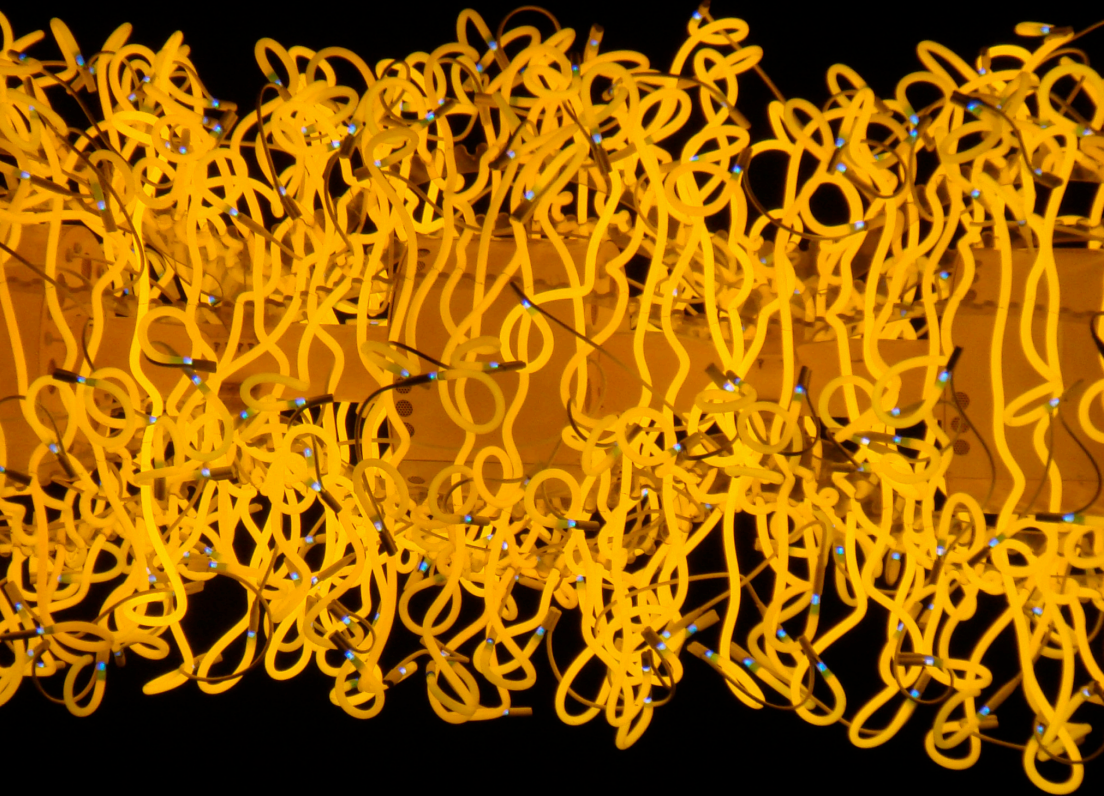


OpenPCR

Build Instructions v1.2



Getting Started with OpenPCR

Here's how it works:

1. Set aside an afternoon. You'll need about 4 hours to assemble OpenPCR, plus time for breaks
2. Clean off a large table for your workspace
3. Get some snacks and dig in!

Questions? Visit <http://openpcr.org/support>

Greetings,

Welcome to OpenPCR! You may be a scientist working to harness the language of life, a high school student exploring biotech for the first time, or a hobbyist looking at the world in a new light. Either way, you've made the right choice. Biotechnology is an exciting new frontier!

Best,

Tito Jankowski and Josh Perfetto
Founders, OpenPCR
Saratoga, California

On the Cover

A section of artist Dale Chihuly's "Saffron Tower". This massive 30 foot tall glass sculpture appeared briefly at the Pool of Enchantment besides the De Young Museum in San Francisco. Printed here at high resolution to display in your home or lab.

Photography by artist Dianne Que
<http://hurleysashimi.com>
San Francisco, California

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Getting Started

These instructions are designed to help you put together your OpenPCR from start to finish. You'll start by assembling OpenPCR's heated lid and move on from there.

Your OpenPCR is designed to take about 5 hours to put together, plus time for breaks. Take breaks when you feel like it -- OpenPCR will be waiting happily when you get back!

Tools you will need

- Philips-head screwdriver
- Flathead screwdriver
- 2 mm flathead screwdriver
- Pliers
- 2.5 mm hex wrench (blue, included)
- 2.0 mm hex wrench (included)
- 3/32" hex wrench (included)

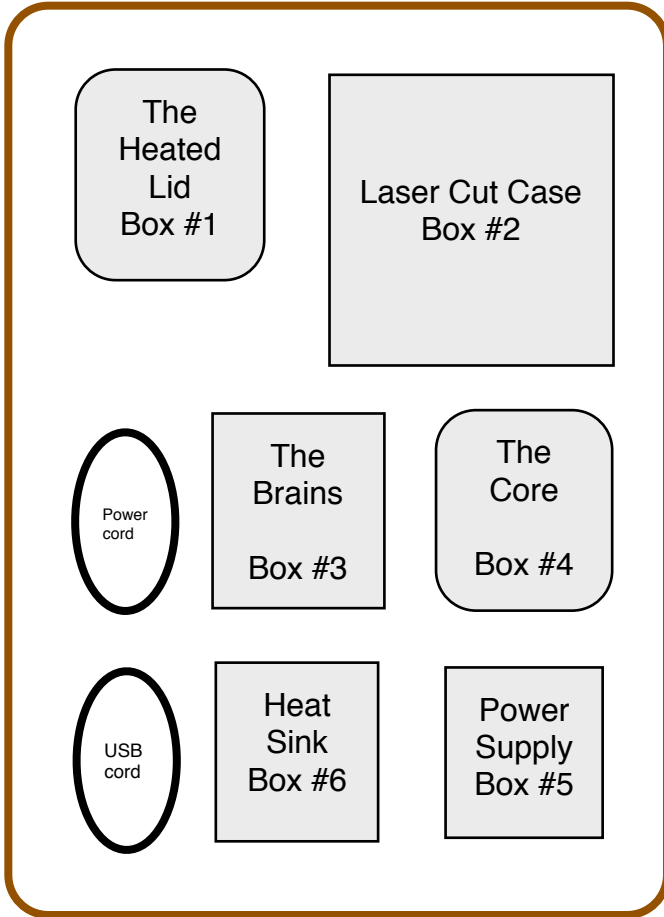
Nice to have

- Needle nose pliers for holding plastic spacers in place



When you see this red sign next to a step, take extra care! These tips are to help avoid pitfalls while putting together OpenPCR.

What's in the Box



Building the Heated Lid

Find these parts:

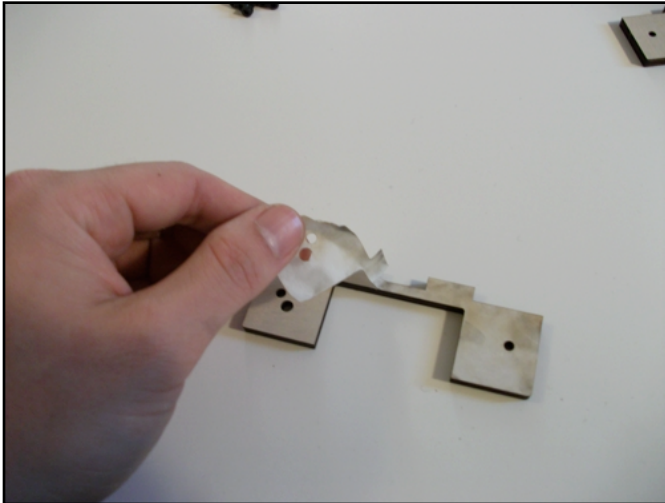
Box #1 The Heated Lid

- Bag of wooden parts (5)

Bag “a”

- Long 16 mm black metal screws (7)
- Metal nuts (7)
- Blue allen wrench

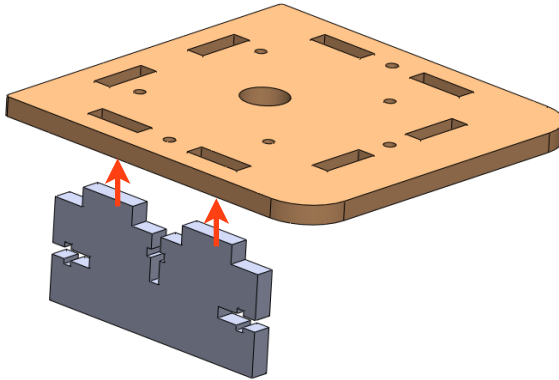
Let's get started! Peel off the backing paper on all 5 wooden parts.



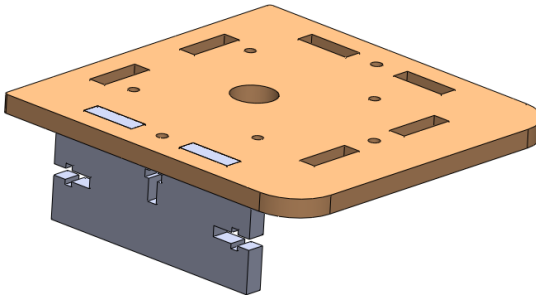
2

Snap together one of the Side pieces into the Top piece.

(The Sides are symmetrical, so don't worry about which way they're facing)

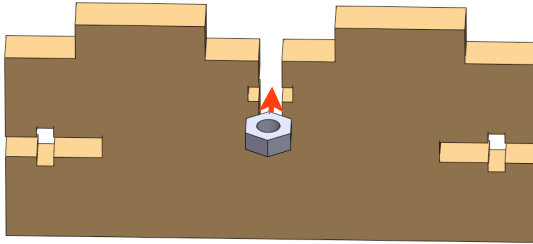


3



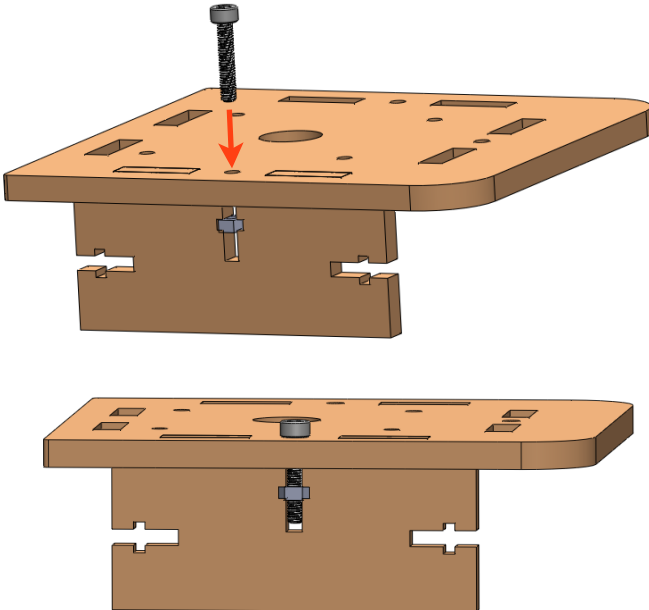
Pick up a small metal nut. Slide the nut into the “t” cross of the Side piece as shown. (Line up the edges of the nut to be parallel with the cross.)

4

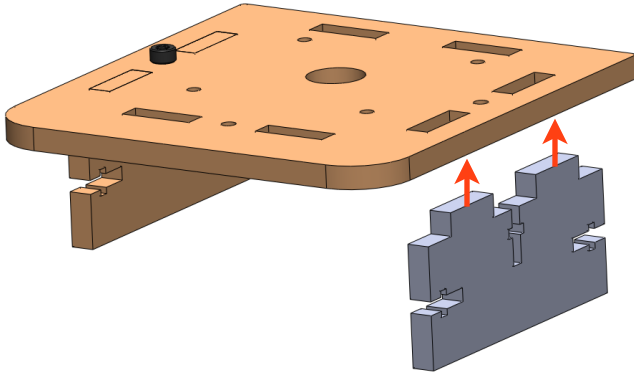


Put a metal screw through the hole as shown. Tighten it using your fingers at first. Finish it off with your blue Allen wrench.

