DARKMATTER

Kit Assembly Guide

The Darkmatter Xbox Laptop has been in the works for a couple of years now and was successfully crowdfunded and launched on Kickstarter in June 2013. The development was carried out by Techjango and the kits & assembled units are stocked on the Techjango estore: http://store.techjango.com

The kit allows you to convert a standard Xbox 360 (Slim) console into a fully functioning Darkmatter Xbox Laptop with a built in display and capacitive touch based controls. The kit includes all the parts (minus some tools) required to build an Xbox laptop from scratch. An Xbox 360 console, screwdrivers, set of files, soldering station, solder and a weekend's worth of free time is all that is required in addition to the kit to build one.

This assembly guide covers all the steps required to build the Darkmatter laptop. Every step is explained with pictures and accompanying text to make the assembly process simple and an enjoyable experience for anyone with little or no prior knowledge of gaming systems. However, if at any stage you need help or assistance please feel free to post your concerns on the Darkmatter forum on http://community.techjango.com or email us at info@techjango

Darkmatter is an open source hardware/software project. For links to design files, source code, examples, wiki, support and additional resources please visit http://techjango.com/darkmatter

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Caution!
The kit contains small and sharp objects. Please exercise proper care when carrying out soldering work on the kit and while assembling it. Keep parts out of reach of small children. Older children and teens may require adult assistance.

Before we begin: The Bill of Materials (BOM)

The kit comes with a printed bill of materials sheet which details all the parts you should expect to find in the kit. Quantities are also mentioned against each part. Please take some time to verify that you have everything you need before you commence the build. In the unlikely event that a kit is missing a part or two or any parts are defected, please notify us immediately and we'll ship you replacements. Note that the exact contents of each kit may differ between different versions of the Darkmatter laptop.

#1	Lower Side Support (3D printed)	4
#2	Lower Middle Support (3D printed)	3
#3	Lower Hinge Support (3D printed)	2
#4	Ring of Lights Board Holder (3D printed)	1
#5	DVD Side Support (3D printed)	1
#6	DVD Rear Left Support (3D printed)	1
#7	DVD Rear Right Support (3D printed)	2
#8	Fan Nozzle (3D printed)	2
#9	Fan Duct (3D printed)	2
#10	Upper Hinge Support (3D printed)	2
#11	Upper Side Support (3D printed)	4
#12	Upper Middle Support (3D printed)	4
#13	Front Panel (Laser Cut)	1
#14	Left Panel (Laser Cut)	1
#15	Right Panel (Laser Cut)	1
#16	Rear Panel (Laser Cut)	1
#17	Casing Bottom Panel (Laser Cut)	1
#18	Casing Top Panel (Laser Cut)	1
#19	Fan Support Panel (Laser Cut)	1
#20	Lid Middle Panel (Laser Cut)	1
#21	Lid Bottom Panel (Laser Cut)	1
#22	Lid Top Panel (Laser Cut)	1
#23	DVD Cover (Laser Cut)	1
#24	16mm M3 Hex Standoff	1
#25	6mm M3 Hex Standoff	2
#26	6mm M4 HexStandoff	9
#27	22mm M3 Hex Standoff	4
#28	Adjustable Friction hinge	2
#29	M3 Hex Nuts	2
#30	M4 Hex Nuts	66
#31	M3 x 20 Countersunk Screw	16
#32	M3 x 6 Countersunk Screw	3
#33	M3 x 12 Countersunk Screw	30
#34	M3 x 8 Countersunk Screw	2
#35	M3 x 10 Countersunk Screw	30
#36	M4 x 6 Countersunk Screw	13
#37	M4 x 16 Pan Head Screw	4
#38	M4 x 20 pan head screw	4
#39	SATA Cable for DVD	4
#40	RGB LED Strip	
#41	Wire (Braided Core)	3
#42	Wire (Shielded Core)	
#43	Laptop Speaker	
#44	Xduino360 Board	2
#45	Mpr121 Breakout Board	1
#46	USB/Audio Breakout Board	1
#47	Laptop Blower Fan	1
#48	Cooling Duct	2
#49	Cable Ties	2
#50	HDMI Custom Cable	5
#51	Display Panel	1
#52	Display Driver Board	1
#53	5V Regulator	1
#54	Allen keys	1
#55	Plastic film	
#56	Common Pins for electrodes	
#57	BOM Sheet	5
#58	Instructions sheet	1
#59	Heat shrink tubing (1mm)	1
#60	Heat shrink tubing (2mm)	
#61	Epoxy Glue	
#62	Super Glue	
#63	RTV Silicone sealant	
#64	Fabric Tape	1
#65	Masking Tape	1
#66	Dual Tape	1
#67	Logo (Laser Cut)	1

Throughout this assembly manual we refer to kit parts and components by their line number on the bill of materials. As an example, #1 is the 3D printed Lower Side Support for the Darkmatter casing.

Step 1: Tools and Supplies Checklist

1) Screwdriver

Any standard Philips head screwdriver would do. Many of the assembly steps involve the use of a screwdriver so a number of different sizes would come in handy.

2) Set of files

3D printed parts usually have a rough, ridged appearance to them which need some light sanding before they can be used. Files will aid in leveling rough edges and surfaces during assembly

3) Soldering Station and Solder

This is a must for soldering work required to hook up the Xbox console motherboard to other electronic bits and pieces of the kit. Any soldering iron would do and a temperature controlled station is recommended but not a must.

4) Computer and Internet Access

A laptop/PC would be useful should you wish to re-program the Xduino360 board. The latest Arduino IDE can be downloaded from http://arduino.cc. Darkmatter resources, source code, support and documentation (including this manual) can be accessed on the Techjango website: http://techjango.com

5) Wire Strippers/Cutters

Needed for soldering work on the Xduino360 board and the Xbox 360 motherboard.

6) Xbox Disassembly Tools (optional)

If you're so inclined… these are available from ifixit, amazon and other online retailers.

7) Hot Air Rework Station (optional)

Only go this route if you're experienced with soldering rework.

Let's jump right in, then!

Step 2: Xbox teardown!

