CE-2801, Board Assembly

1 Purpose

The purpose of this doc is to assemble the computer engineering development board.

2 Prerequisites

- Computer Engineering Development Board kit has been purchased from EECS TSC.

3 Activities

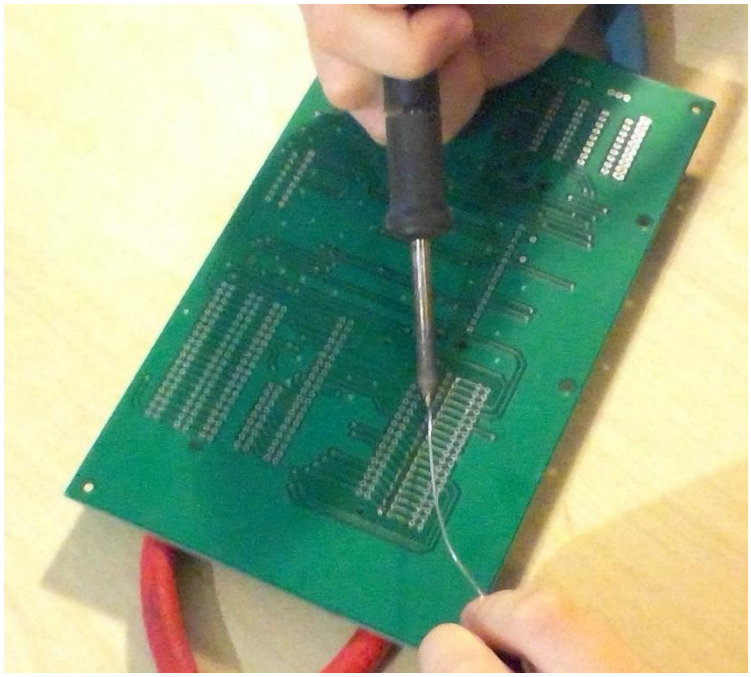
3.1 Assemble Board

3.1.1 Verify Kit Contents

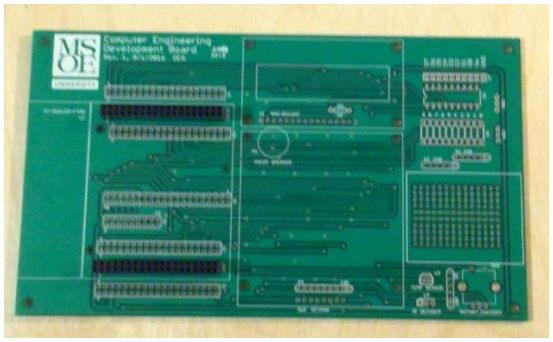
Lay all of the parts from the kit out on the bench and verify against the parts list. We will verify that all the parts in the Components and Hardware bags are there later.

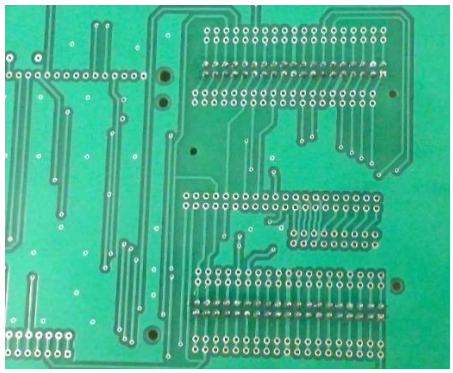
3.1.2 Place U2-a 38-pin female headers on board

Position these two headers in CN7 and CN10 set of holes. (These are the non-outlined sets of holes). Make sure they are level and that you can't see light between them and the board. Flip the board upside down and begin to solder each pin in place. Start with the outside corner pins.



Solder

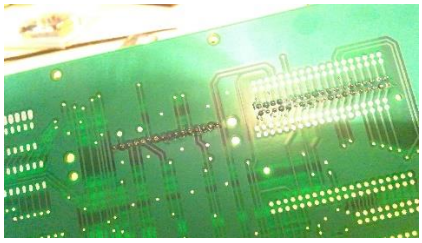


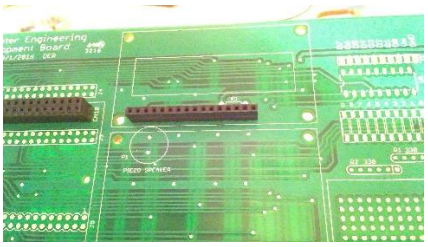


Finished front and back

3.1.3 Place U1-a 16 Pos. female header on board

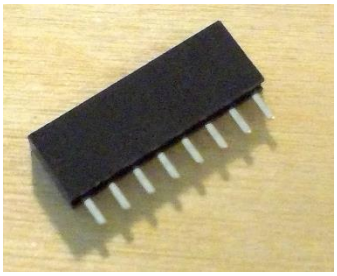
Place the header in the row of holes labeled U1 NHD-0216HZ. Make sure it's level. Flip over the board and solder it on. Start with the ends.