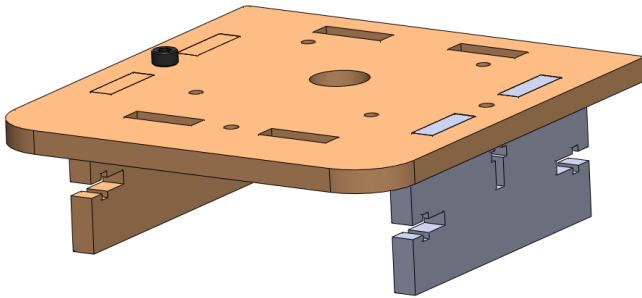
5



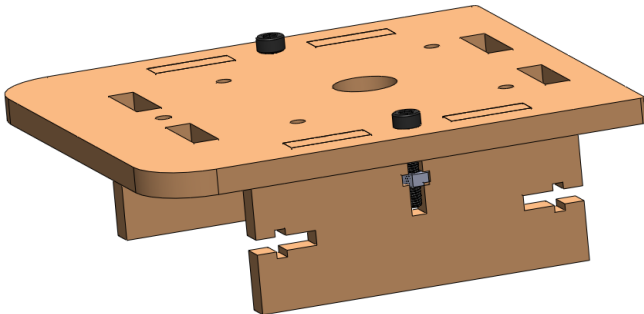
1

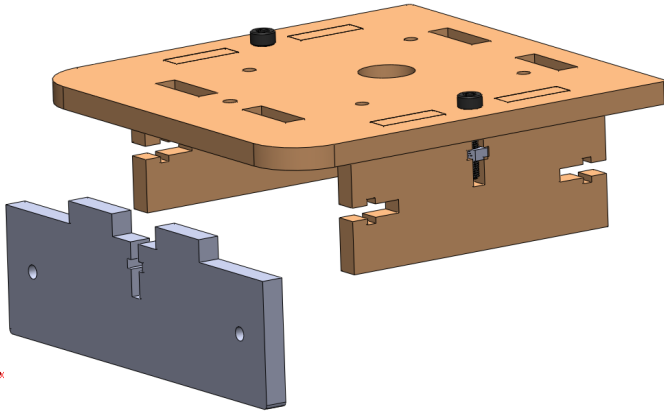


2

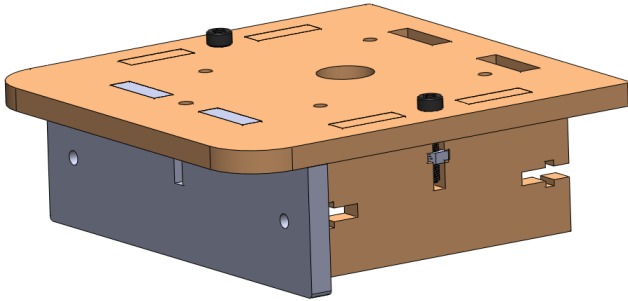


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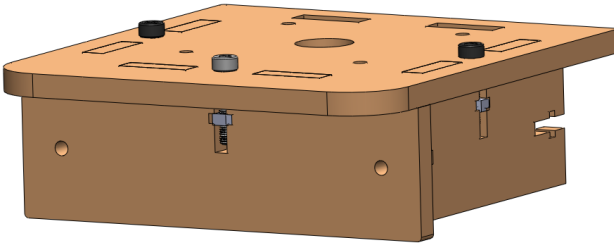




1

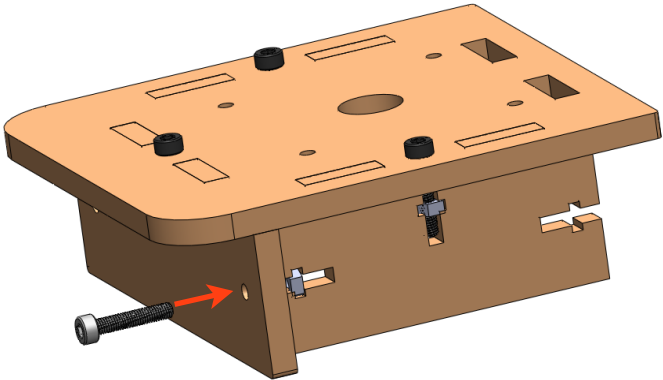


2

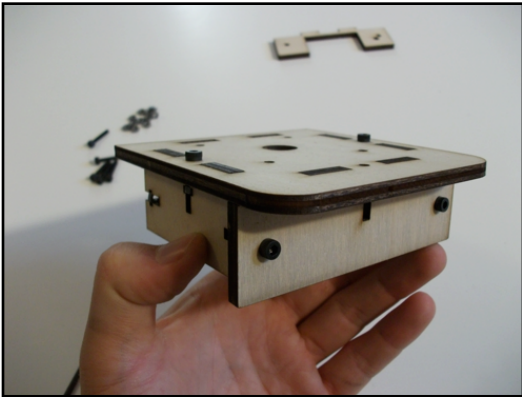
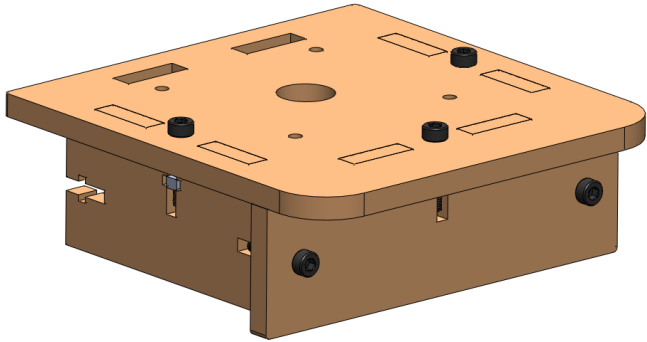


3

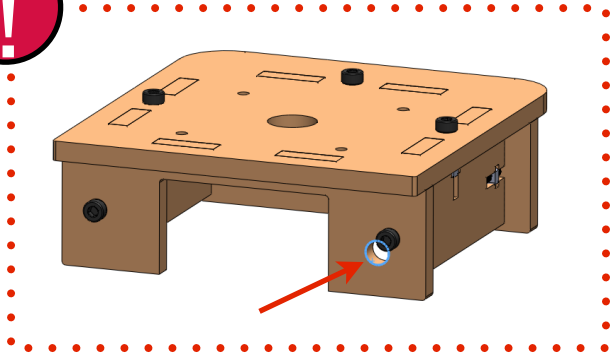
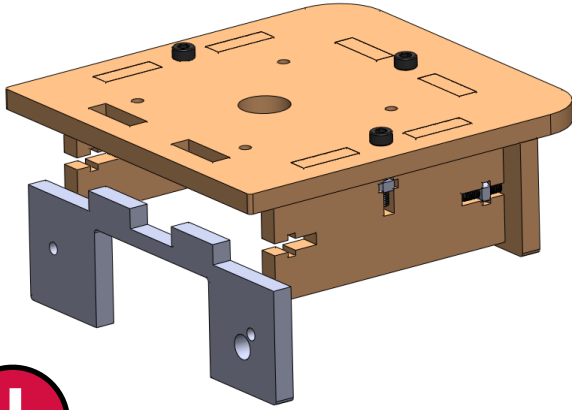
4



5

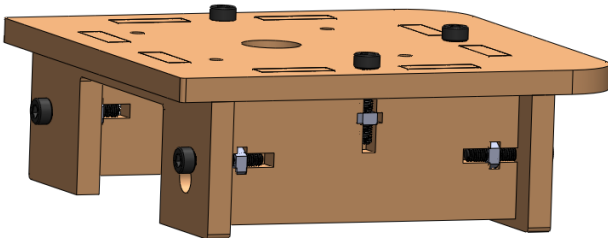


1



The hole shown must be on the RIGHT when viewed from the back (non-rounded).

2



The Heated Lid - Part 2

Find these parts:

Box #1 The Heated Lid

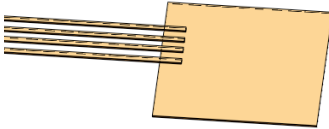
- Small rectangular lid plate
- Orange lid heater
- Heated lid mounting plate

Bag "a"

- White insulation padding
- 1/8" white plastic spacers (4)
- Flat white plastic washers (4)
- Black metal 8 mm screws (4)

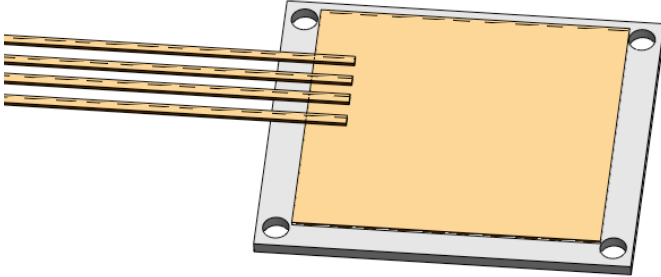
1

Find the orange lid heater and small rectangular lid plate. Remove the adhesive backing on the orange lid heater.



Stick the heater in the middle of the plate

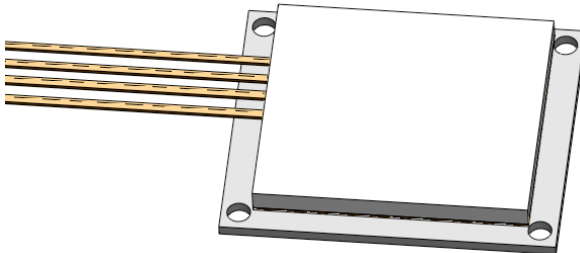
2



Check that the edges of the orange heater do not hang off the edge of the plate, cover up any of the 4 holes, or have any air bubbles underneath. The heater could break during PCR if part of it doesn't make contact with the aluminum plate.

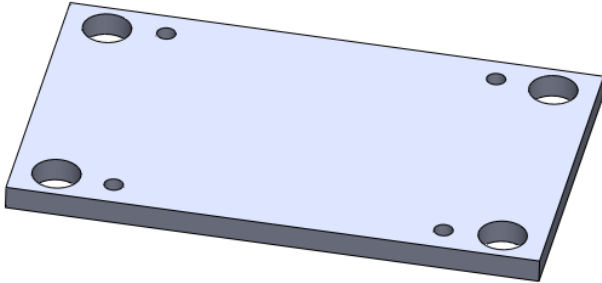
Remove the adhesive backing on the white insulation. Stick it on top of the lid heater.

3



1

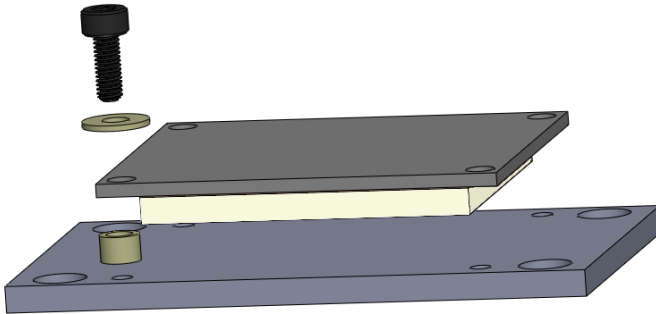
Find the heater mounting plate

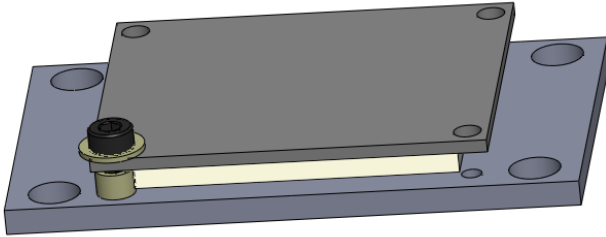


Flip over the lid heater plate so the insulation is sandwiched between the heater and mounting bracket. Ensure there is room for spacers (next step)

2

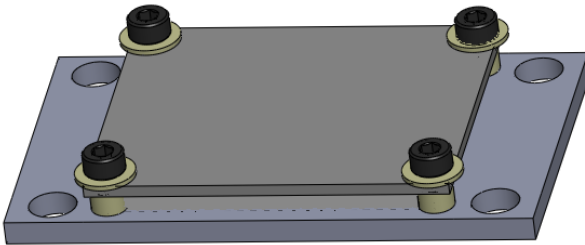
With the blue allen wrench, screw together the two plates. Use a plastic washer, 1/8" plastic spacer, and 8 mm black screw as shown.





Repeat for the other 3 screws

3



Set this aside for now.

The Heated Lid - Part 3

Find these parts:

Box #1 The Heated Lid

- Heated lid bracket
- Black plastic knob

Bag “a”

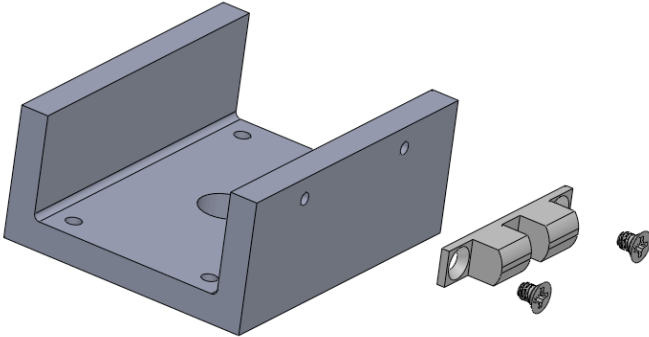
- Black metal 8 mm screws (4)
- Shoulder bolts (4)
- Springs (4)

Bag “b”

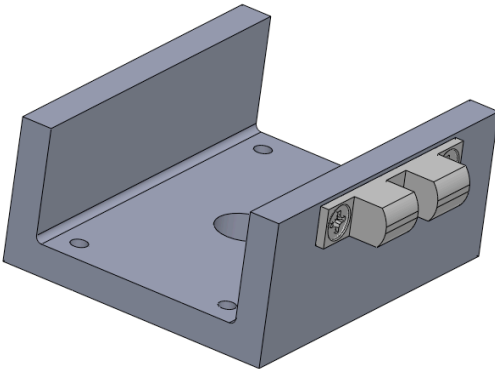
- Metal latch (2 parts)
- Black plastic hinge
- Short black philips head screws for hinge
- Short philips head screws for latch
- Short metal bolt
- 1” black tube

Screw in the latch using 2 short philips head screws. Set aside the other latch part. You may need to loosen the latch tension to remove it. Disregard the screws which come in the latch bag.