Contrary to popular belief, disassembling the Xbox is not difficult at all and no special tools are necessary. However if you're so inclined you can easily find specialist tools online on ifixit or amazon. Since there are a ton of resources on this subject we thought it best to skip directly to the Darkmatter casing assembly and leave you with these detailed guides and videos:

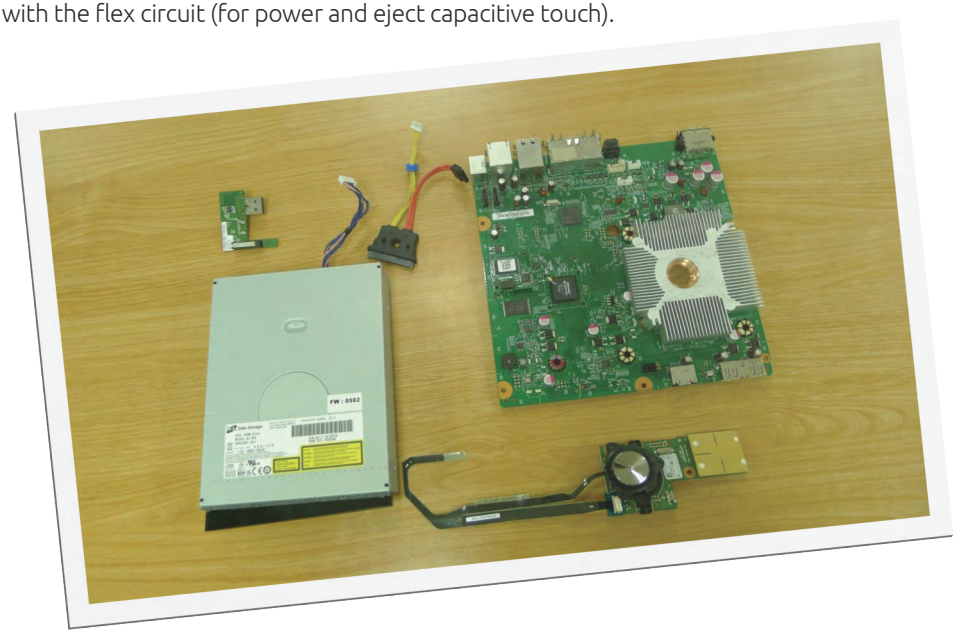
Ifixit:
http://www.ifixit.com/Device/Xbox_360_S

Youtube:
www.youtube.com/watch?v=Fp5O1uKGqB0

Techrepublic:
http://www.techrepublic.com/pictures/xbox-360-s-2010-teardown/

Forum threads:
http://team-xecuter.com/forums/showthread.php/61651-Disassembling-the-Xbox-360-Slim

Once done disassembling the console you should be left with the following bits and pieces. Feel free to chuck out the rest of the guts of the Xbox. The parts we would be using include the DVD drive, Wifi board, HDD connector, Xbox Motherboard and the ring of lights board with the flex circuit (for power and eject capacitive touch).



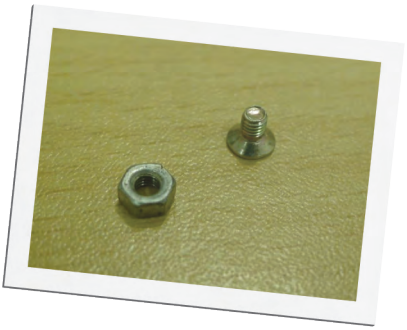
We'll come round to these parts in a bit. For now, we'll start off with assembling the casing for the laptop.

Step 3: Bottom Casing Assembly

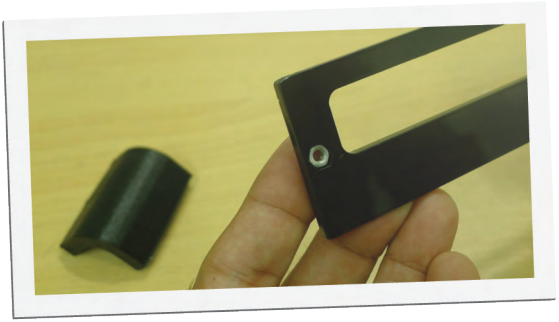
We start off with the 3D printed Lower Side Support, part #1 on the BOM. Four of these come with the kit and attach to laser cut panels to form the bottom half of the laptop which will house the motherboard and various other bits and pieces.

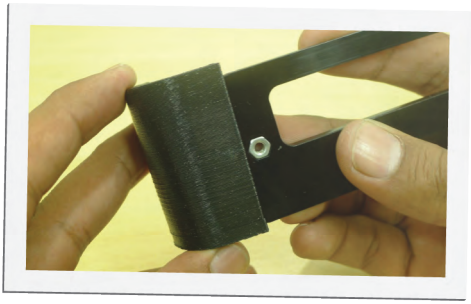
It is common for 3D printed parts to have a rough ridged surface which results from the printer laying out the part layer by layer on top of each other. Use a file to even out areas of the part which will come in contact with the laser cut acrylic panels of the laptop.

You will attach this part with the laser cut Front Panel, part #13 using an M3 x 6 Countersunk Screw, part #32 and an M3 Hex nut, part #29 in the BOM using Allen keys, part #54, that come with the kit.



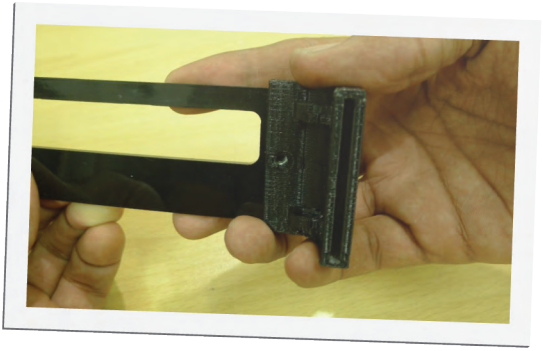
Slip the M3 Hex nut in the cutout near the left edge of the front panel. These hexagonal shaped cutouts in the laptop panels hold the M3 hex nuts in place. Now hold the Nut in place while you slip one edge of the 3D printed Lower Side Support over the panel. If the panel doesn't slip easily within the Side Support part try sanding the inside recess to level out any surface roughness or residual support material that may be left on the part after the 3D printing process.

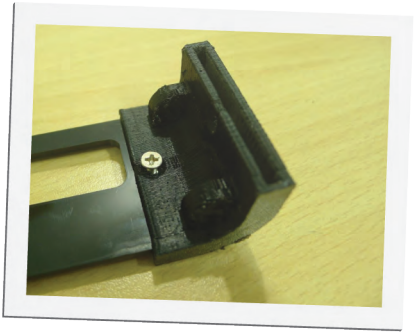




Press fit the part carefully until the hole aligns with the hex nut. Insert an M3 x 6 countersunk screw and tighten.

Do not over tighten as this may crack the 3D printed part.