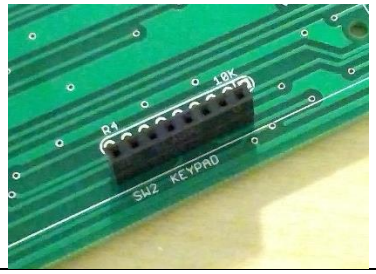
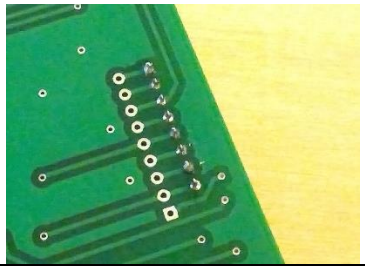


Finished front and back

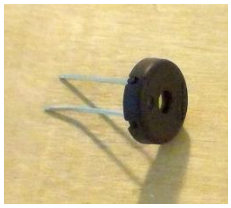
3.1.4 Place the SW2-a 8 Pos. female header on the board



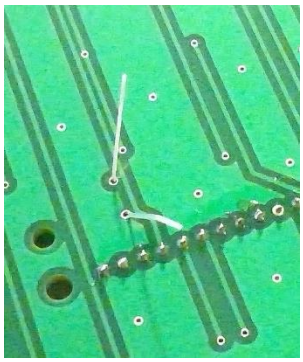
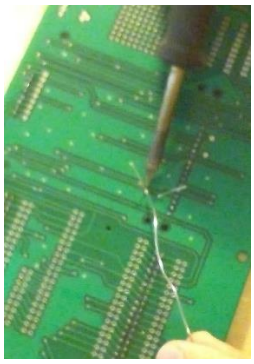
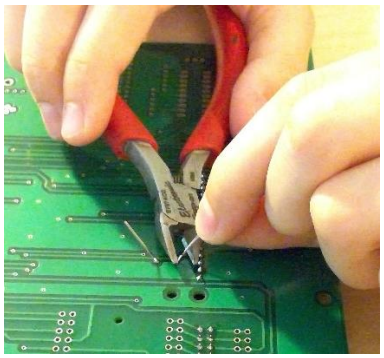
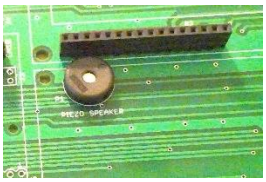
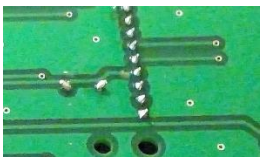
Find this header and place it on the board just like the three other headers you already did. Put the pins through the set of eight holes at the bottom of the board between the words “SW2 KEYPAD” and “R4”.

 	
Finished	

3.1.5 Place P1 PS12 piezo buzzer on board

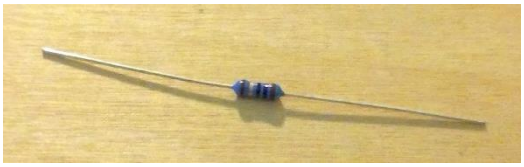


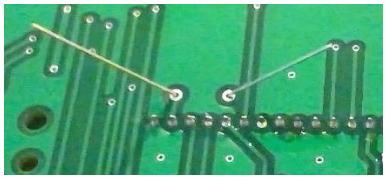
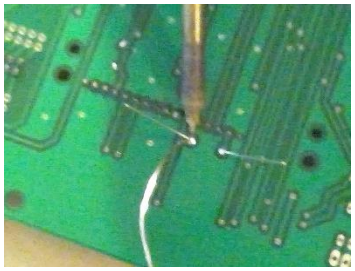
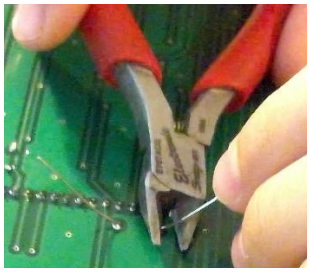
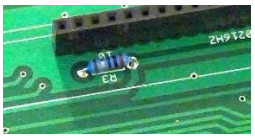
Find this part in the components bag. The piezo speaker has long leads. Stick them through the holes inside the circle marked P1 PIEZO SPEAKER. The speaker is not polar, so it does not matter which direction you place it in. Flip the board over and bend the prongs out so the speaker stays in. Solder the speaker on. Trim the leads, making sure you hold on to them when you cut them. This will prevent the severed leads from flying across the room.

			 
Bend the leads outwards	Solder	Clip leads	Finished

3.1.6 Insert R3 10-ohm resistor

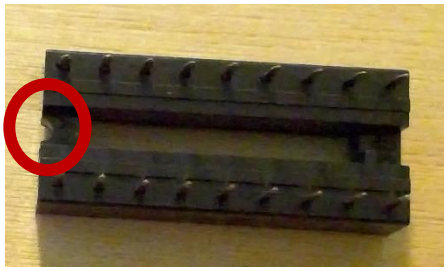
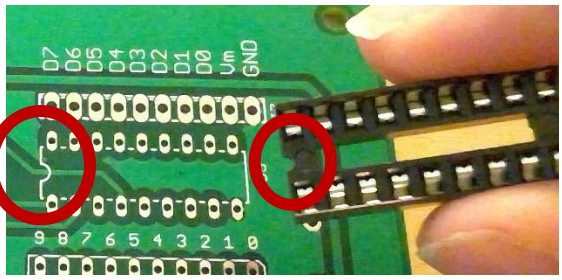
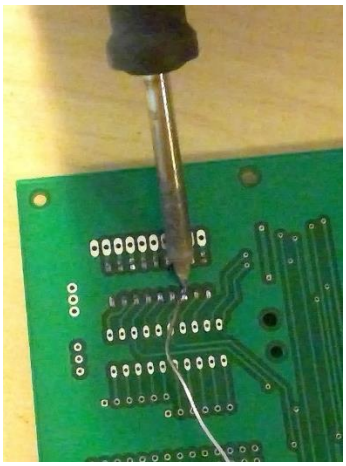
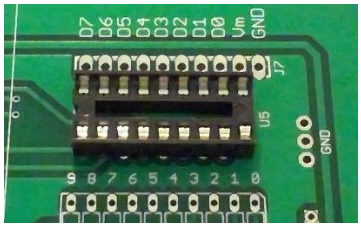
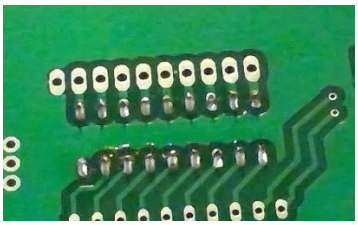
Find the resistor R3 in the components bag. Place each lead through one of the holes marked R3. Just like the piezo, you will bend out the leads to make it stay. Solder and clip the leads as before.