1

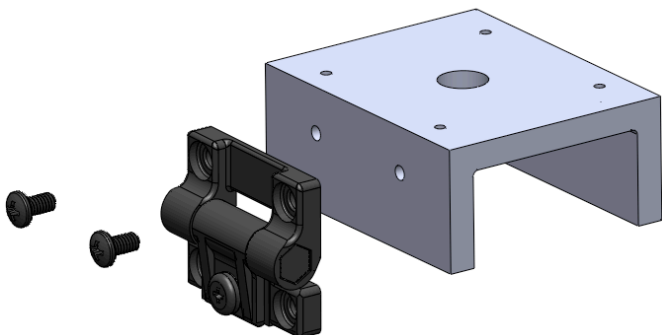


2

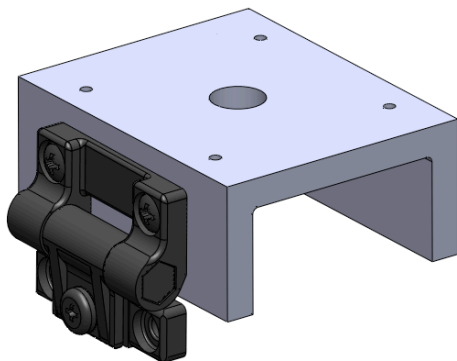


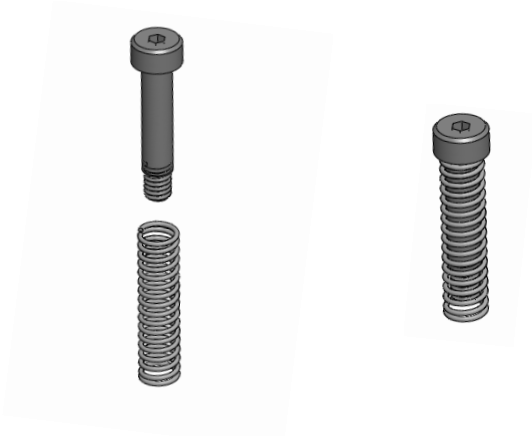
3

Screw the hinge to the back of the heated lid bracket with 2 black philips head screws



4

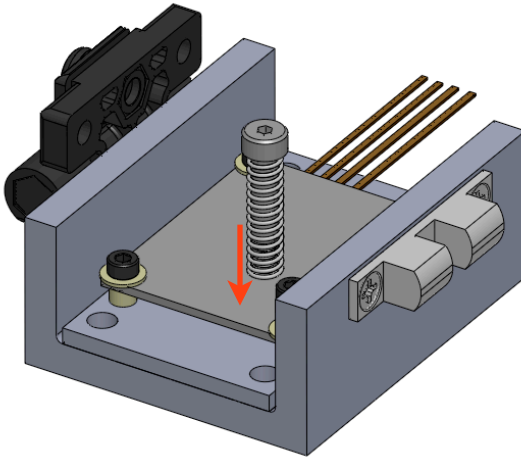




1

Find the small 2 mm black Allen wrench. Place a spring around the shoulder bolt. Screw the shoulder bolt on to hold the plates together.

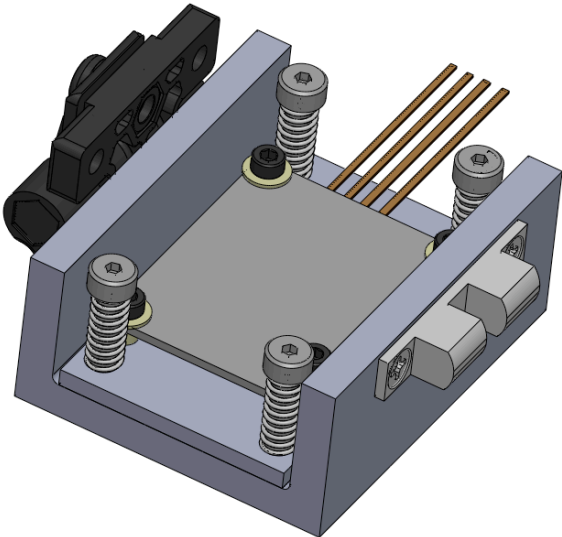
2



With the latch facing towards you, the heater wires must point out to the RIGHT, as shown.

3

Repeat with the other 3 shoulder bolts



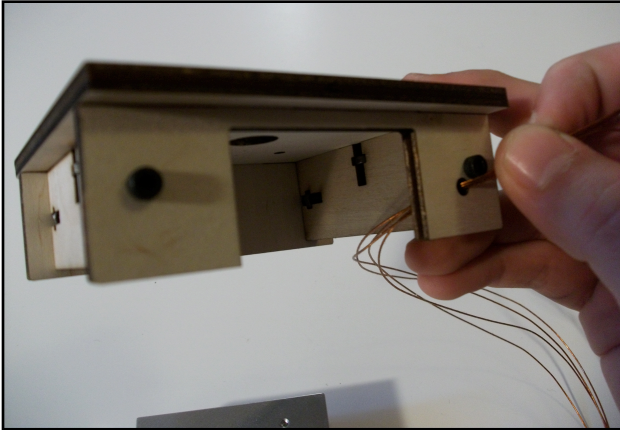
There are 4 wires coming out of the lid heater. 2 are labeled “NTC”. 2 are labeled “Power”. These labels are very important. If they get mixed up, the heated lid may break the first time it is plugged in.

1

Pick up the 2 “NTC” wires, and carefully slide the label off (you will slide the label back on in the next step. Leave the “Power” wires alone).

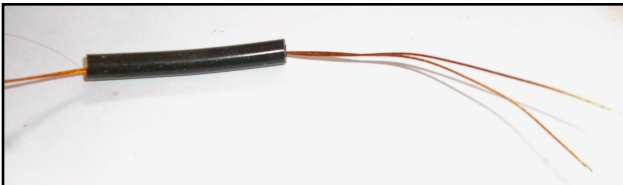
Pass the 2 wires through the hole in the wood lid case as shown.

2



Pass the ends of the 2 wires through the 1.5” piece of black tube.

3



4

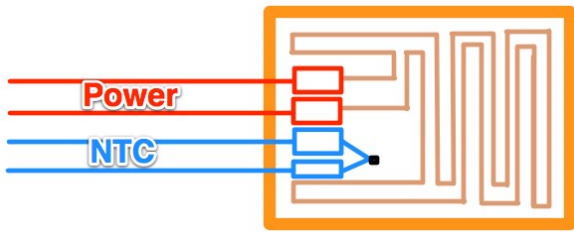
Carefully slide the “NTC” label back on to these 2 wires.

5

Repeat Steps 1, 2, and 3 for the 2 “Power” wires.

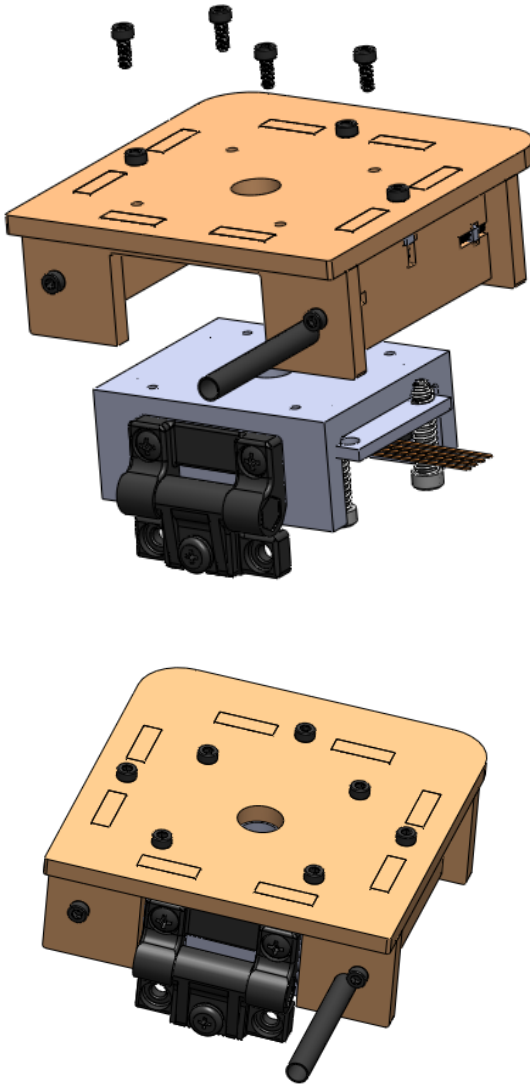


If the “NTC” wires get mixed up with the “Power” wires, the heated lid may break the first time it is plugged in. If the wires get mixed up, undo the past several steps and remove the insulation on the lid heater. Use this diagram of the lid heater to fix the labels.



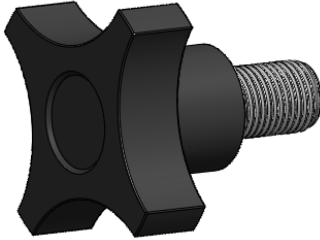
Attach the lid casing to the lid assembly using 4 black screws (8 mm), as shown. Insert tubing through hole - you may need to loosen a nearby screw.

1



2

Find the heated lid handle



3

Screw the handle into the top of the lid. When you turn the knob, the heated plate inside the lid will move. A few turns are all you need.



The Core

Find these parts:

Box #6 The Heat Sink

- Heat sink and Fan
- Small screws (8)
- Metal arms (2 left, 2 right)

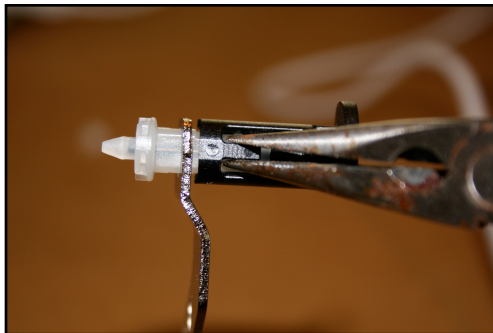
The 4 heat sink arms have plastic clips. These clips need to be removed for OpenPCR.

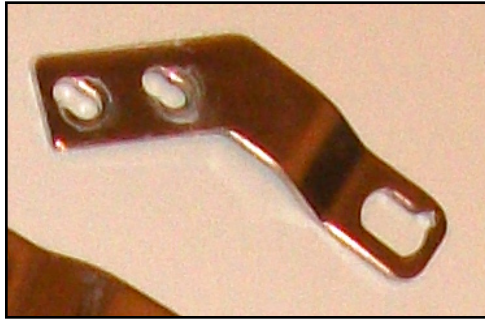
1



Find your pliers and break off 2 of the black plastic tabs. Avoid bending the metal arm. You can put the plastic parts in the trash.

2



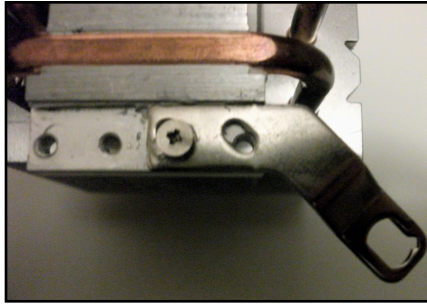
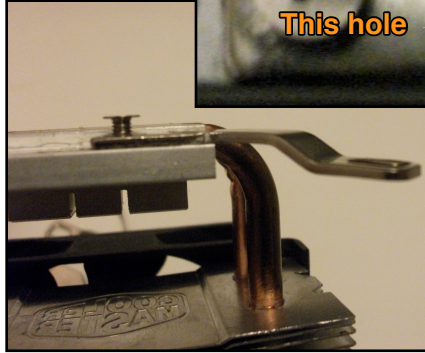
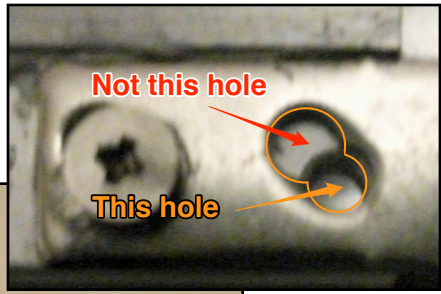


3

Remove the sticker on the top of the heat sink that reads “Please peel off label...”.

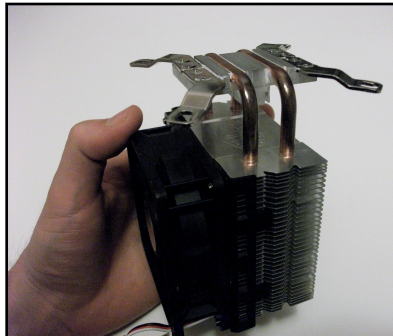
4

Use 2 aluminum screws to mount the arms onto the heat sink. Make sure the all arms angle DOWN, as shown.



Repeat for the other 3 arms. Leave the screws a little loose, so the arms can wiggle a little bit. You'll tighten these in a few steps. Throw the other fan parts away, except for the thermal paste.

5



The Core - Part 2

Find these parts:

Box #3 The Core

- Aluminum mounting plate
- Square aluminum adapter plate
- Ceramic Peltier heater
- 16-well PCR block (Fragile, watch out for the temperature sensor wire poking out)

Bag “c”

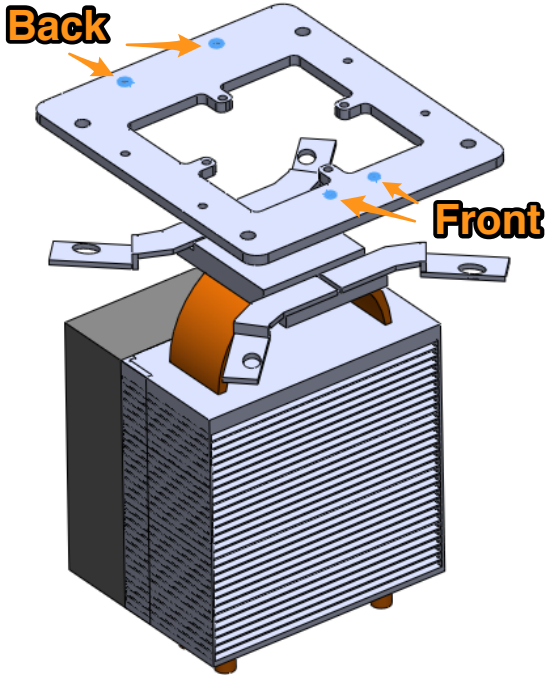
- Metal short screws, 5 mm diameter (4)
- Black plastic spacers, 10 mm diameter (4)
- Small button head screws (4)
- Plastic washers (4)
- Insulation strips (4)

Bag “d”

- Grey thermal pad (3)
- Purple thermal paste tube (Heat Sink box)

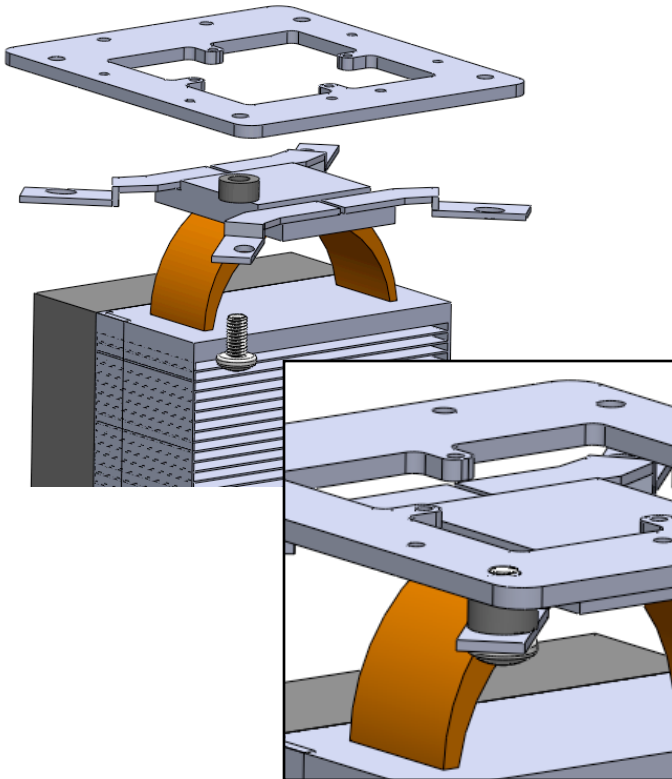
Align the mounting plate as shown. There are 4 holes highlighted in blue. The closely spaced holes are “front”. The 2 highlighted holes further apart are “back”, on the same side as the fan.

