pins into the holes two at a time. Solder just the ends and check alignment before soldering the remainder of the pins. Repeat the procedure with the five 8-pin headers and the one 6-pin header. Do not trim the ends, they are meant to be long to insert into the Arduino. For position reference see **Figure 2.**



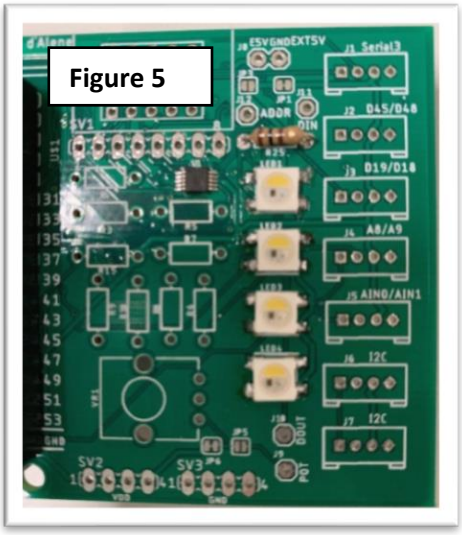
The next step is applying the LED lights to the board. One light is to indicate that the board has power and the other is associated with pin D13. There is a misprint on the board; follow these directions carefully. LEDs are polar, meaning they have a positive lead and a negative lead. The positive lead is slightly longer than the negative lead. Sometimes there will be a flat spot on the bulb itself indicating that the side is negative. Normally when looking at a board, there is a line perpendicular to one of the holes showing the location of the negative lead. That is true for the power indicating light in the upper left shown in **Figure 3.** For the power light you will have the negative lead go into the hole with the perpendicular line. For the D13 light, the *opposite* is true. Reverse it and insert the positive lead into the hole marked by the perpendicular line. **Figure 3** shows the position of the D13 light. Once the lights are in place, snip off the excess lead length. The lights will need resistors to protect them before testing. The resistor locations are numbered on both the board and the schematic. Place 1K resistors in positions R1 and R2. They will be right next to the lights themselves and pictured in **Figure 3.** Resistors are non-polar; it does not matter what direction they are inserted. Trim off any extra wire from the resistors after soldering them into place.

*****Run V2-D13-Blink program*****

If everything is assembled correctly the power light will come on and the D13 light will blink. Do not proceed until the board passes this test.

*****Run I2CScanner program*****

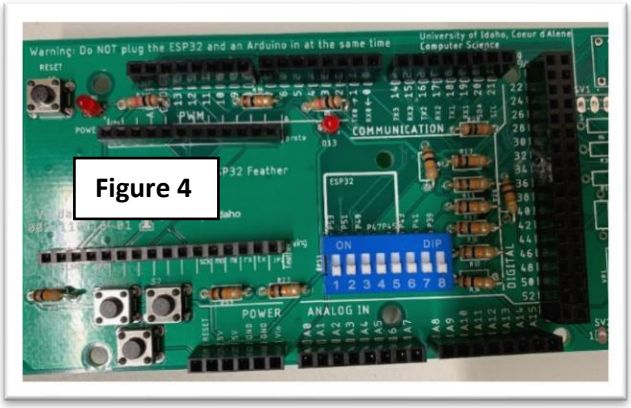
The test will either display the address of the bus or it will display a message saying that it could not find it. Do not proceed until the test displays the address of the bus.



The first components added to the right side of the board will be the four surface-mounted RGBW LEDS and the single 100 Ohm resistor that protects them. The resistor location is labelled R25 and is shown in **Figure 5**. The resistor must be in place before testing the lights. The orientation of the lights matters. There is a yellow half circle that can be used for placement reference. Make sure that the rounded portion of the half circle is facing up as shown in **Figure 5.** Work with the RGBW LEDS one at a time and test them one at a time. You will put a small amount of solder on one pad of your choice. Holding the LED with tweezers, lower one corner on to one pad. Before contacting the pad with the LED, heat up the solder so that the LED will adhere to it. The pads on the lights themselves are both on the bottom of the piece and bent up the sides. It is easiest to heat of the remaining pads on the board one at a time and drag solder up on to the side pads of the lights. Once a light is applied, run the appropriate test.

*****Run V2-RGBWstrandtest program*****

Do not proceed until the first light passes the test. Repeat the procedure one light at a time, not proceeding to the next light until the previous light passes the test.



The switches and buttons are the next components to be attached. There will be four push buttons. One will be off by itself in the upper left with a label above it that says “RESET”. The remainder will be in a cluster on the lower left. These push buttons will click into the board making them easy to solder. Next attach the dipswitch. Refer to **Figure 4** for position. Insert the piece so that the lettering and numbers read left to right. Before you run the next test, apply the remaining resistors on the left side of the double row pin header. The remaining resistors on that side of pin header are all 10K resistors, 13 in total. **Figure 4** shows what this

looks like completed. Also, place one 10k resistor on the right side of the double row header pin in position R15.

*****Run V2-DIP8 program*****

Before running this program, confirm that the baud rate set on the serial monitor matches that of the test program. There will be a row of eight 0's and 1's coming up repeatedly on the serial monitor. When the switch positions are changed, it should change the value of the bits. Confirm that each switch changes the bits displayed. Do not proceed with assembly until the board passes this test.

Note: there is not a test for the push buttons during assembly.