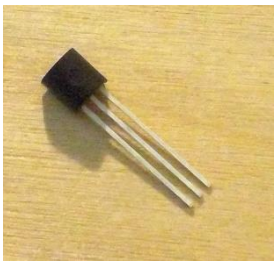
			 
Bend the leads outwards	Solder	Clip leads	Finished

3.1.7 Insert the 18 pin DIP socket

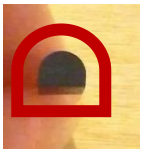
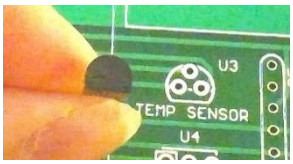
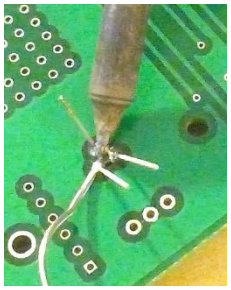
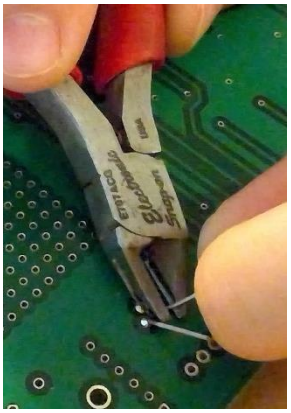
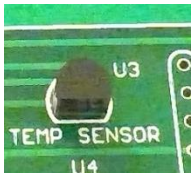
Find the socket. Note that one end has a notch. This is SUPER IMPORTANT!!! Find the section of the board marked U5. Notice that there is a shape in the silkscreen surrounding the pins. This shape also has a notch. Place the socket onto the board making sure that the notch on the silkscreen and the notch on the board face the SAME DIRECTION!!! Otherwise, your board won't work. Secure and solder.

 		 
Find the notch	Solder	Finished

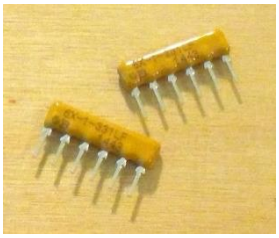
3.1.8 Insert U3 board mounted temperature sensor



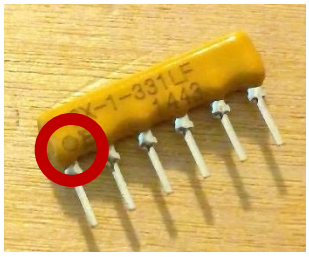
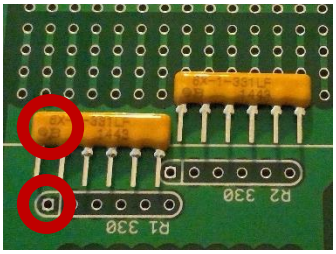
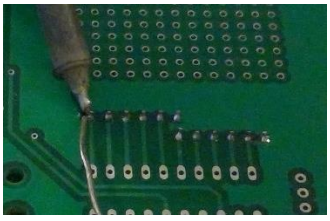
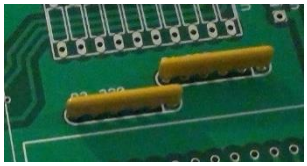
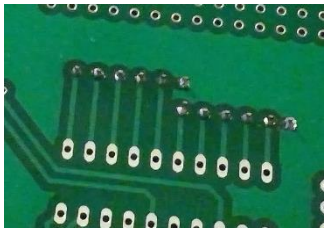
Find the temperature sensor in the components bag. Notice that one side of it is rounded and one side is flat. Find the holes on the board marked U3 TEMP SENSOR. Notice that the silkscreen shape around the holes is the same shape as the part. Place the part through the holes so the shapes match up. This is VERY IMPORTANT, just like the notches on the last part.

 			 
Find the matching shapes	Bend the leads, solder	Clip leads	Finished

3.1.9 Insert the R1 and R2 5 bussed SIP-330 ohm resistors

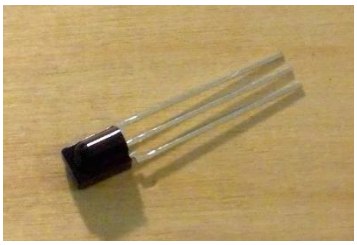


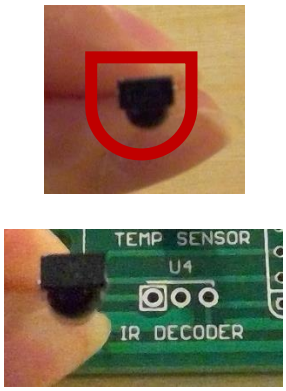
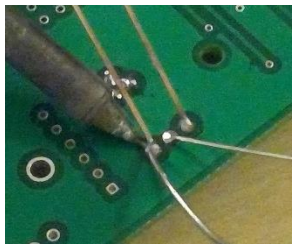
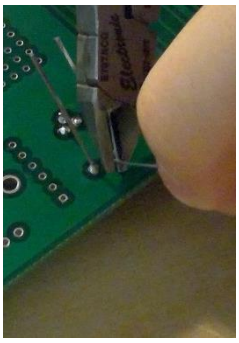
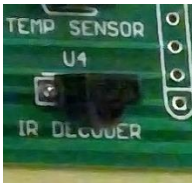
Locate these two parts in the components bag. Notice that on one end, the last prong has a dot above it. On the board, find the holes marked R1 330 and R2 330. Note that each set of six holes is surrounded by a long oval, but the last hole is partitioned off by a line. Place the parts in the holes so that the prong with the dot goes into the marked hole. Solder.