1



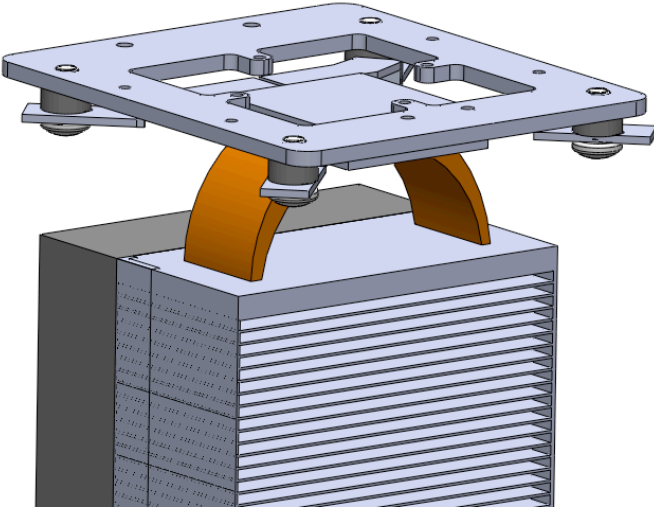
2

Using a big 5 mm diameter screw and a 10 mm black plastic washer, screw the mounting plate to the heat sink. Make sure these screws go in straight. If not, loosen the arm brackets on the heat sink and wiggle the mounting plate.



Repeat with the 3 other screws. Tighten the small screws on the heat sink arms, as well as the large screws. Don't over-tighten, stop if the arm starts to bend.

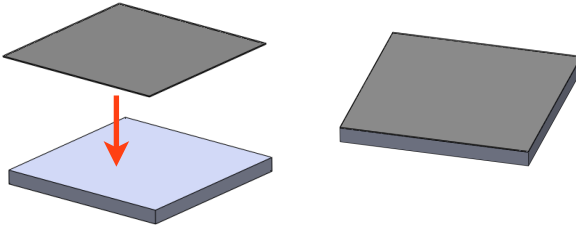
3



1

Find the square aluminum adapter plate.

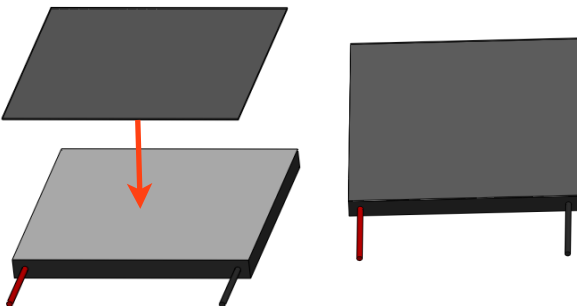
Take 1 grey thermal pad from bag “d”. Make sure that the thermal pad doesn’t rub or touch against anything else. Remove the adhesive backing on the thermal pad. Stick the pad to the aluminum adapter plate. **The pad is fragile, so line up the pad before you stick it on. Make sure none of the thermal pad hangs over the edge of the plate; this will slow the heating and cooling performance of OpenPCR.**



Set this aside carefully.

2

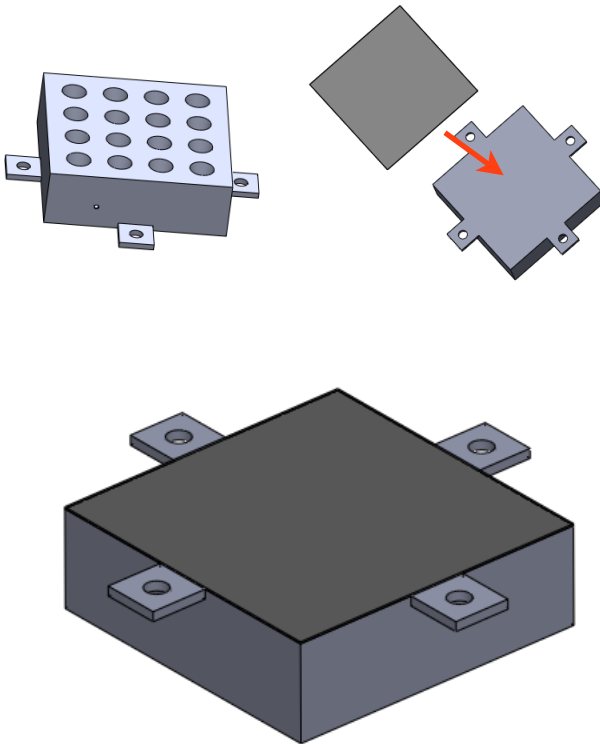
Find the Peltier heater and another thermal pad. With the red wires facing the LEFT side as shown, stick on another thermal pad. Set this aside carefully.



3

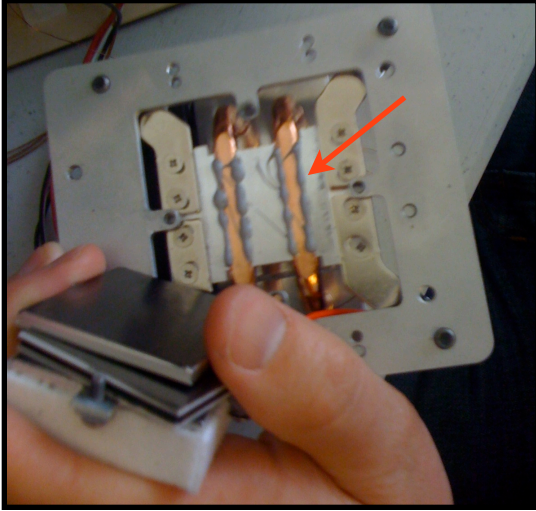
Find the 16-tube PCR block. The block temperature sensor wire coming out of the block is extremely fragile, it's almost hair thin. Leave it taped to the block for now.

Attach a thermal pad to the underside. Make sure the pad doesn't hang over the edge of the block. Set this aside carefully.



1

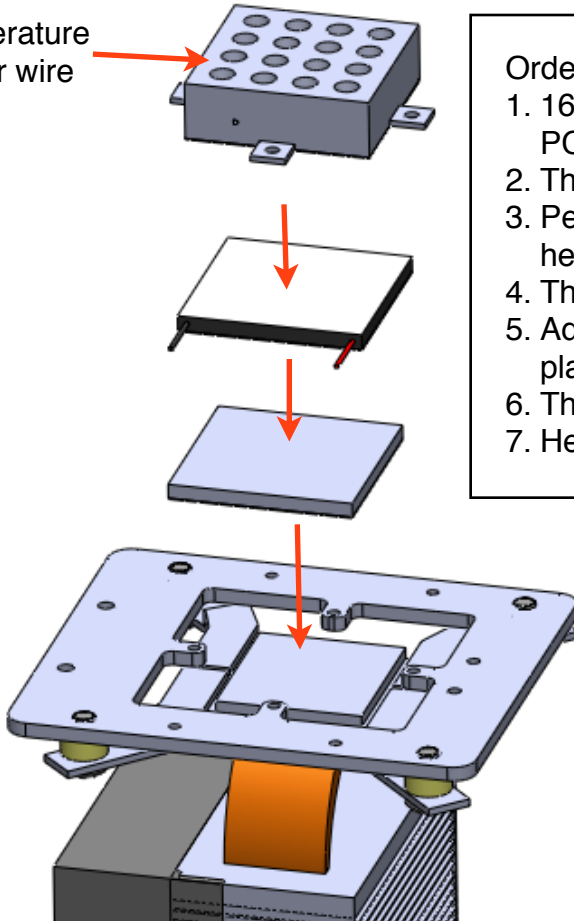
Squirt a small amount of grey thermal paste from the purple tube. Get it in the 4 cracks between the copper and aluminum parts of the heat sink, but don't cover the whole surface.



Stack the aluminum plate, peltier, and block with all thermal pads facing DOWN. **Red peltier wire must face RIGHT** as shown, where the fan is on the left!

2

Temperature sensor wire

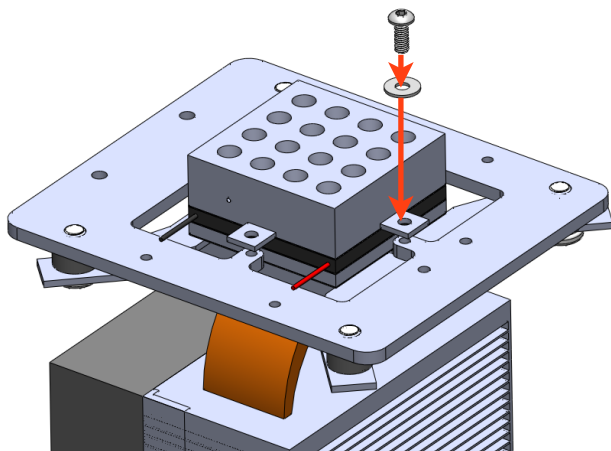


Order of parts

1. 16-tube PCR block
2. Thermal pad
3. Peltier heater
4. Thermal pad
5. Adapter plate
6. Thermal pad
7. Heat sink

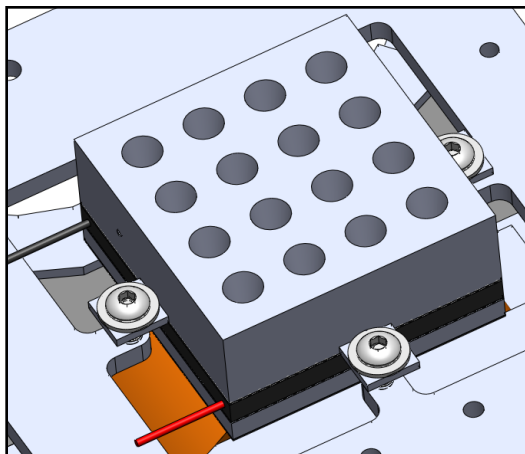
3

Using the tiny screws, mount the heat block to the mounting plate, inserting a nylon spacer between screw and heat block. Don't tighten too much, we'll tighten more later. (If for some reason you later disassemble OpenPCR after thermal cycling, do not take this apart or the thermal pads will need to be replaced)



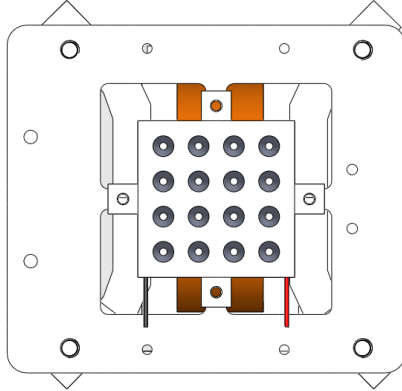
4

Repeat with the other 3 screws.



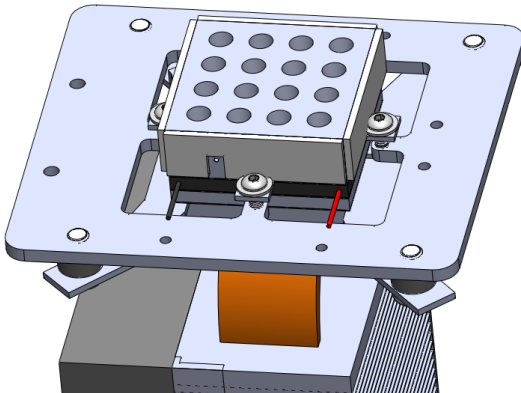
Check all the edges are aligned and no one part sticks out. Check the arms don't touch the mounting plate.

5



Find the 4 pieces of white insulation. The notched piece is for the block temperature sensor wire. Remove the backing from the white insulation strips and stick them to the sides of the block.