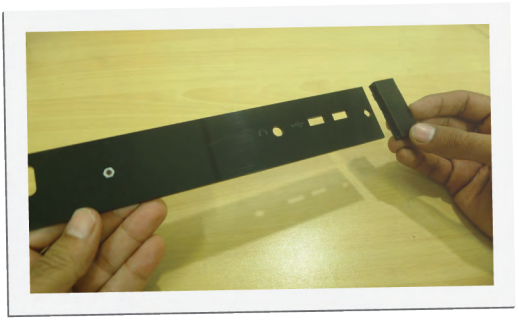


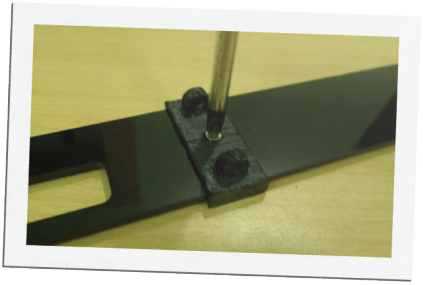


The Lower Middle Support, part #2, will be attached next. Three of these come with the kit.

Slip another M3 Hex Nut in the middle cutout of the Front Panel and gently slide the Lower Middle Support on to the panel over the hex nut. Align the hole in the 3D printed part with the hex nut and insert an M3 x 6 screw and tighten.

Do not over tighten as the 3D printed part could crack under stress.

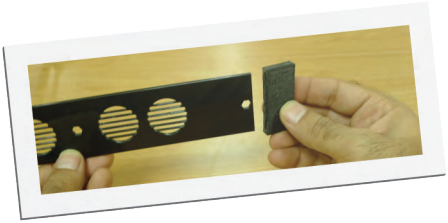




Now we'll attach another Lower Side Support, part #1, with the Front Panel in the same manner as the first one.

Next we'll attach the Right Panel, part #15, to this assembly. With the front panel assembly facing you, attach the Right Panel to the Lower Side Support on the right of this assembly. Again, an M3 x 6 and M3 hex nut will be used.

If it's a tight fit or the panel won't slide in easily, sand the inside cavity of the Lower Side Support lightly with a file.



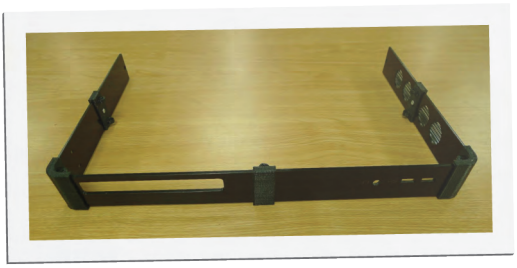
Another Lower Middle Support, part #2, will now be attached to the Right Panel using an M3 x 6 Countersunk screw and a M3 Hex Nut.

Hold the hex nut in place in the cut out in the middle of the panel while you slide the part over it until the hole aligns with the hex nut. Insert the M3 x 6 screw and tighten it using an Allen key.

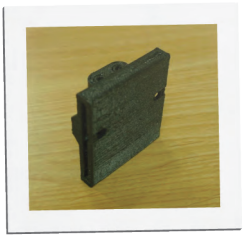
Next we'll fix the Left Panel, part #14, to this assembly. This will get attached to the Lower Side Support part on the left when the assembly is viewed from the front. Follow the same procedure we used for the Right Panel. An M3 x 6 Countersunk screw and a Hex Nut will be needed.

When viewed from the front as in the picture to the right, the right end of the Left Panel will be fixed to the Lower Side Support part. This end is where the countersunk bore is closest to the edge of the laser cut Left Panel.

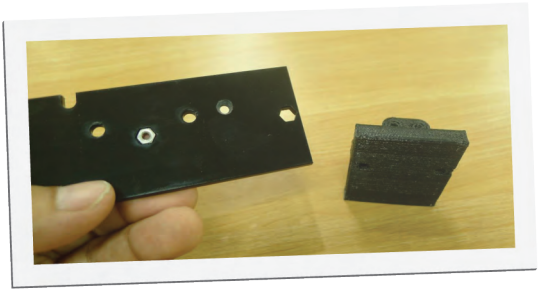
Now we'll use another Lower Middle Support, part #2, for the Left Panel. The procedure is the same as the one we followed for the Right Panel. Lightly sand the insides of this part if the part won't slide in with ease.

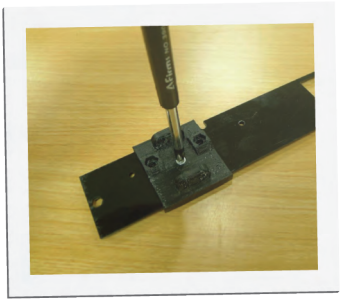


We'll now need two Lower Hinge Supports, part #3, and the laser cut Rear Panel, part #16, for the next few assembly steps.

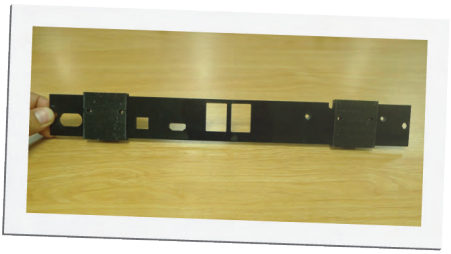


Starting from the right end of the panel, slip an M3 Hex Nut, part #29, in the cutout as shown above and slide the Lower Hinge Support onto the panel until the hole aligns with the Hex nut. Insert an M3 x 6 Countersunk Screw, part #32, and tighten the screw into the hex nut through the Lower Hinge Support part.



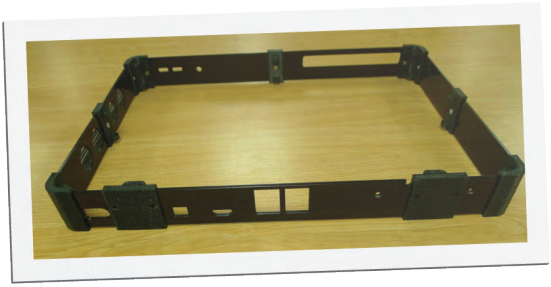


Do the same for the other end of the Rear Panel where another Lower Hinge Support part will be attached. The two holes on either side of the Hex Nut cut out on the Rear Panel should align perfectly.



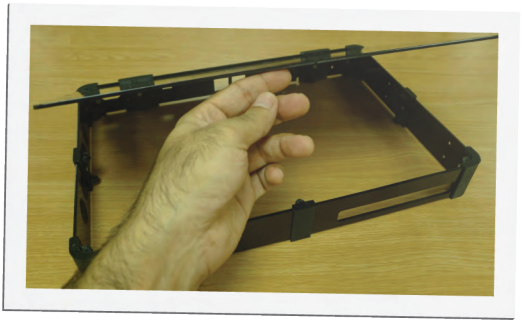
The Rear Panel assembly will now attach to the previous subassembly. Gently slide each end of the Rear Panel into the respective Lower Side Support parts. Use a file to increase clearance within the cavities for the laser cut panel to slide in, if required.