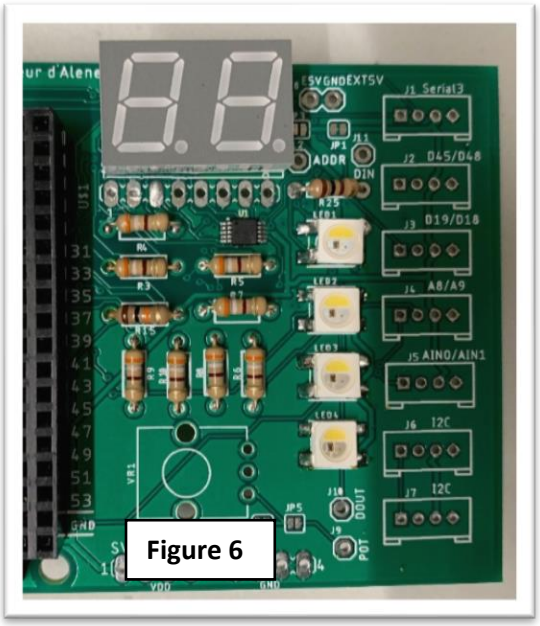
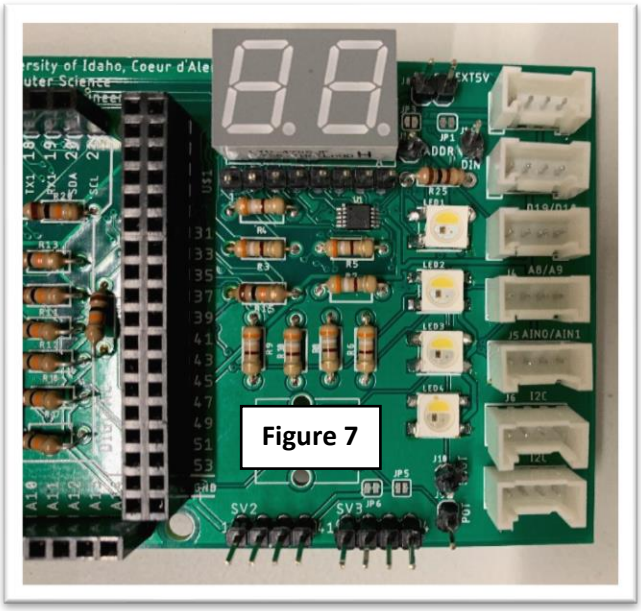


Figure 6

At this point in the assembly, leave the board attached to the Arduino. Unplug the Arduino from the computer and solder the board with the Arduino attached. The seven-segment display is a challenging piece to insert. Bend the pins inward gently until they fit through the holes. Before soldering, make sure to orient the piece with the decimal points on the bottom. Place the remaining resistors onto the board. There are eight 390 Ohm resistors that need placed. It should look like **Figure 6**.

*****Run V2-7SegTest program*****

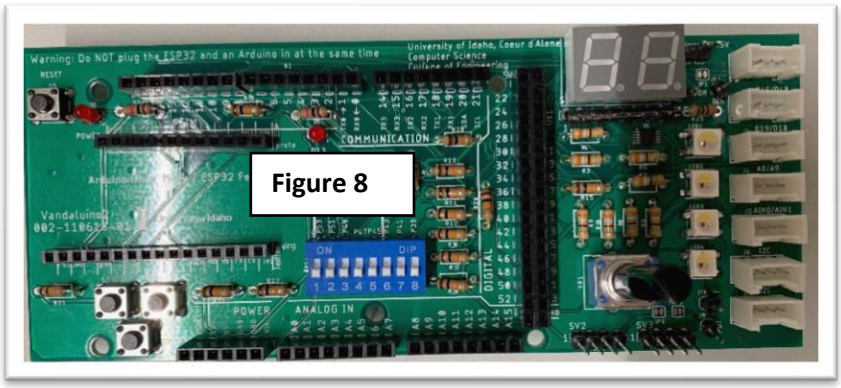
The test program will light up the segments individually and then flash the dots. Make sure that every segment lights up before checking this test off as complete. Do not proceed with the assembly until the board passes this test.



Next, take the seven grove connectors and solder them into place. The two white notches on the pieces themselves line up with the notches on the board as shown in **Figure 7**.

Next, apply the male header pins. Start with the biggest sections first, that way there are enough big pieces to solder before attaching the individual pins. There is a row of eight pins directly below the seven-segment display. Start with these pins. Snap off 8 from the strip and orient them so that the long ends of the pins are on the top and the short end of pins are on the bottom. Solder them with the same method used for the header pins, attaching either end before committing to soldering the remaining pins. There are two four-pin pieces along the bottom labeled SV2 and SV3. There is a two-pin length section labeled J8 and four single-pins at labeled J11, J12, J10 and J9. **Figure 7** shows them soldered into place.

The last piece to be installed will be the potentiometer. It will go in the last bare spot on the board, location VR1. There are three small holes on the right side of the piece that needs soldered. The two large holes on the top and bottom are just to hold the piece in place. No solder is needed. Push the piece into place and bend the top and bottom prongs to hold the piece then solder the three pins to the right. **Figure 8** shows the finished product. Once this piece is in place run the final test.



*****Run ADSTest program*****

The test will give a read out that will display numbers that will go up and down depending on the direction the potentiometer is turned. Once the board passes this test, the assembly is complete.