6



The Face

Find these parts:

Box #2 Laser cut case

- Top of OpenPCR laser cut case

Box #3 - Bag “e”

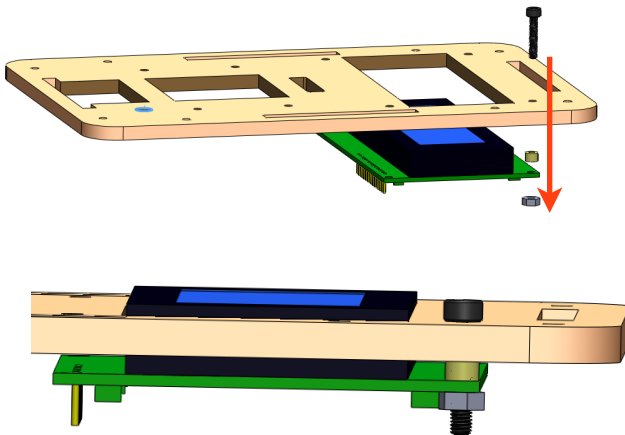
- 16 mm thin black screws (4)
- Thin metal nuts (4)
- 1/8” plastic spacers (4)

Box #4

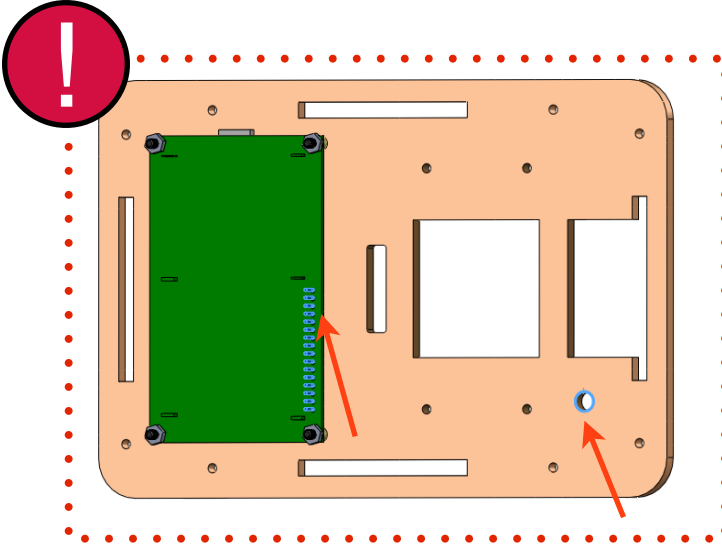
- OpenPCR LCD screen
- LCD ribbon cable

1

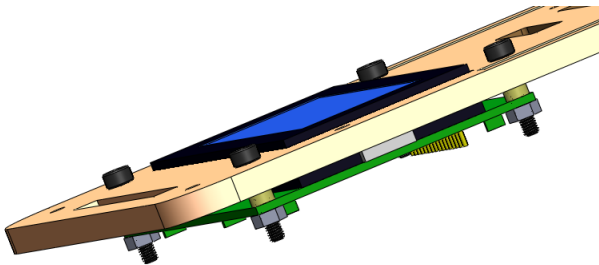
Remove the paper from the backside of the Top. Using one of the screws and spacers, attach the LCD to the lid. Note the direction of the pins in the diagram below! Ensure you are using the thin 16 mm screws and nuts, not the thick ones.



The LCD pins must be on the same side as the highlighted hole (blue)



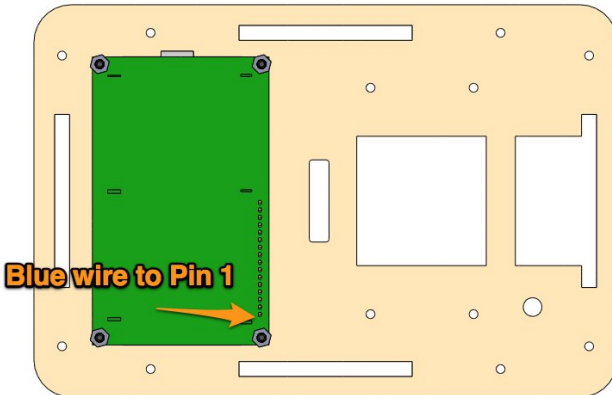
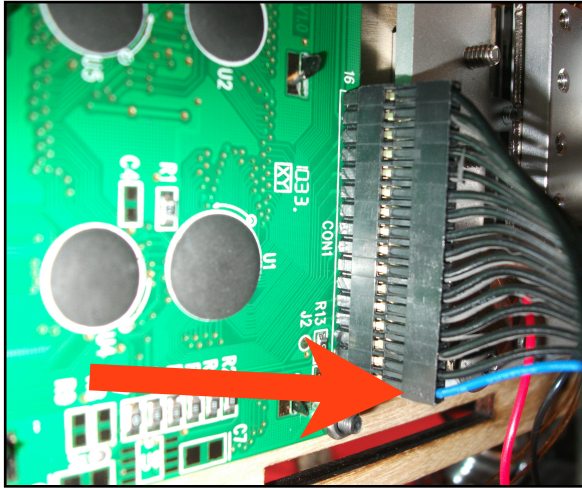
Repeat for the other 3 screw holes



2

3

Plug in the LCD cable to the OpenPCR LCD. Make sure the **BLUE** wire on the LCD cable matches with pin #1 on the LCD.



The Face - Part 2

Find these parts:

Box #3 The Core

- Latch mounting block
- Hinge mounting block

Bag "b"

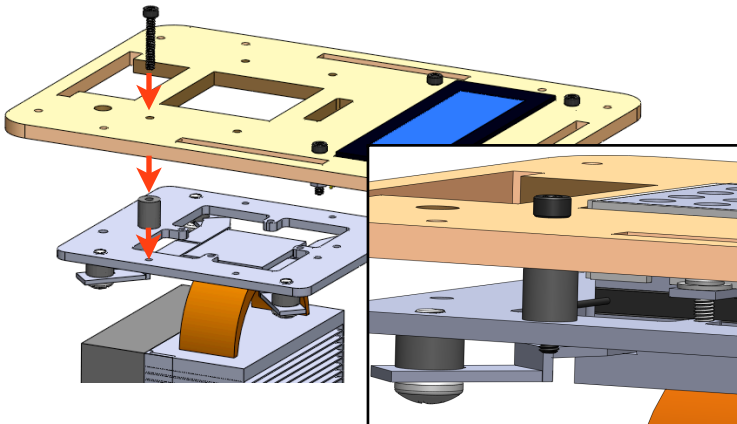
- Metal latch (from page 17)
- Philips head screws for latch (2)
- Philips head screws for hinge (2)

Bag "e"

- 20 mm really long black screws (4)
- 5/8" black plastic spacers (4)

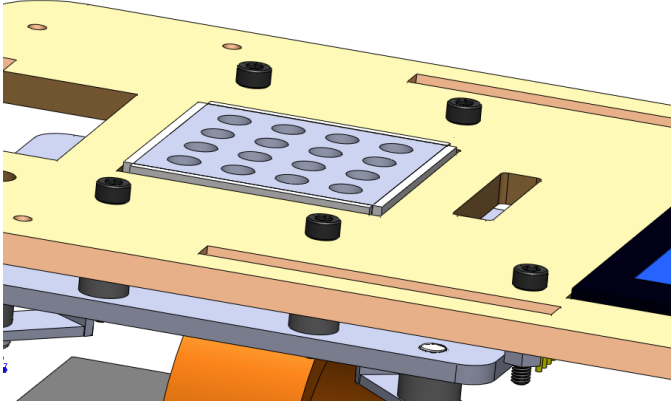
Un-tape the block temperature sensor from the block. This is fragile, make sure not to break it!

Use a 20 mm black screw and long plastic spacer to mount the Top piece and Core together. Note the alignment of the heat sink fan in the drawings.



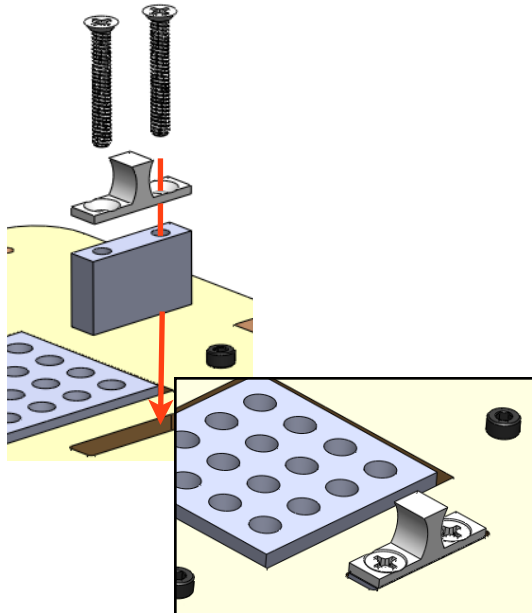
3

Repeat with the other 3 screws and spacers.



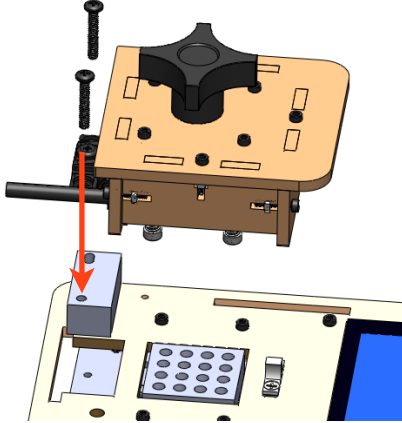
1

Find the latch block and latch. Using 2 philips head screws, screw the latch onto the mounting plate.



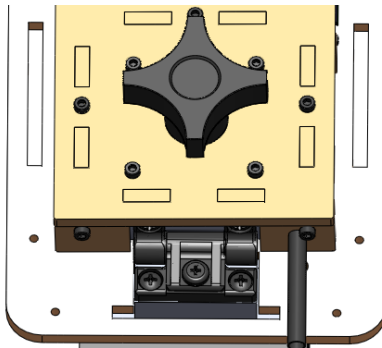
With the hinge block and 2 philips head screws, attach the heated lid. Close and open the lid. You may need to loosen the screws on the side of the latch that control the latch tension in order to open the lid easily.

2



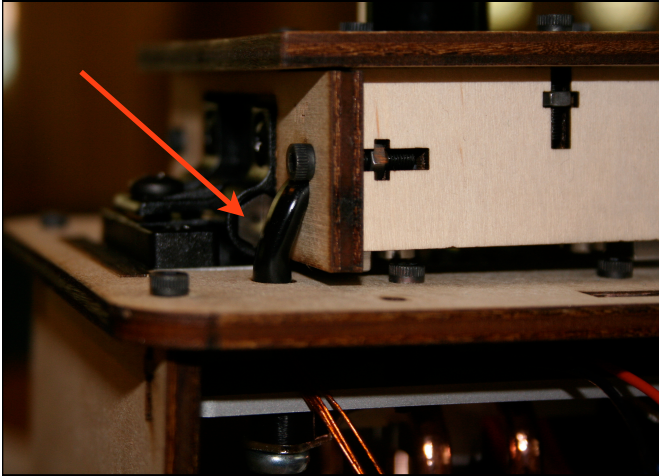
Route the 4 lid wires and black tubing into the round hole in the Top wood case. The labels should slide through. **If the labels don't slide through, take one off, put the wires through, and re-attach the label. Be sure not to mix up the "NTC" and "Power" wires.**

3



4

The rubber tube should look like this, with the wires going through it.



The Body

Find these parts:

Box #2 - The Laser Cut Case

- Right side (lots of holes/ports)
- Front
- Back (lots of holes)
- Bottom

Bag “e”

- 16mm thick black metal screws (4)
- Thick metal nuts (4)
- Clear Rubber feet (4)

Bag “f”

- Long black plastic screws (4)
- Black plastic nuts (4)
- 1/8” plastic spacers (3)
- 5/8” plastic spacer

Box #4 - The Brains

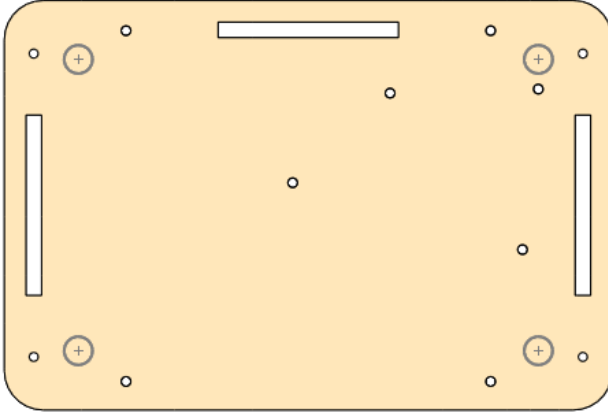
- OpenPCR Brains board
- Arduino UNO board

Tools: Allen wrench, micro philips head screwdriver, needle nose pliers (nice to have)

1

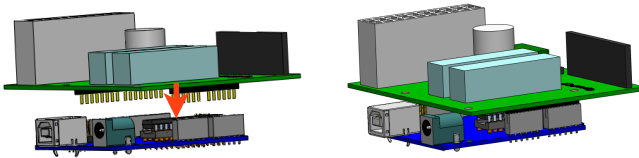
Take the paper off of all the laser cut parts.

Peel off the 4 rubber feet and attach to the Bottom case. There are black circles on the bottom plate to help place the feet.



2

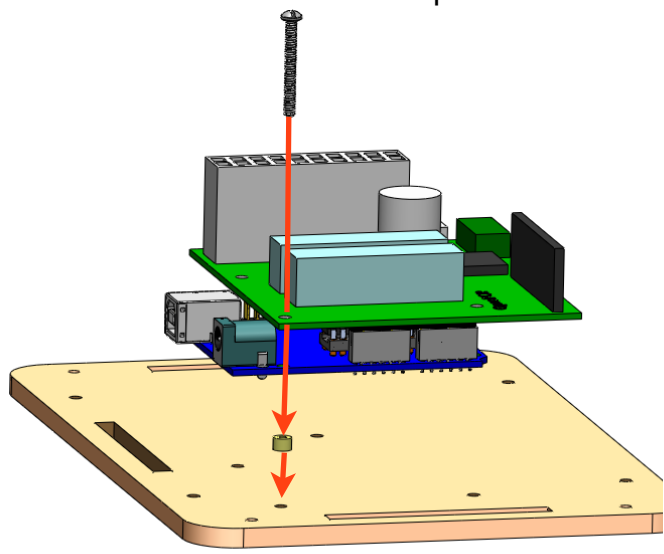
Connect the Arduino UNO (blue) and OpenPCR Brains board (green) as shown. Make sure not to bend any of the pins!



3

Flip over the Bottom case so the rubber feet are facing away from you. Use 3 black plastic screws to attach the circuit board assembly to the case. Use a 1/8" plastic spacer in between the Arduino and the case.