 		 
Find the markings	Solder	Finished

3.1.10 Insert U4 IC 38 khz IR sensor

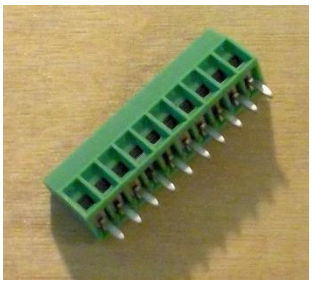
Find this component in your components envelope. Notice that one side of it has a rounded bulge. Look for the spot marked U4 IR DECODER on the board. Place the part on the board so the bulge faces the nearest edge of the board as pictured. Solder and clip the leads.

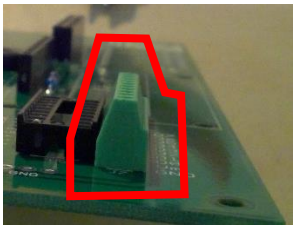
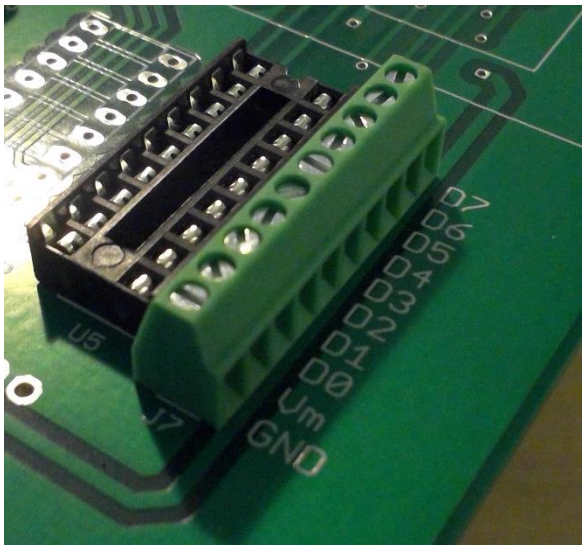


			 
Find the shapes	Bend the leads, solder	Clip leads	Finished

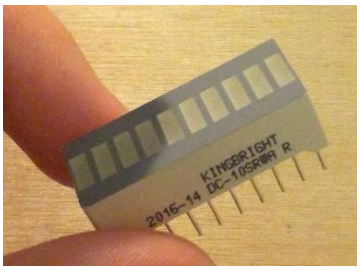
3.1.11 Insert J7 10 position screw terminal block

Find this component. Notice that each side is shaped differently. Find the group of pins marked J7. There are little letters and numbers next to one row of the pins. Make sure the side of the part that is more flat goes next to the letters and numbers, as shown. This side is also closer to the edge of the board. Solder.

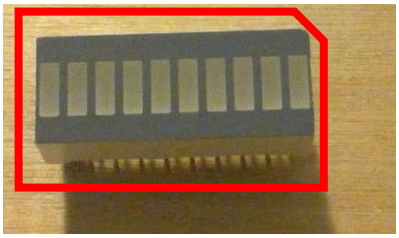


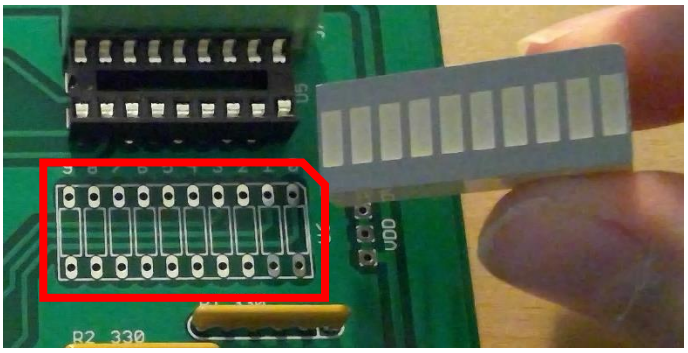
 	You know how to do this!	
Find the shapes	Solder	Finished

3.1.12 Insert U6 LED bar

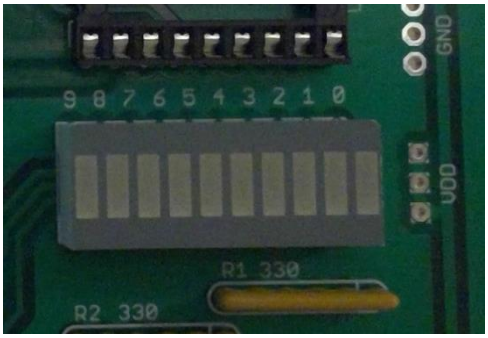


Find this part. Notice that one corner is angled, while the other corners are square. Look on the board for the group of holes marked U6. Notice that the shape surrounding these holes has one angled corner. Place the part on the board so that the angled corners of the part and the silkscreen match up. Solder.





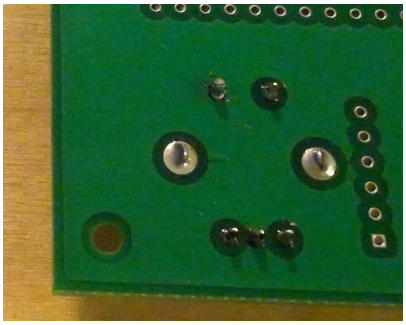
Find the matching shapes

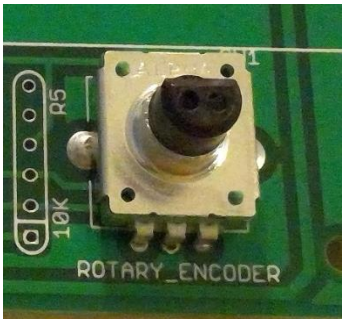


Finished

3.1.13 SW1 rotary encoder installation

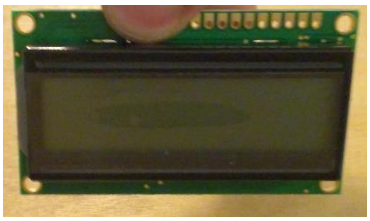
Find this part. Find the holes on the board labeled SW1 ROTARY ENCODER. Stick the pins through the holes. They will only fit one way. Solder.