M3 x 6 Countersunk Screws and M3 Hex Nuts will be used to fasten the panel with the rest of the assembly.



With the side panels all fastened together we'll move now to the top and bottom panels.

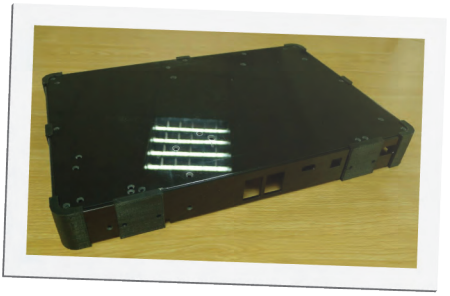
This is the Casing Bottom Panel, part #17, that will be attached to the bottom part of the assembly. Note that countersunk boring is done on one side of the sheet.



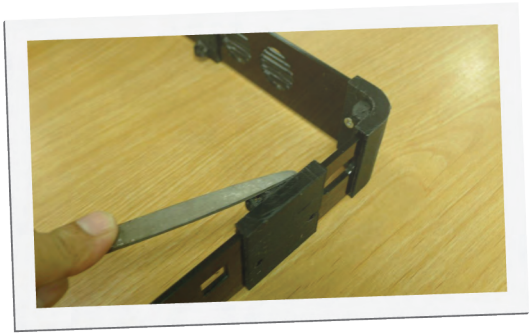
This side with the tapered holes will be kept towards the outside of the assembly as shown below.

Turn the subassembly over and place the sheet above it with the countersunk bores on the outside.

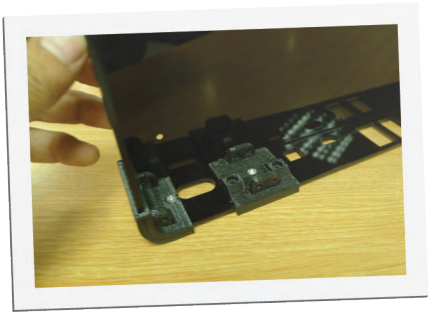
Press fit the sheet in place. You may need to nudge it around a bit to snap it in place.



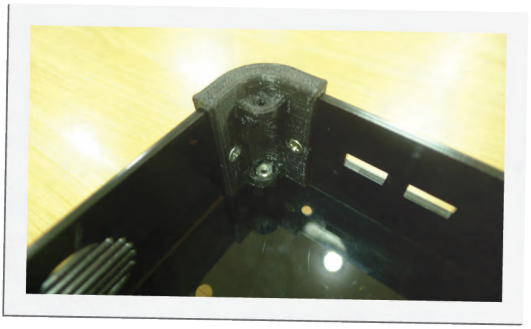
The Casing Bottom Panel should now be flush with the edges of the laser cut side panels. The panel rests on top of the ridges in the 3D printed side and middle support parts. The holes in these ridges should align with the holes in the Bottom Panel. You may find that in some areas the sheet isn't level with the side panel edges. Don't fret, this is an easy fix. Remove the sheet and sand the ridges lightly near the point where you find this anomaly.



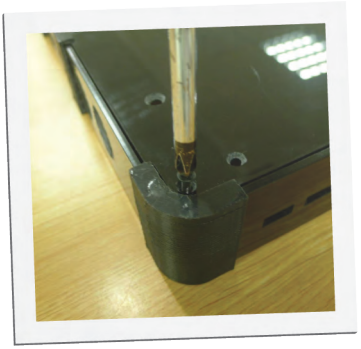
Place the sheet again to check if it's level with the edges. If so, carry on to the next step otherwise sand the ridge some more until the required depth is achieved.



Now turn the assembly over and take a look at the 3D printed side and middle support parts. The support ridges on which the Casing Bottom Panel is resting have cavities to hold Hex Nuts in place.



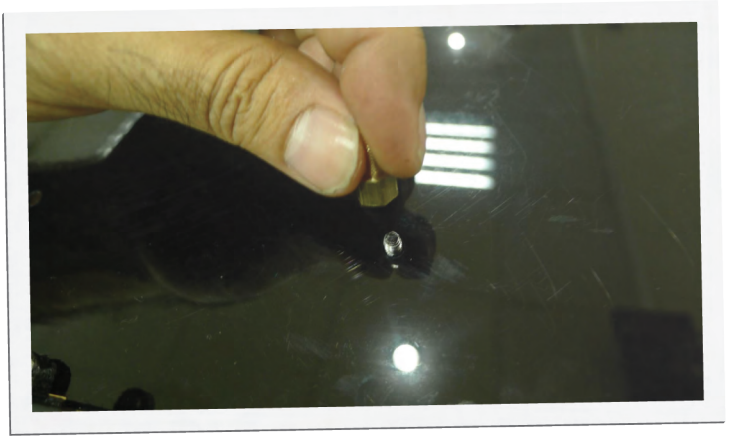
We'll now place M3 Hex Nuts, part #29, within these cavities. Press fit these Hex nuts in all the side and middle support parts, applying appropriate pressure.



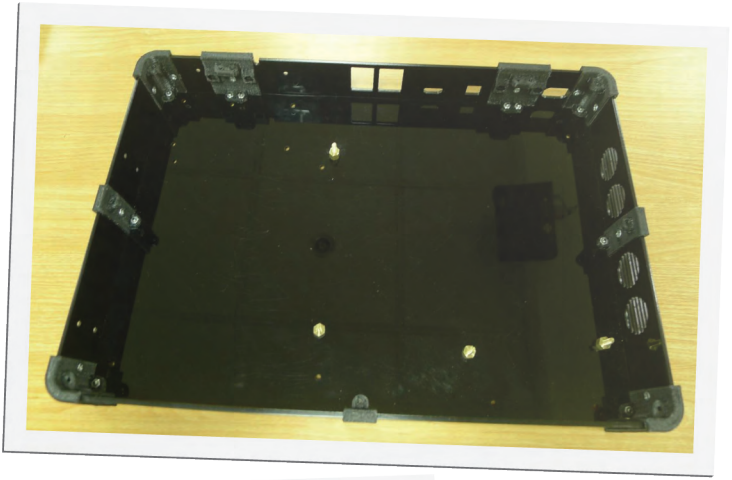
Flip the assembly over. We'll need M3 x 8 Countersunk screws, part #34, to fasten the Casing Bottom Plate to the hex nuts placed earlier. Fasten these screws to all the 3D printed side and middle support parts using an allen key or a screwdriver.