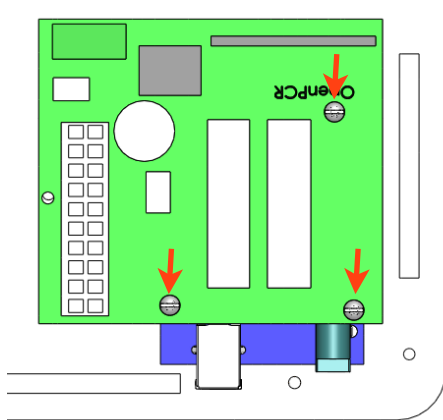
You'll add the nuts in a later step.



If you have needle nose pliers, use them to hold the spacers in place while you put the screws through.

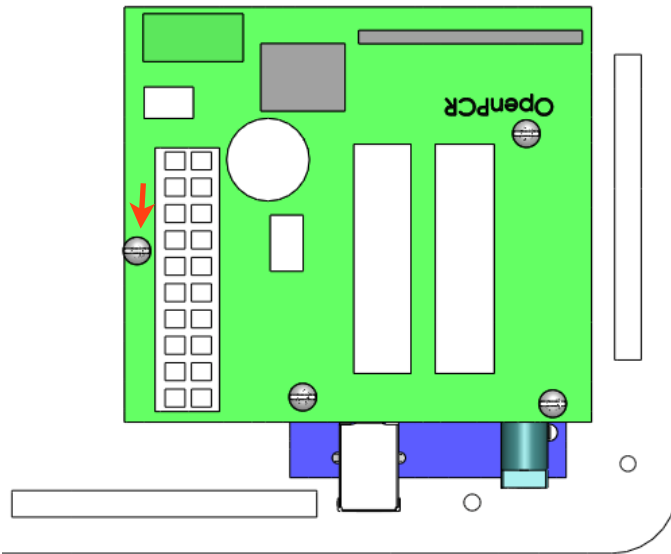
4

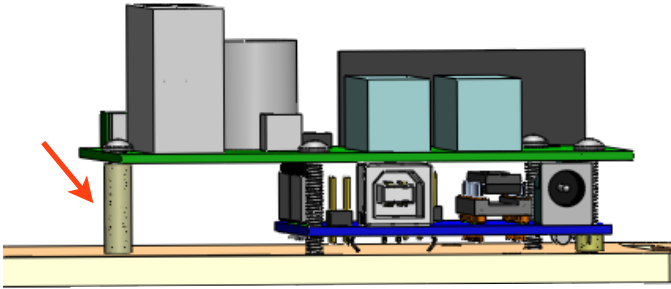
Repeat for the 3 screw-holes shown.



5

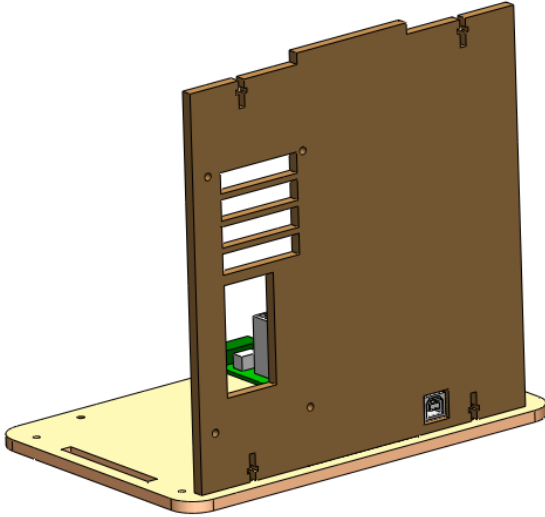
Use the last black plastic screw and the longer 5/8" plastic spacer for the last mounting hole.





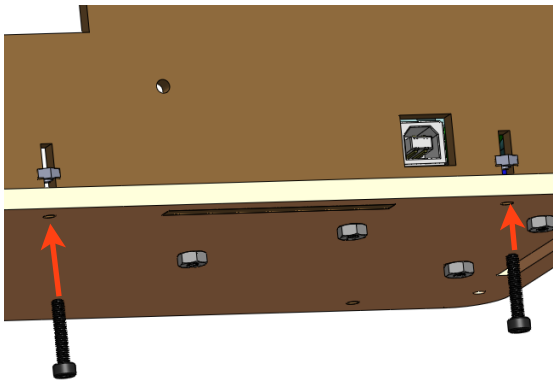
1

Slide in the Side with holes and screw it down. It will take a bit of wiggling to get past the USB port on the Arduino Uno. It should go in easily. Lift up the circuit boards a little bit to help, but careful not to lose the spacers.



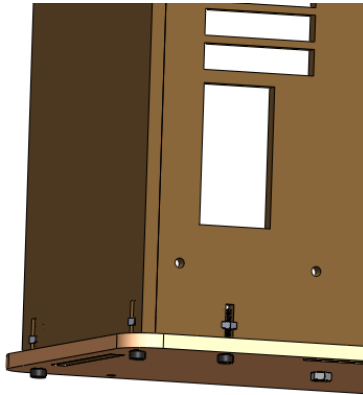
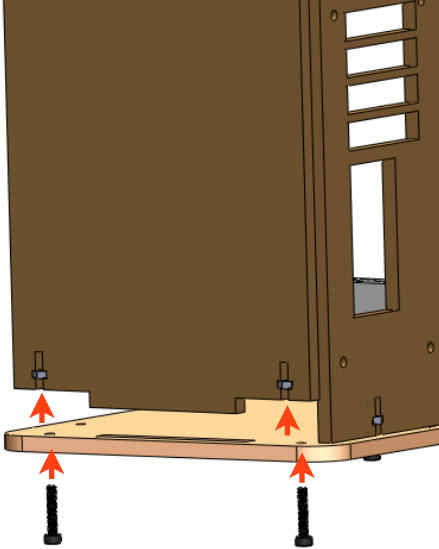
2

Add 4 black plastic nuts to lock the Brains board in place. Add 2 screws and nuts to the side.



Slide in the Front piece and screw it in.

3



Some tricky steps are coming up next. Now is a great time for a break!

The Body - Part 2

Find these parts:

Box #3 - Bag “f”

- Philips head short plastic screws (4)
- Big plastic clip

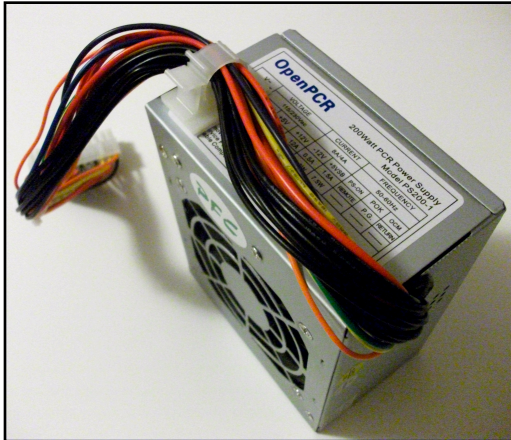
Bag #3 - Bag “e”

- 16 mm thick screws (2)
- Thick metal nuts (2)

Box #5 - OpenPCR Power Supply

1

Stick the big plastic clip to the power supply in the position shown, but not too close to the corner so the wires can wrap around. Route wires through clip.

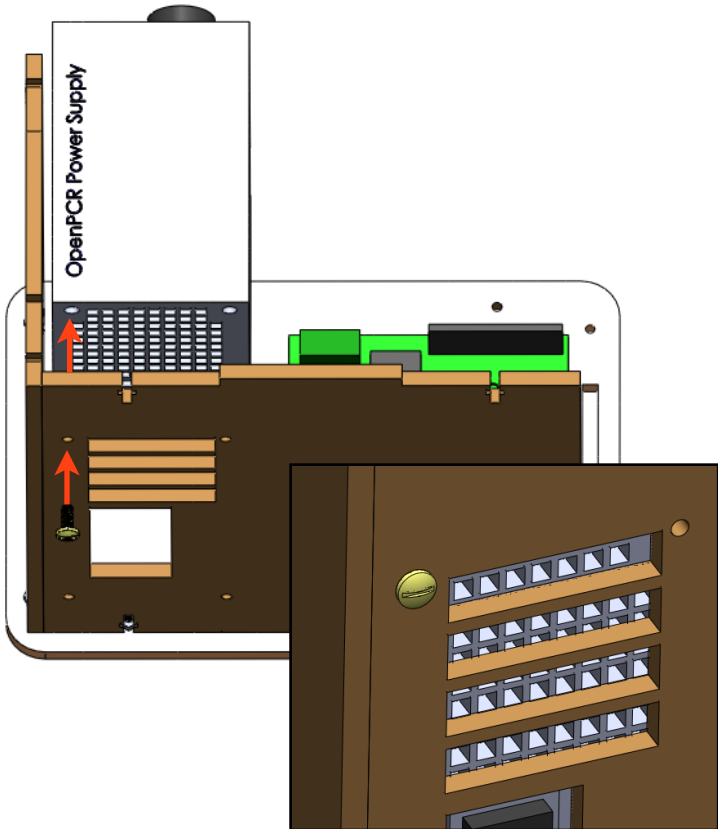


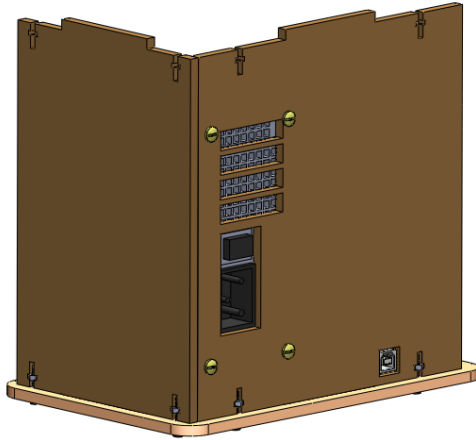
!

Set the red voltage switch for your country's power system. In the USA, this is 115 V. Other countries may require that you switch to the 230 V setting.

2

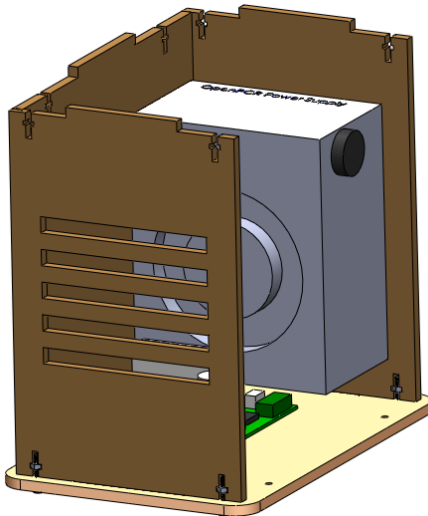
Using the 4 short plastic philips head screws, attach the OpenPCR Power Supply onto the side of the case. You'll need to lift the power supply up about 1 inch to get the screw-holes lined up. We recommend holding the Power Supply in place with one hand. Use your other hand to thread the screws. After you have all 4 screws connected use your screwdriver to tighten.





3

Use 2 screws and 2 nuts to attach the other panel. Pay attention to the “up” and “down” labels on the panel.

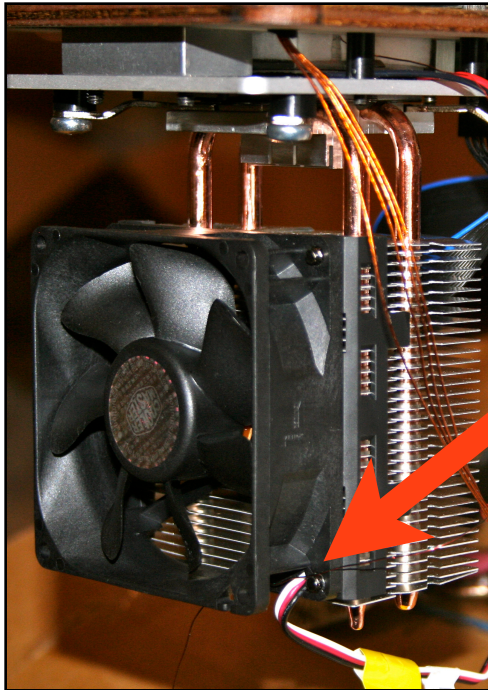


Connecting All the Wires

Tools: Tiny 2 mm flathead screwdriver, blue allen wrench

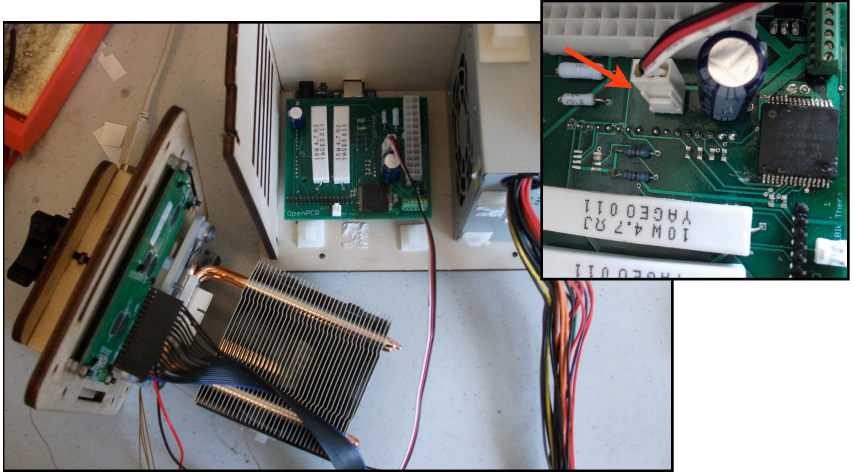
Find the fan cable (red, white, black) connected to the fan on the heat sink. Make sure the wires come out of the bottom right corner of the fan, as shown. If not, unclip the fan and rotate it so the wires are in the position shown.