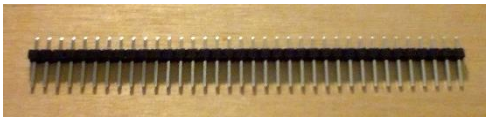




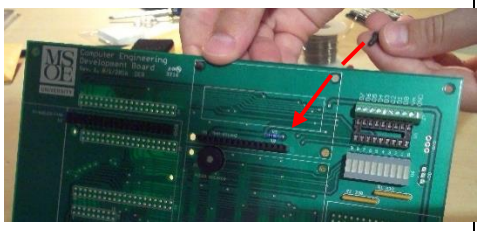
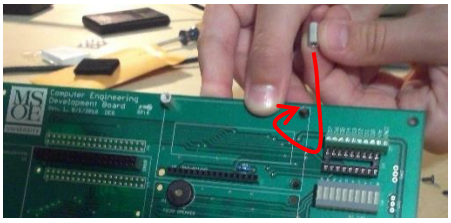
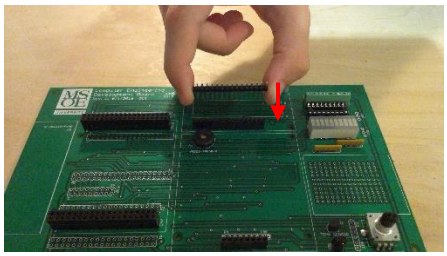
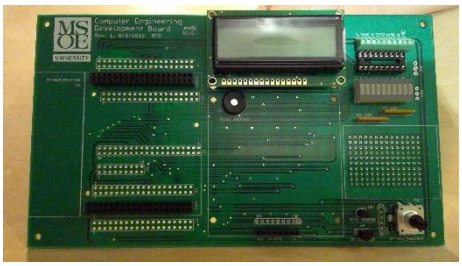
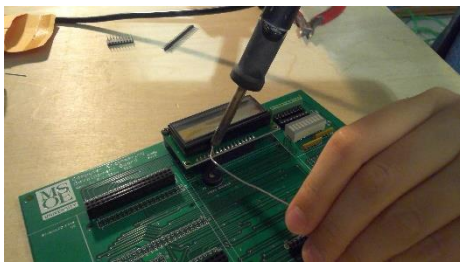
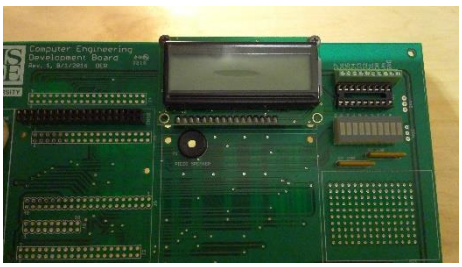
Finished

3.1.14 Place LCD screen

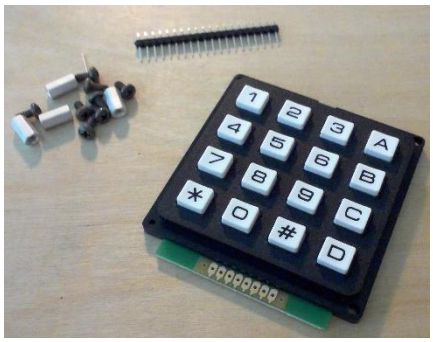




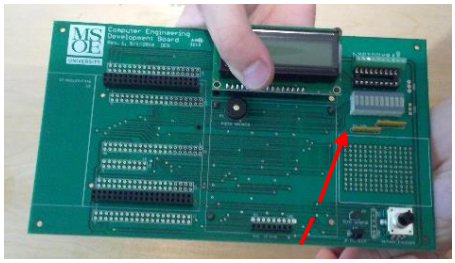
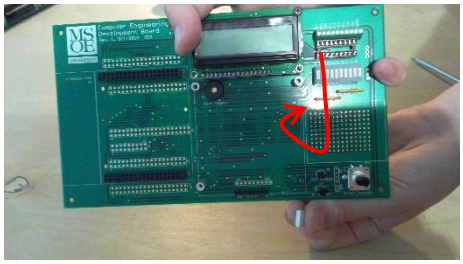
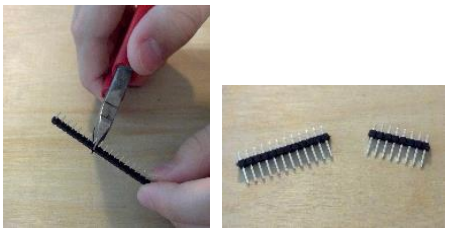
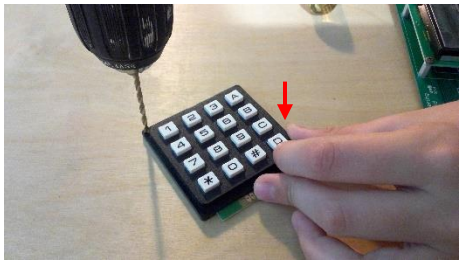
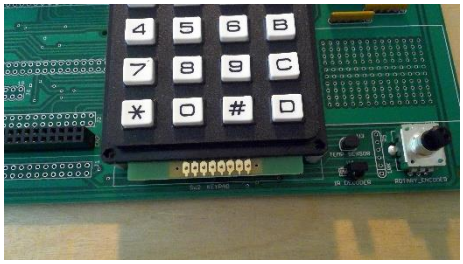
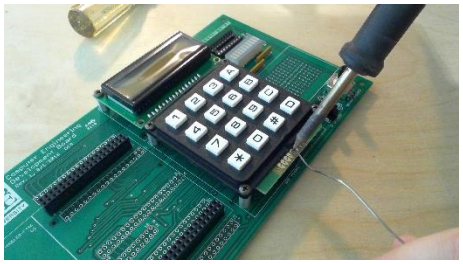
Find the SW2-d & U1-d 4-40x1/4” screws. Take two. Put one of them through each of the top two holes from the backside of the board. The holes you are looking for are bigger than the other holes and aren’t metal coated. Next, take two SW2-c & U1-c 4-40x3/8” standoffs. Screw one on each screw that is poking up from the bottom of the board. You may need to use a screwdriver. Next, find the SW2-b & U1-b 8 & 16 pos. male header breakaway. You will have to cut off a 16 pin chunk. Take your cutters and make snip halfway through the plastic. Tear the group of pins off the rest of the way. Take the 16 pin section and attach it to the U1-a 16 pos. female header that is already on the board. Make sure the long side of the pins faces down. Next, lay the U1 16x2 LCD display on top of the pins. Take two more SW2-d & U1-d 4-40x1/4” screws. Screw them into the SW2-c & U1-c 4-40x3/8” standoffs through the LCD board. Solder the 16 pins to the LCD display’s board. This is a lot of information, please refer to the pictures below.