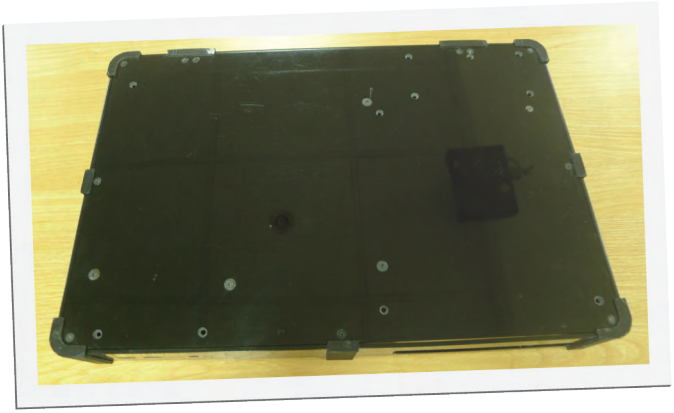
Take four 6mm M4 Hex Standoffs, part #26, and four M4 x 6 Countersunk Screws, part #36, and locate four 4mm size holes on the Casing Bottom Plate. These are easy to spot as they are slightly larger than the rest of the screw holes on the panel.

Place the standoffs on the inside of the casing directly above the 4mm holes and slip the M4 x 6 screws under the Bottom Plate through these holes. Fasten the screws in these standoffs.



This is what the casing should look from the top with these four M4 standoffs in place:

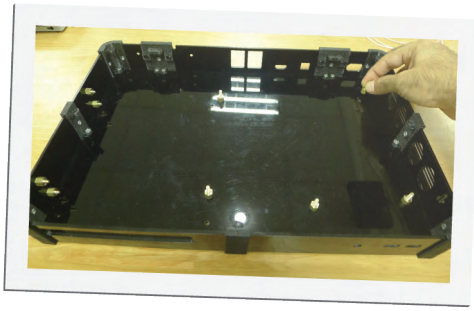


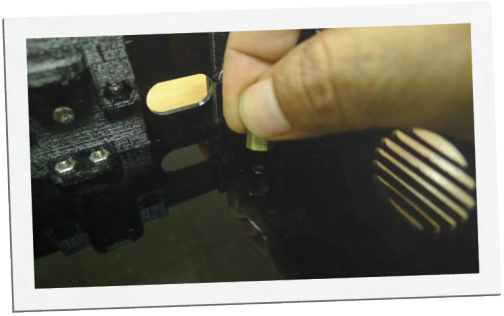


And this is what the bottom will look like with the four M4 screws holding the stand offs in place.

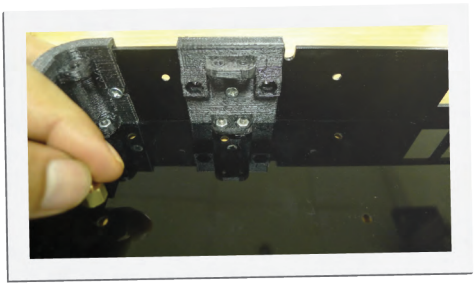
Moving on, we'll now fasten five 6mm M3 Hex Standoffs, part #25, to the bottom plate using M3 x 6 countersunk screws, part #32.

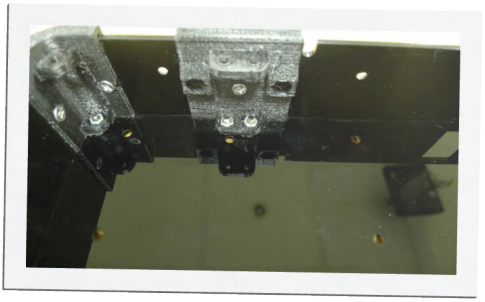
Place one of these standoffs on the M3 size hole near the top left corner of the bottom plate when viewed from above. Slip the M3 x 6 screw through the hole from under the bottom plate and fasten it.



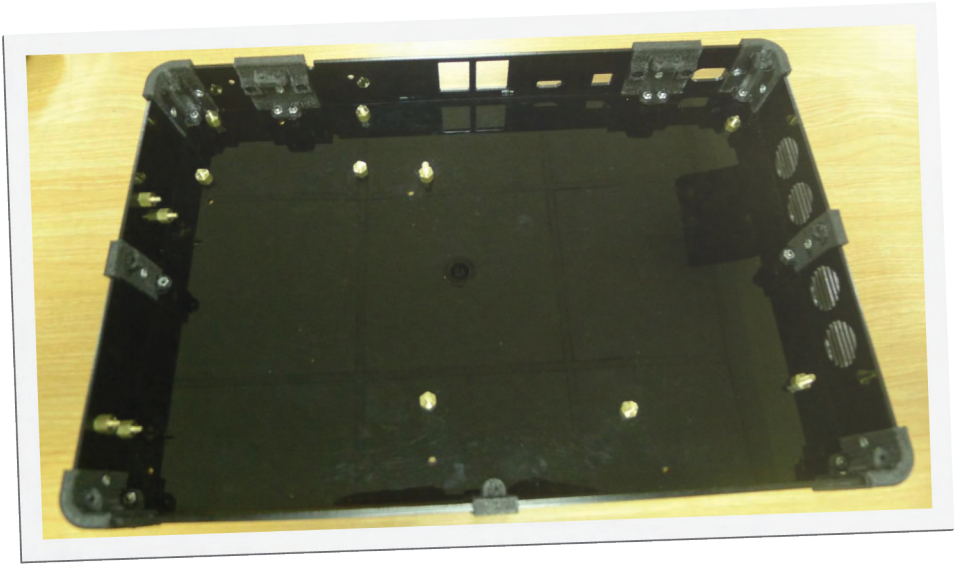


Now locate four M3 size holes near the top left corner of the bottom plate. Four of the 6mm M3 Stand offs will be fastened to these holes. M3 x 6 screws will again be used here.





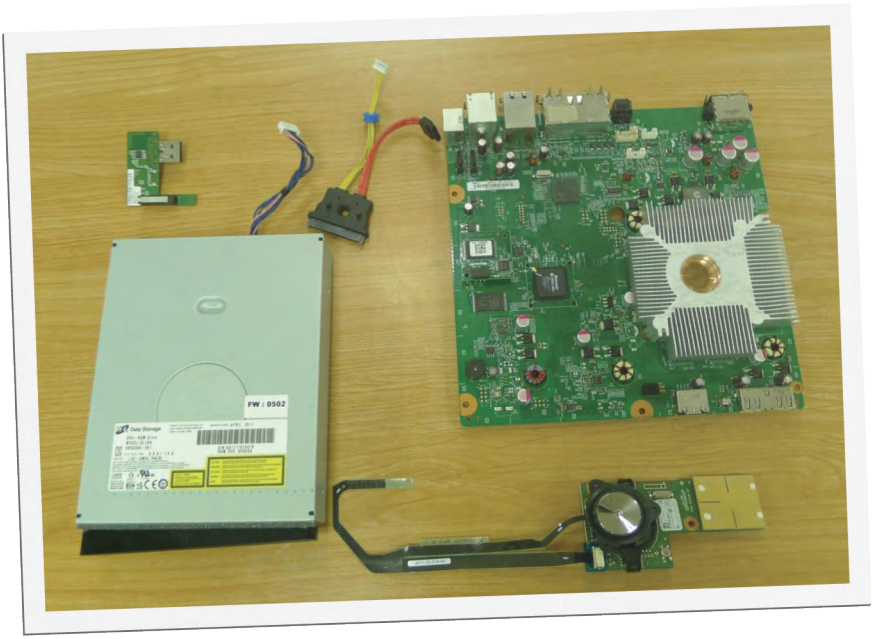
This is what the assembly will look like from the top with these standoffs in place:



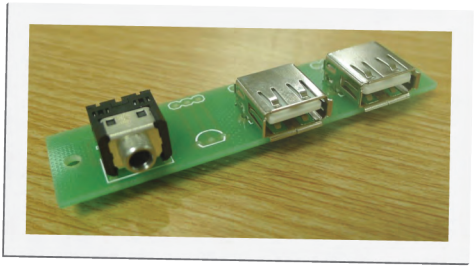
Step 4: Motherboard Soldering

For the following steps you would require a soldering station and solder wire. Wire strippers and cutters and other soldering tools will also come in handy.

In this step we'll be working with the Xbox motherboard, Ring of lights board (and accompanying flex circuit), Wifi board, DVD drive and the HDD connector that we salvaged earlier from our Xbox console:

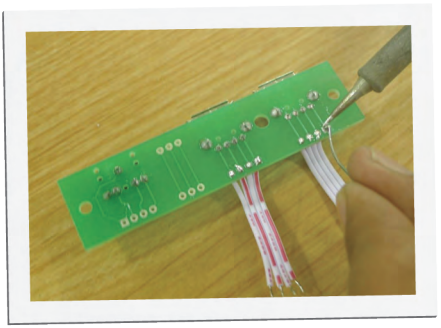


We'll also need the USB/Audio breakout board, part #46, which is included in the kit.

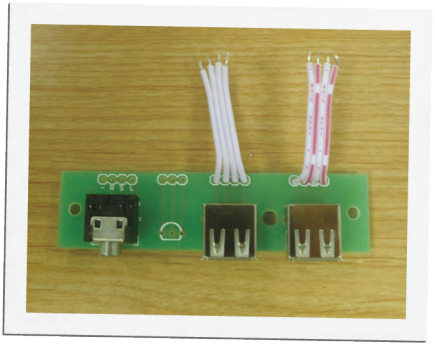


Let's start off by first cutting two pieces of two inch long 4 strand wire pieces from the unshielded wire spool, part #41, which comes with the kit. We'll use these to hook up the USB ports on the Xbox motherboard to the ones on the USB/Audio breakout board.

Strip the wires from both ends and solder each 4 wire bundle to each of the USB ports on the breakout board. There are four through hole pads on the board against each USB on the board to which these wires need to be soldered to.



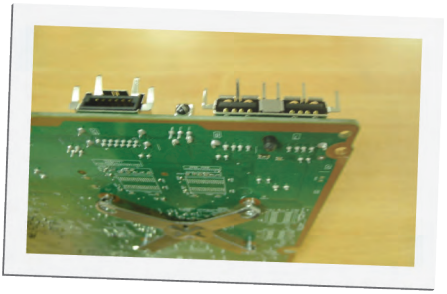
This is what the breakout board should look like once you're done soldering these wires:



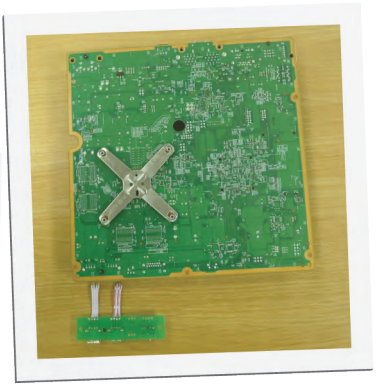
We'll now be hooking up this breakout board to the USB ports located at the front of the motherboard.

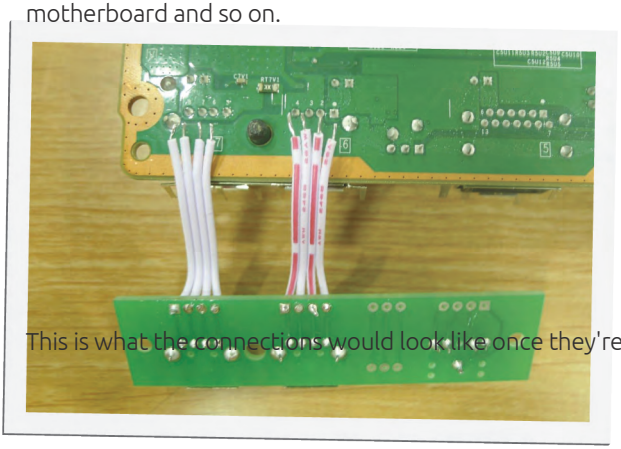
Each USB port has four connections/pads underneath it. Locate these four soldering points.

Now align the breakout board (which should also be flipped over) with the wires facing the USB ports on the motherboard:

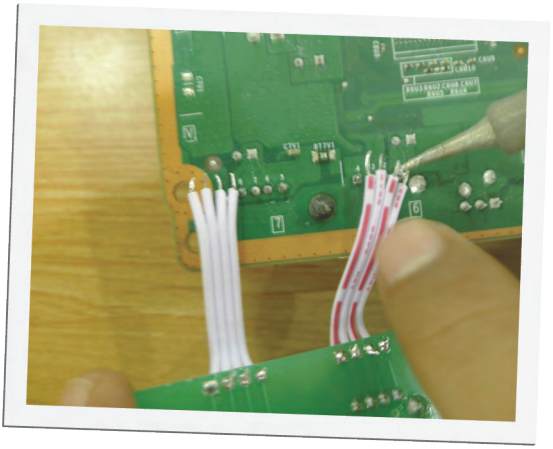


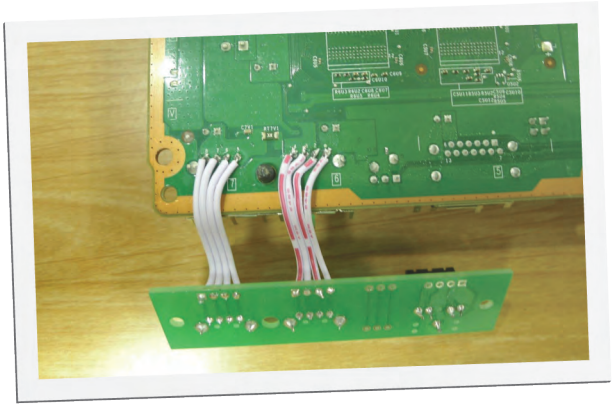
Solder each wire to the respective connection on the board in the manner shown. The wire ordering will be sequential - the first wire will be soldered to the first pad, the second to the second pad on the motherboard and so on.