1



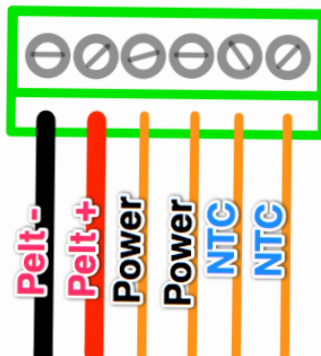
2

Remove tags from fan cable, and connect fan cable to the Fan port on the OpenPCR Brains board. (Move the Top assembly close to the Case assembly so the wires will reach.)



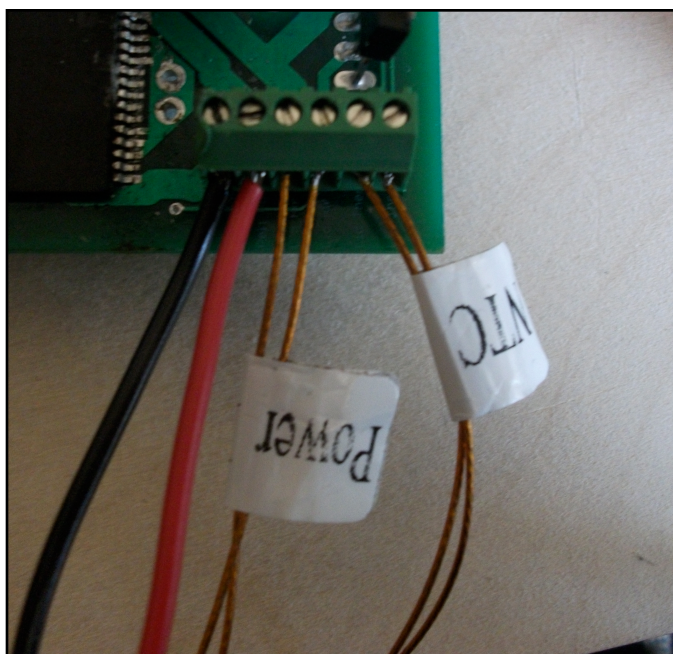
3

Connect the red and black Peltier heater wires as shown.



Use your 2 mm screwdriver to loosen the terminals (righty tighty lefty loosey). Hold each

wire in place and tighten the screw. Tug on each wire to make sure it is connected!



Connect the wires for the Lid Heater to the OpenPCR board. All 4 wires connect to the green terminal. The order is very important!

4

Use the labels to make sure the 4 wires are connected correctly. If they're not, the Lid heater may burn out the first time OpenPCR is connected to power.

5

Connect the OpenPCR Power Supply to the OpenPCR Brains board. **Be sure it is seated all the way! Numerous problems have resulted from close but not complete seating of the power supply connector!**



6

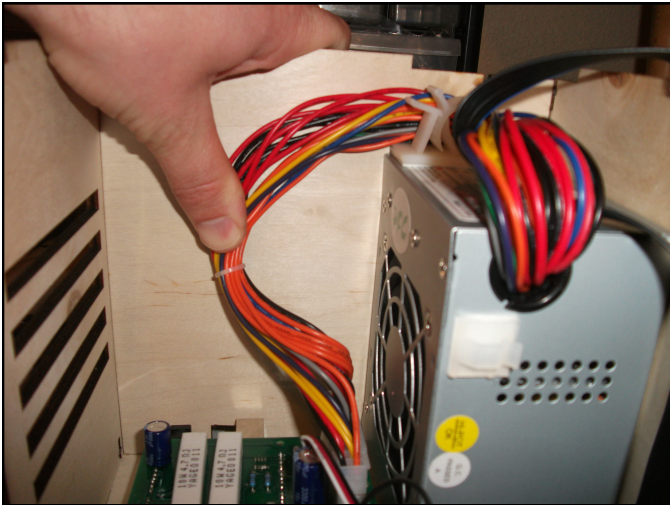
Pull the LCD wire under the Power Supply wires as shown. Leave it disconnected for now.



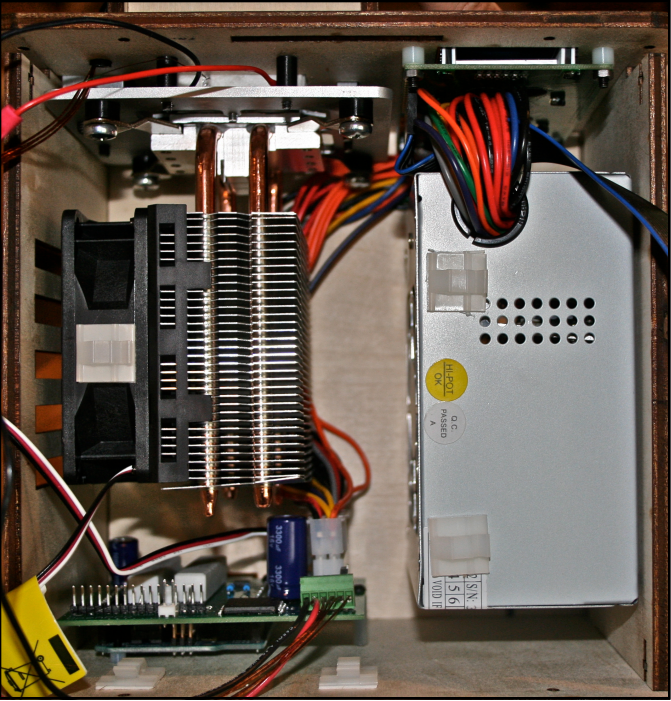
There's two wires remaining: one which connects to the the block temperature sensor, and the LCD cable. Leave them disconnected for now. Keep them away from the rest of the wires to make sure they do not snag or break.

Take the Core (Top + heat stack) that you built earlier and slide it onto the top of the case. The power supply wires should not block the fan on the front of the power supply (This will degrade the thermal performance of OpenPCR). Squish the wires between the side of the heat sink and case as you put on the Top.

7



Make sure the Power supply cable does not block the power supply fan



Routing the wires

Find these parts:

Box #2 - Laser cut case

- Left side

Box #3 - Bag “e”

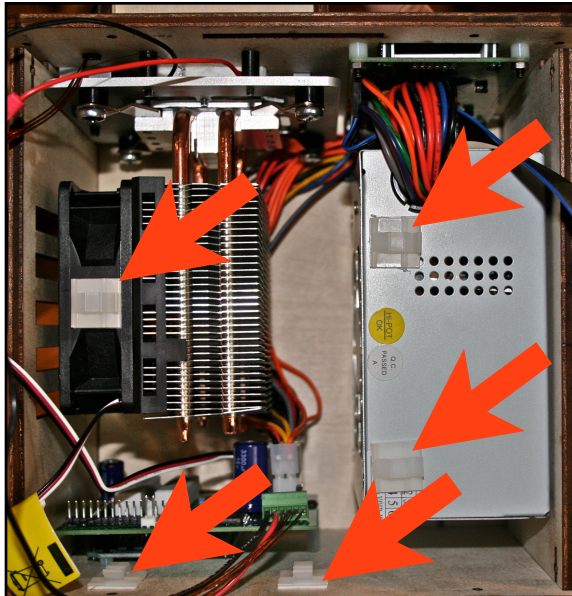
- 16 mm thick black screws (10)
- Thick metal nuts (10)

Box #3 - Bag “f”

- Plastic clips (5)

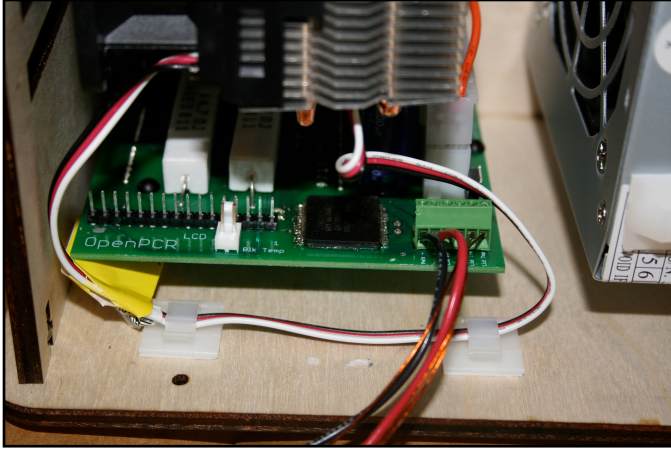
Stick the 5 plastic clips onto OpenPCR as shown.

1



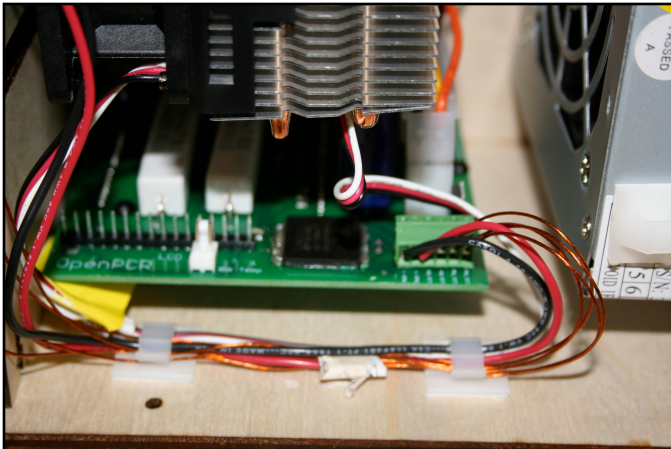
2

Put the fan wire (red, black, white) under the 2 clips shown.



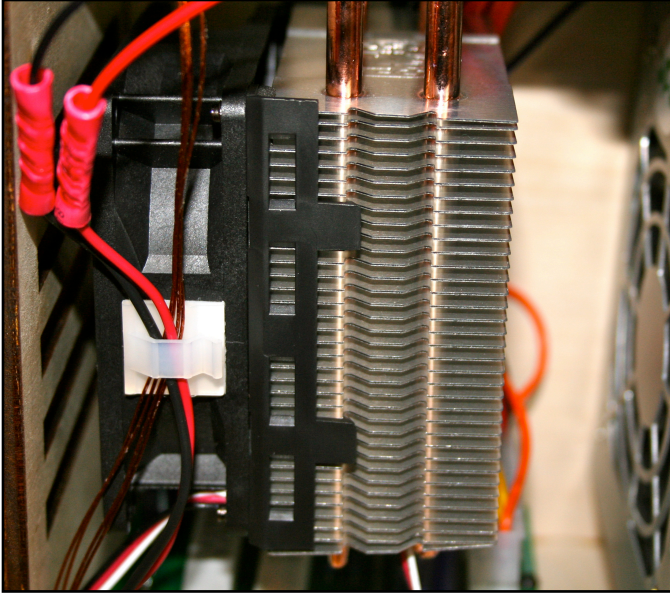
3

Add the 4 orange lid wires + red and black peltier wires to those clips.



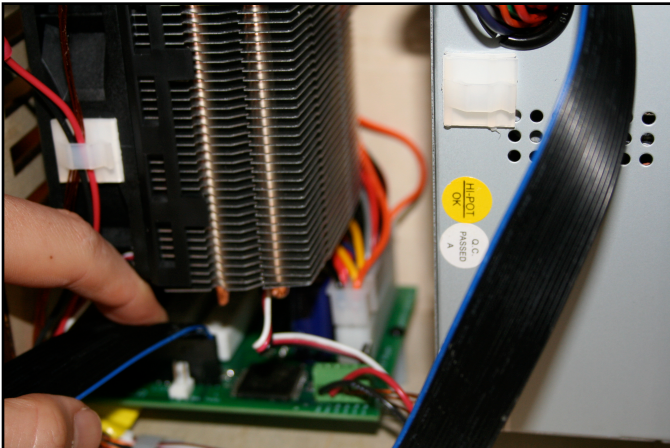
Clip the 4 tan lid heater wires + red and black peltier heater wires to the clip on the fan.

4



Plug in the LCD cable. The blue cable must be plugged in to pin #1, on the RIGHT as shown.

5



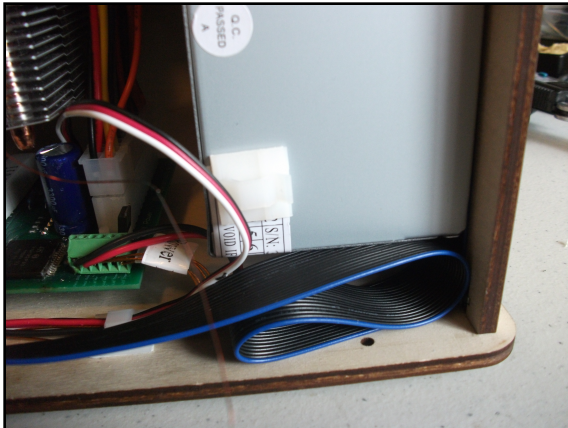
1

Push some of the LCD ribbon around the back of the OpenPCR power supply as shown



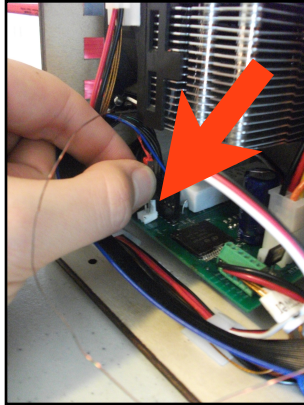
2

Make a loop in the LCD wire. Push it well underneath the OpenPCR Power supply.



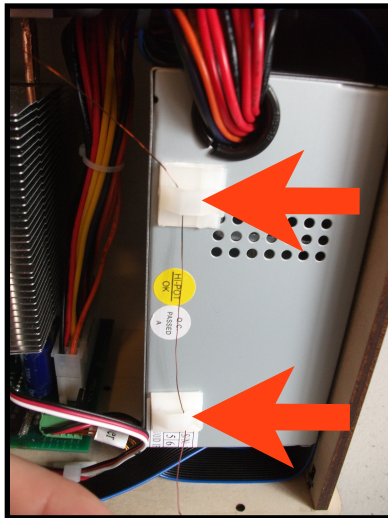
Plug in the heat block temperature sensor wire.
Your wire may be larger than that shown below.