		
Insert screws	Insert standoffs	Cut male header
		
Put it into the female adapter	Like this	Place LCD screen
		
Screw it on	Solder	Finished

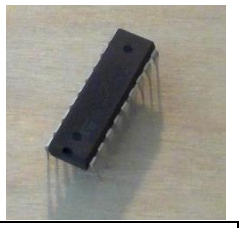
3.1.15 Place the keyboard



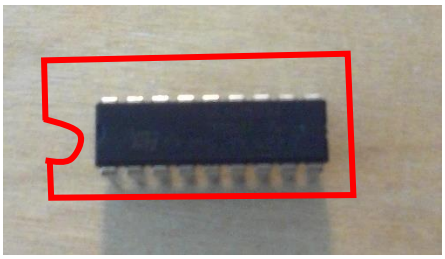
Place one SW2-d & U1-d 4-40x1/4” screw through each hole located in a corner of the square marked SW2 KEYPAD. Find four SW2-c & U1-c 4-40x3/8” standoffs. Screw one onto each screw that is poking through the board. You may need to use a screw driver. Find the remaining part of the SW2-b & U1-b 8 & 16 pos. male header breakaway. Cut off 8 pins. Take the 8 pin section and stick it into the SW2-a 8 Pos. female header. Make sure the side with the longer prongs is sticking down. Next, find the SW2 hex keypad. The holes on the corners are too small. Get a drill with a 7/64 drill bit and enlarge the holes. Be careful with power tools! Once all the holes are drilled, set the keypad on the board so that the prongs of the SW2-b & U1-b 8 & 16 pos. male header breakaway go through the eight center holes at the bottom of the keypad. These holes have metal around them. The holes you just drilled should line up with the standoffs. Then, take four more SW2-d & U1-d 4-40x1/4” screws and screw them into the standoffs through the keyboard. You may need to use a screwdriver. Next, solder the eight pins to the keyboard. You can then turn your soldering iron off, because there is no more soldering to do.

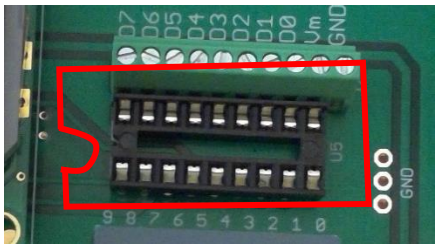
		
Insert screws	Insert standoffs	Cut male header, put it into female header
		
Drill holes	Place Keyboard	Screw it on
		
Solder	Turn iron off	Finished

3.1.16 Insert U5 ULN2803A 8 transistor NPN array

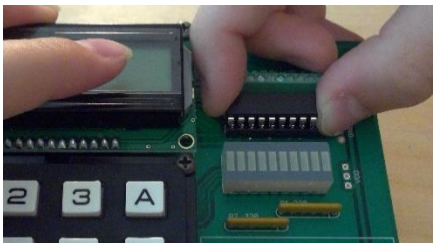


Find this part. Notice that there is a notch on one end. The notch does not go all the way through the part. Next, on your board, find the 18 pin DIP socket that you already soldered on. This has a notch as well. Making sure the notches face in the same direction, plug the transistor array into the DIP socket.