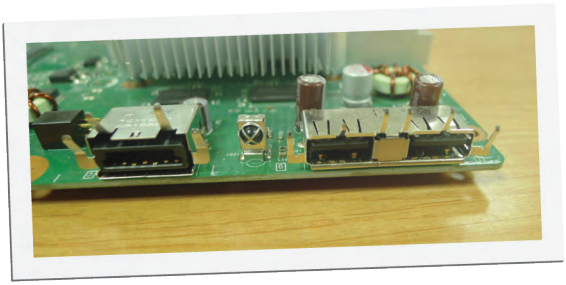




This is what the connections would look like once they're all soldered.

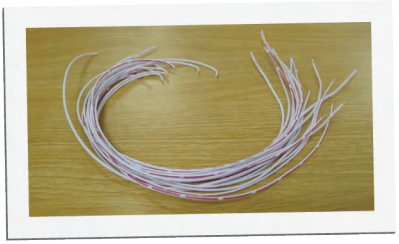


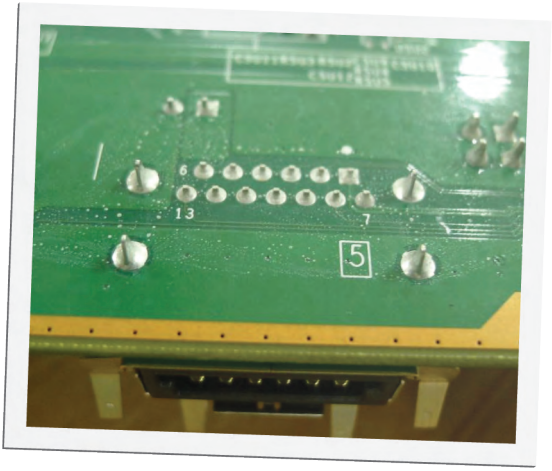




Now we'll be soldering connections on the Ring of lights port on the Xbox motherboard. This port is located to the left of the USB ports when the motherboard is viewed from front.

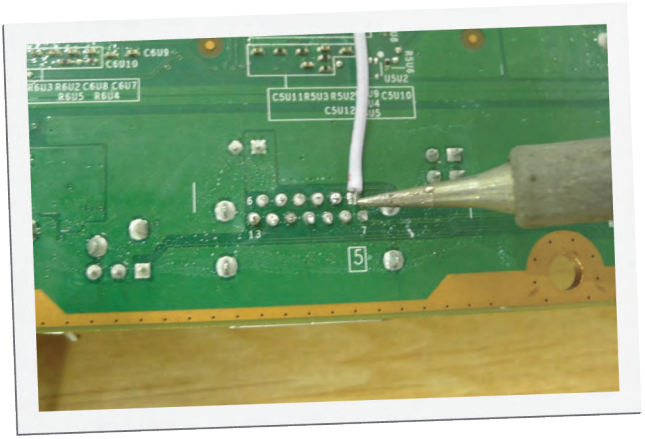
We'll need about 14 individual 10 inch long wires to make these connections. Prepare these from the braided wire spool, part#41.



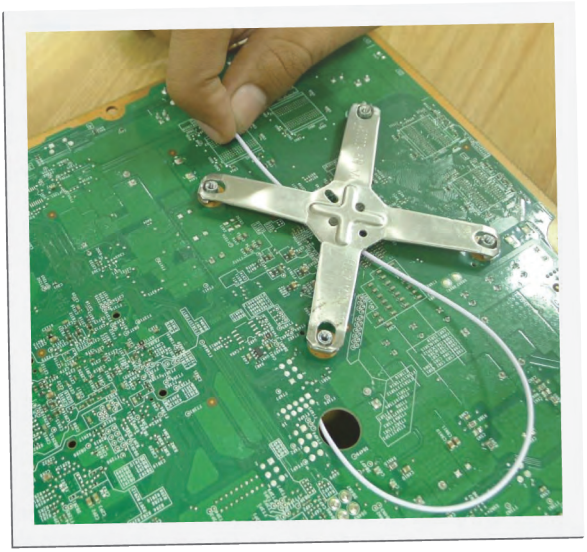


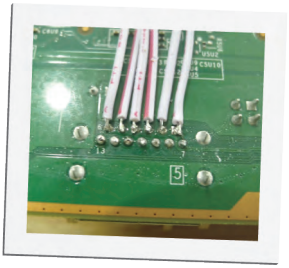
Flip the motherboard over and observe the connections/pads underneath the Ring of Lights board port. Note that the pads are numbered. Starting from the square pad on the top right, the first row is numbered 1 to 6 and the second is marked from 7 to 13 from right to left. The four large pads on both ends of these pads are Ground (GND). We'll be referring to these connections by this numbering sequence.

Solder one end of each wire you prepared earlier to each of these connections carefully, making sure none are shorted to any other connection.

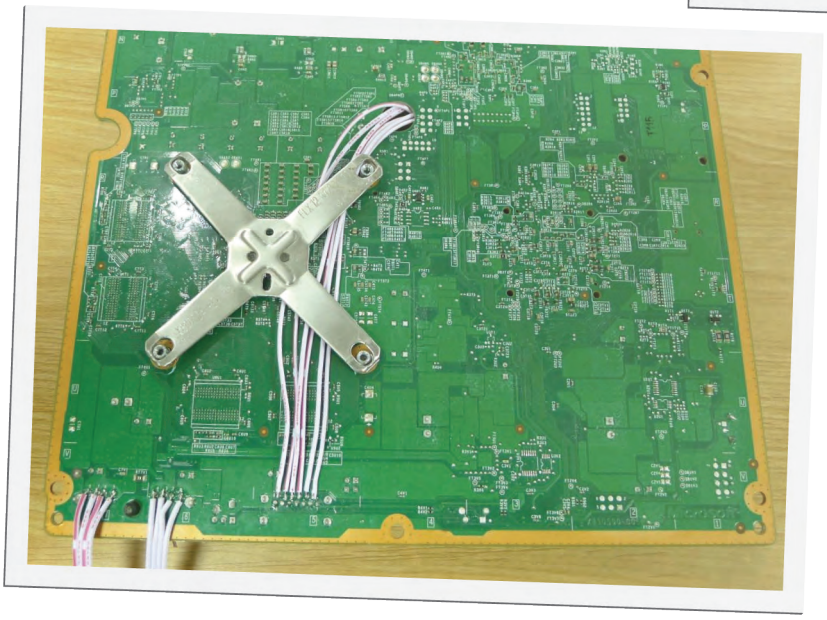


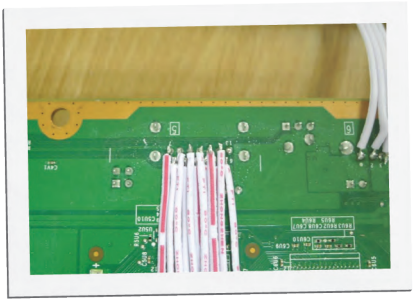
Slip the other end of each wire through the large hole in the middle of the motherboard passing it under the X shaped aluminum heatsink holder.