3



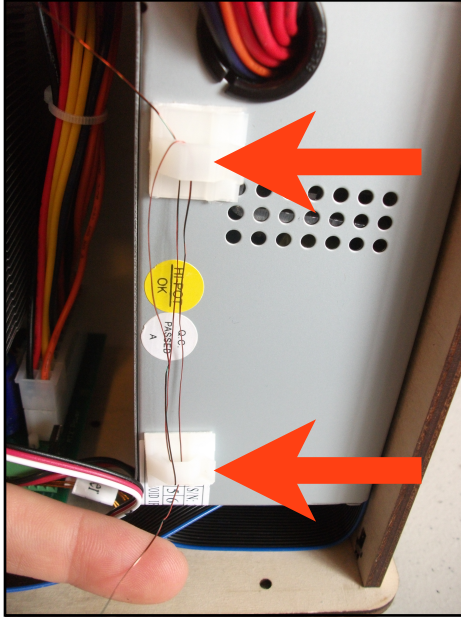
Wrap the heat block temperature sensor once
around the clips on the power supply.

4



5

Add one more loop to the clips.



Beautiful -- Like a Picasso



If the Power Supply wires are blocking the power supply fan, make sure to push them out of the way. The same applies to any other wires that might block OpenPCR's airflow.

Add 6 screws + nuts to the screwholes around the top of the case.



7

Put on the final side. Lock it in place with 4 screws and nuts.



Congrats, OpenPCR is done!



Power Test

Find these:

- Black power supply cable
- USB cable
- Your Mac or PC

No software is needed for this step

Find the black power supply cable, and plug OpenPCR into the wall.

1

Find the USB cable, and plug OpenPCR into your computer.

2

Flip OpenPCR's power switch and you should see the OpenPCR boot up on the screen. If it is hard to read the characters, you may need to adjust the LCD contrast using the software.

3

If you do not see OpenPCR boot up, unplug OpenPCR from USB and the wall outlet. Check that there are no loose wires. Visit openpcr.org/support for more help.

Start OpenPCR

1

Visit openpcr.org/start to install Adobe Air and the OpenPCR app

2

Connect OpenPCR to a wall outlet

3

Plug in OpenPCR to your computer's USB port

4

Switch on OpenPCR

5

Start up the OpenPCR App

No tubes or chemicals are needed for this test

Pre-Flight Test

Under “Re-run an experiment” you’ll see a drop-down list of experiments. Click on the list and select “A simple test”.

Click the “Re-run” button.

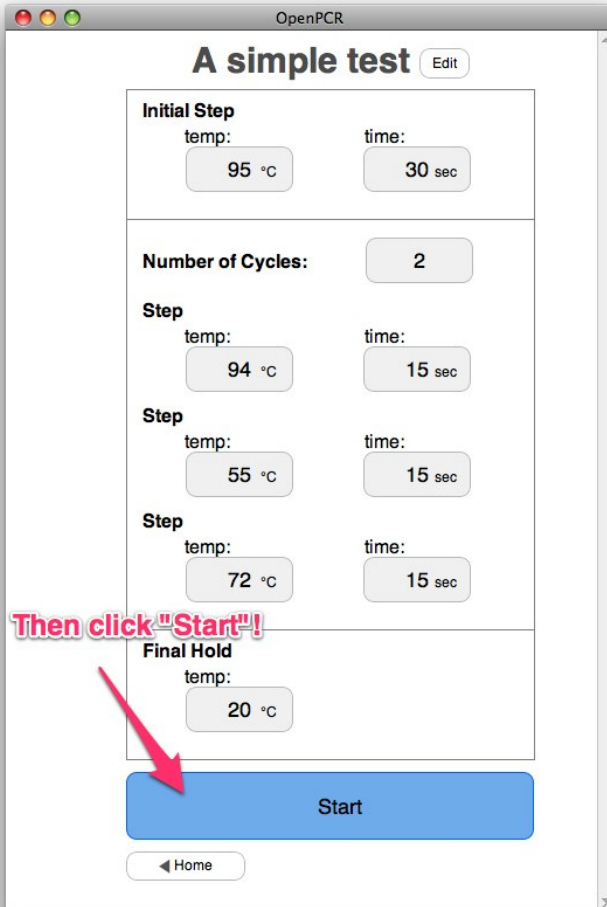


1

2

Now the full list of steps for this test are listed. Read through the test. The first step will heat OpenPCR to 95 degrees Celsius (203 degrees Fahrenheit) for 30 seconds. Then OpenPCR will do 2 cycles between 95 C, 55 C, and 72 C. Finally, OpenPCR will cool to 20 C and hold until it is switched off or stopped.

3



After reviewing the protocol click “Start”.
See “Plug in OpenPCR to Start” instead? Make sure OpenPCR is turned on and plugged in!

4

OpenPCR will begin to run the protocol. For about 30 seconds, the OpenPCR app will

display “Lid is Heating” screen while the lid heats up to 110 C. In the lower right you can monitor the lid temperature. Next, OpenPCR will hold the block at 95 C for 30 seconds. Did the block heat to 95 C?

5

Watch the block temperature at 95 C closely. You should see very little variation in the temperature.

6

A few minutes later, OpenPCR will begin cooling down to 20 C. One easy benchmark is how quickly your OpenPCR is able to cool down from 72 C to 20 C.

7

You’re all set! Click the “Stop” button to turn off OpenPCR.

8

Your First Experiment

Now add your own protocols to OpenPCR!

1

From the Home screen, click “Add a new experiment”



2

You'll see a blank protocol screen for a 3-step amplification. You can fill in your temperatures, times, and number of cycles, as shown on the next page.

New Experiment

Number of Cycles:	<input type="text" value="35"/>
Denaturing	
temp:	time:
<input type="text" value="95 °C"/>	<input type="text" value="30 sec"/>
Annealing	
temp:	time:
<input type="text" value="65 °C"/>	<input type="text" value="30 sec"/>
Extending	
temp:	time:
<input type="text" value="72 °C"/>	<input type="text" value="30 sec"/>
Final Hold	
temp:	
<input type="text" value="4 °C"/>	

To add steps, delete steps, and more, click the
"More Options" button

3

Add, Delete, and Hold Steps

The screenshot shows a PCR protocol configuration interface with several sections highlighted by colored borders:

- Heated Lid:** A pink border surrounds the "Heated Lid" label and a numeric input field containing "110".
- Initial Step:** A blue border surrounds a section starting with a plus icon and the text "Initial Step".
- Cycle Steps:** A green border surrounds a section containing:
 - "Number of Cycles:" with a numeric input field set to "35".
 - "Denaturing" with a minus icon, "temp:" input field set to "95 °C", and "time:" input field set to "30 sec".
 - "Annealing" with a minus icon, "temp:" input field set to "65 °C", and "time:" input field set to "30 sec".
 - "Extending" with a minus icon, "temp:" input field set to "72 °C", and "time:" input field set to "30 sec".
 - A plus icon and the text "Step" at the bottom of the section.
- Final Step:** An orange border surrounds a section starting with a plus icon and the text "Final Step".
- Final Hold:** A purple border surrounds a section containing:
 - "Final Hold" with a minus icon.
 - "temp:" input field set to "4 °C".
 - A "Less options" button at the bottom right.

- A.** Temperature of the heated lid. By default it's 110 °C. Setting the lid to "0" turns OFF the heated lid
- B.** Add an "Initial Step" such as an initial denaturing step
- C.** Cycle steps
- D.** Add a "Final Step" such as final extension
- E.** Hold this temperature indefinitely after the protocol is done

Set up the Heated Lid

OpenPCR's heated lid eliminates condensation in your PCR tubes. But you need to set it up first!

The black lid knob raises and lowers OpenPCR's heated lid. To set your heated lid, unscrew the knob *counter-clockwise* all the way. Open the lid and put several empty PCR tubes into OpenPCR's tube block.



Now close the lid and screw the lid knob *clockwise* to lower the heated lid. Watch the heated lid carefully as you screw down the knob. The front of the lid will start to lift up when the heated lid is at the proper height.



Add a drop of water to an empty PCR tube, place it in OpenPCR, and run a PCR experiment for a few cycles. After a few cycles, open the lid and check that there's not much condensation on the top of the tube.



Once you set the height of the heated lid, you shouldn't need to adjust it unless your lab switches to a new brand of PCR tubes!



Run PCR without a computer

Running workshops, demos, or repeating the same PCR protocol over and over again? Start your protocol once, and OpenPCR will repeat it without being connected to your computer!

Here's how!

With OpenPCR plugged into your computer, start the protocol you want to repeat. Once it's running, simply unplug OpenPCR from your computer (without hitting Stop). Switch OFF OpenPCR, count to 10, and then switch ON OpenPCR. Now your protocol will begin running whenever OpenPCR is turned on.

When you want to program OpenPCR with a new experiment, simply connect OpenPCR to your computer with a USB cable. Switch ON OpenPCR and start up the OpenPCR App. OpenPCR will be in "Ready" mode for you to send over a new experiment.

More Questions?

Looking for more information about how to get OpenPCR to run your protocol?

Running PCR for the first time and have questions about DNA?

Other questions? Come visit us at:

openpcr.org/forum

Or you can privately email us for help at:

support@openpcr.org

Keeping OpenPCR Healthy

Here's a few tips

- OpenPCR is a sensitive electronics instrument. Keep all liquids away from OpenPCR. If liquids are spilled on OpenPCR, immediately unplug OpenPCR directly from the wall outlet.
- Avoid dropping OpenPCR as this may damage the electronics and laser cut case
- When transporting OpenPCR, make sure the heated lid is latched in place. Be sure to let OpenPCR return to room temperature before transporting.
- When a friend or colleague borrows OpenPCR, be sure to let them know about these guidelines.

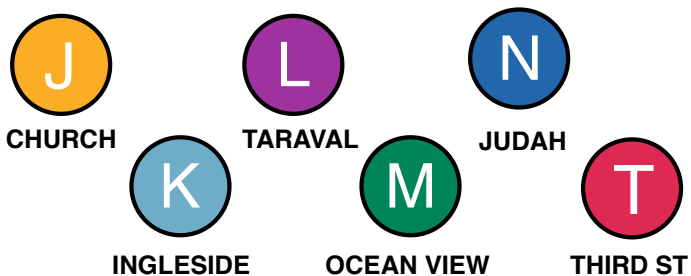
Disclaimer

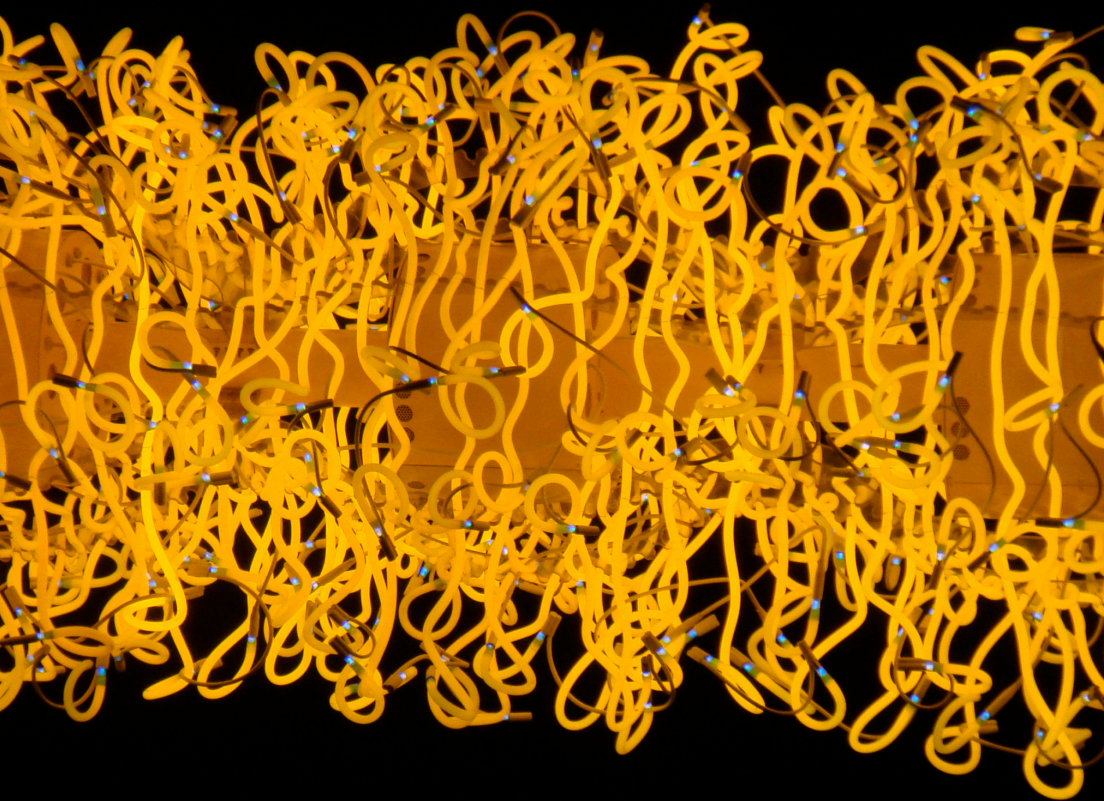
We are not responsible for damages, injuries, deaths, or other ill effects arising from proper or improper use of or assembly of the OpenPCR components. To the fullest extent permissible by the applicable law, we hereby disclaim any and all responsibility, risk, liability, and damages arising out of death or personal injury resulting from assembly of or operation of this kit.

OpenPCR Instructions version 1.2 9/13/2012

Many thanks to everyone who helped OpenPCR happen!

And to the San Francisco Muni for inspiring the color scheme of these instructions.





OpenPCR
Saratoga, California