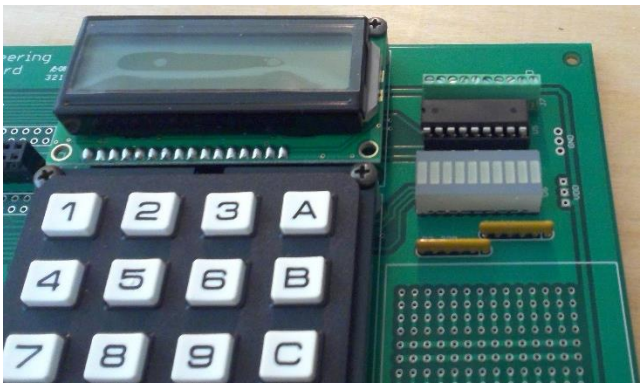




Notice notches



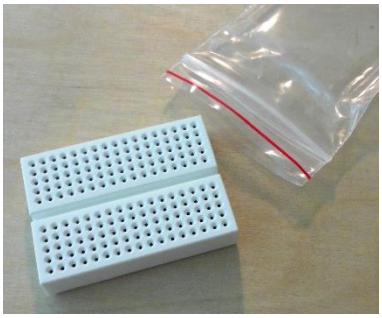
Push part into socket

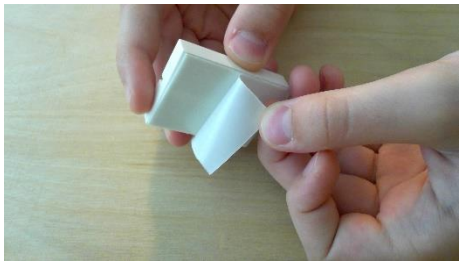
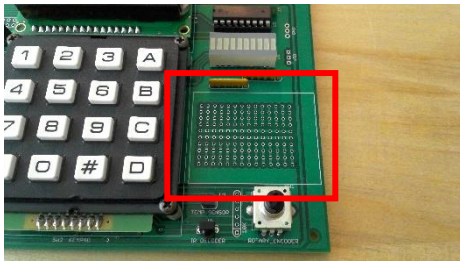
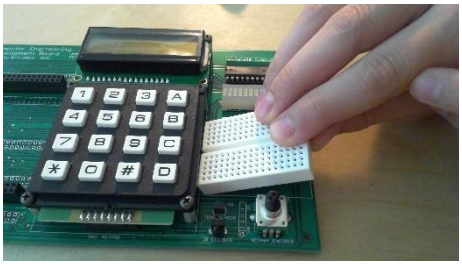
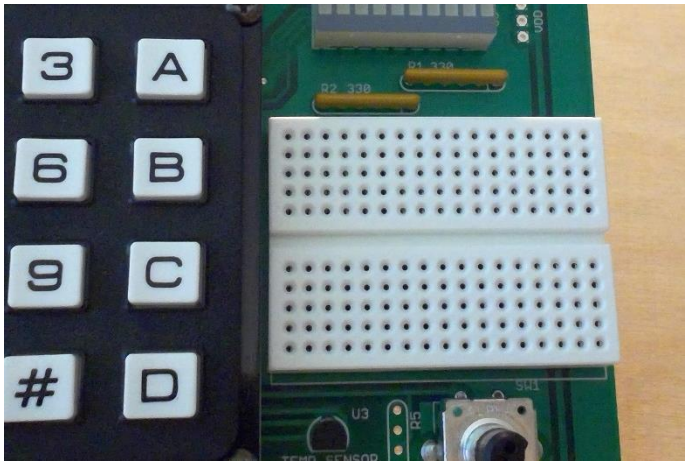


Finished

3.1.17 Install breadboard

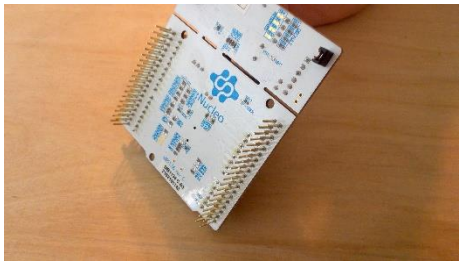
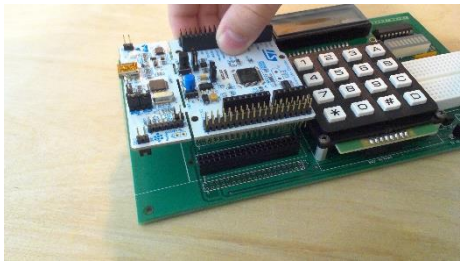
Find the PT1 170 tie point self-adhesive breadboard. Peel off the back layer like a sticker. Stick the breadboard on the board in the group of holes above the rotary encoder. The breadboard can face either direction and it does not have to sit exactly on the holes. Just make sure it is centered in the white silkscreen outline. That was easy!



		
Peel off backing	Find correct location	Stick it on
		
Finished		

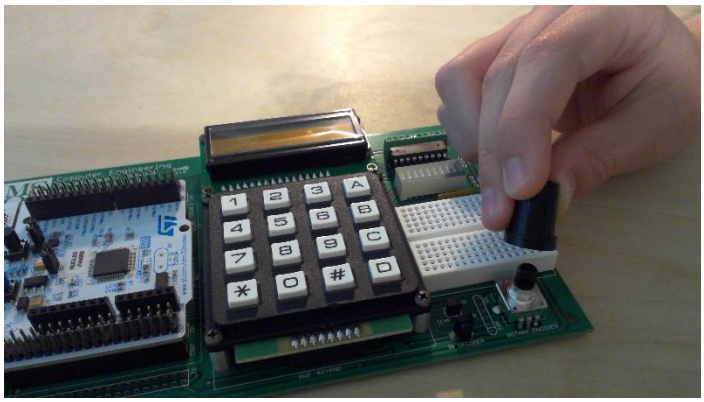
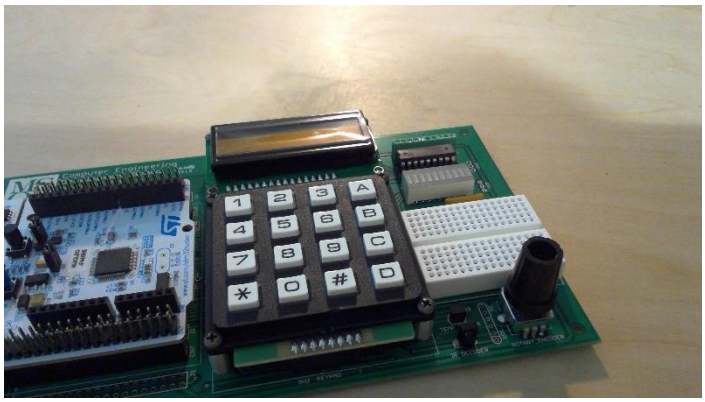
3.1.18 Put on the U2 ARM Nucleo Development Board

Find this board. Notice the prongs on the bottom. Stick them into the U2-a 38-pin female headers that are already on the board. There will be a little gap between the board and the plastic part of the header, that's OK.

		
Find prongs	Push it on	Finished

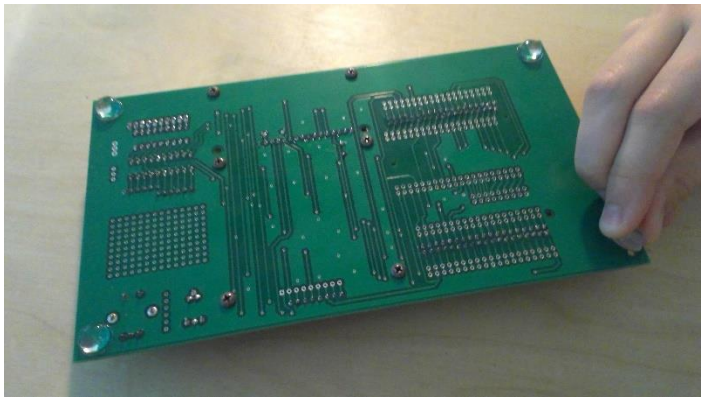
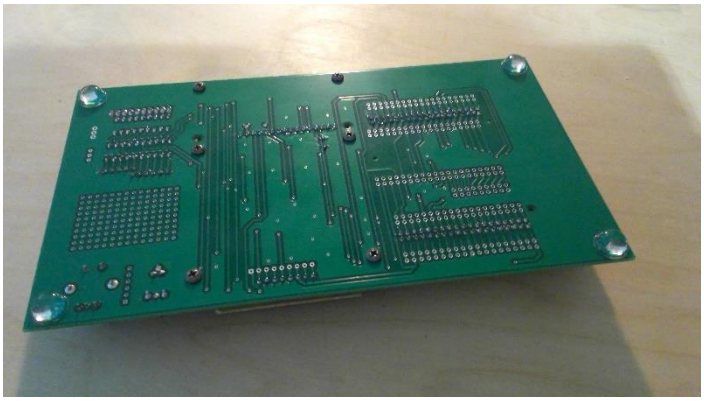
3.1.19 Insert knob for 6mm shaft on rotary encoder.

Find this part. Stick it on the rotary encoder's shaft.

	
Push it on	Finished

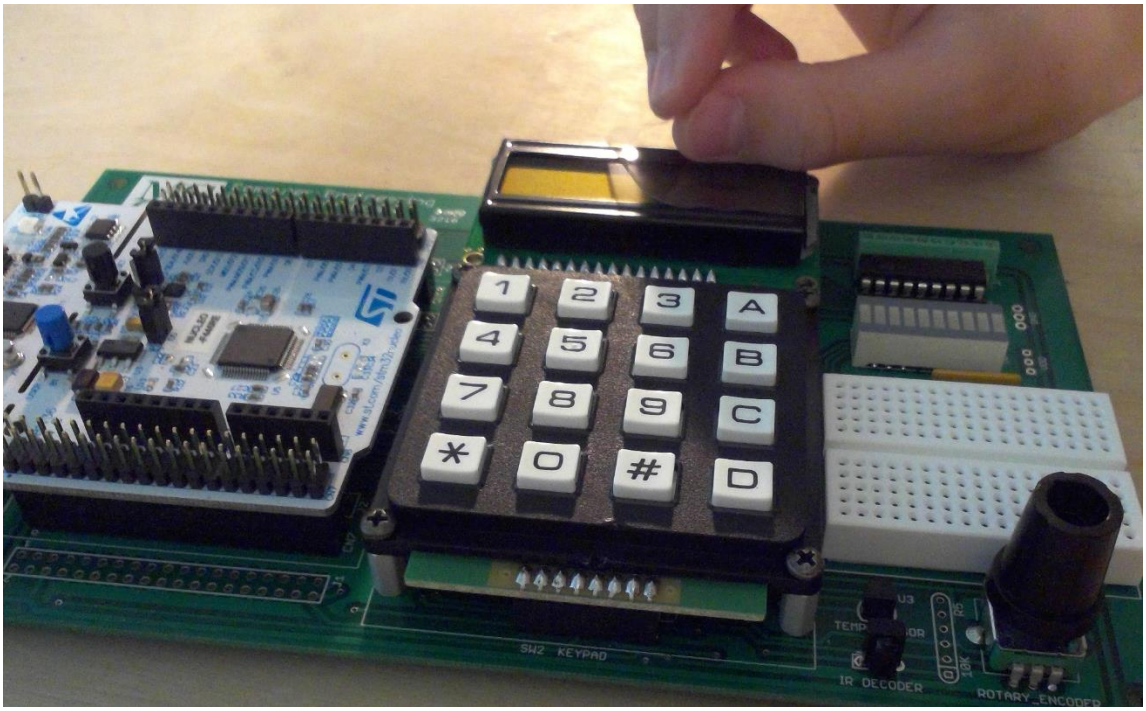
3.1.20 Put on rubber feet

Find these. Peel them off their backing like stickers, and stick them on the corners of the board on the back side.

	
Push them on	Finished

3.1.21 Take screen protector off

If you have not already done so, please take the screen protector off your LCD screen



Take it off

3.1.22 Yay! You're done!

Now, you may cheer that you are done with this task!

Done!