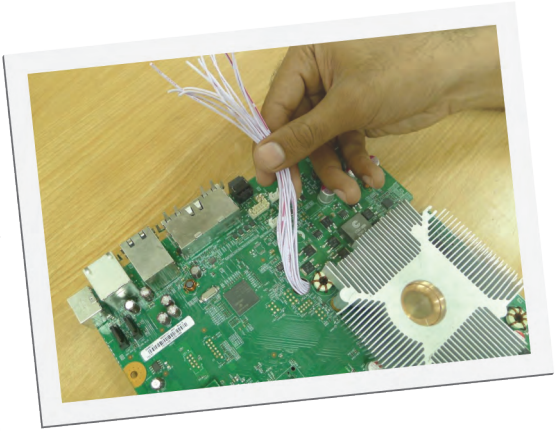


This is what the underside of the motherboard should look like with the first row connections completed:



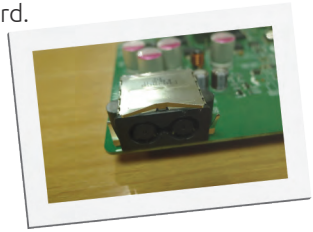


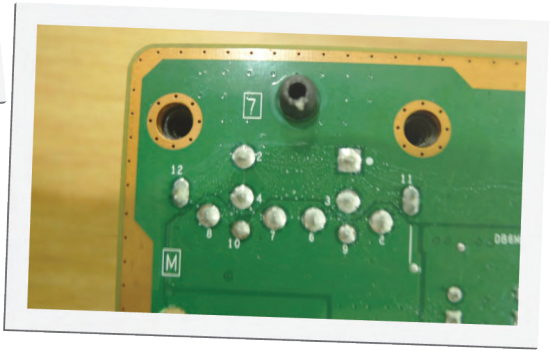
Complete the rest of the connections and pass the all the wires through the hole from the other face of the motherboard.



Next we'll be making power and ground connections to the Xbox motherboard. For this purpose prepare two individual 20 inch long wires using the braided (unshielded) wire spool included in the kit.

Locate the Power port on the motherboard.



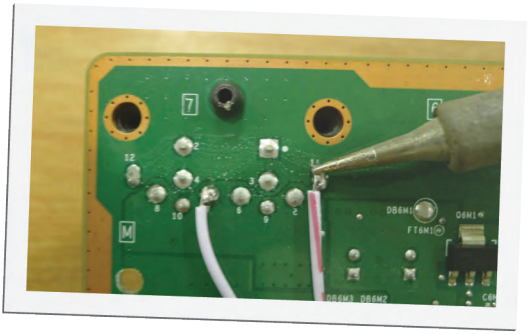


Flip the motherboard over, you'll see these numbered connections/pads right below the power connector.

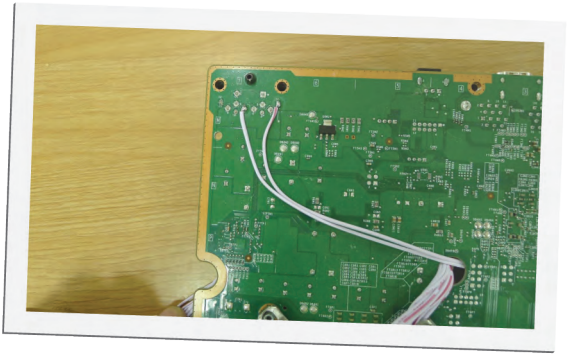
Here's a Pinout table for these connections with their corresponding voltage levels

Pin	Voltage
1	Gnd
2	Gnd
3	Gnd
4	Gnd
5	12V
6	12V
7	12V
8	12V
9	3.3V
10	5V
11	Gnd
12	Gnd

Solder one wire to any 12V Pin and the other wire to any GND Pin.

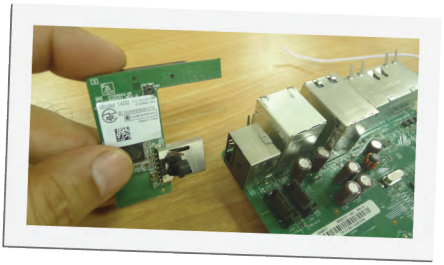


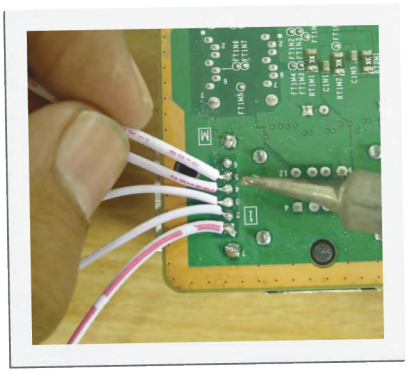
Pass these wires through the large hole in the middle of the Xbox motherboard.



Next, make connections for the Wifi module. Prepare seven separate 12 inch long wires from the braided wire spool included in the kit, part #41.

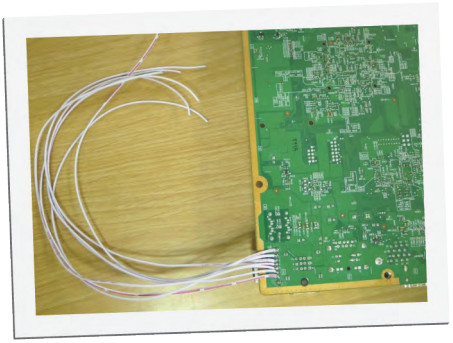
The wifi module comes attached to the motherboard with a USB type connector. Remove the module from the motherboard simply by pulling it out of the USB socket.





Turn the motherboard over to expose the connections under the USB type port on the motherboard that connects to the wifi module. There are 6 numbered Pins for the module and 2 ground pins on either side. Solder the 12 inch long wires to the numbered pins and to one of the ground pins.

We'll solder the other ends of these wires on to the wifi module at a later stage of the build.

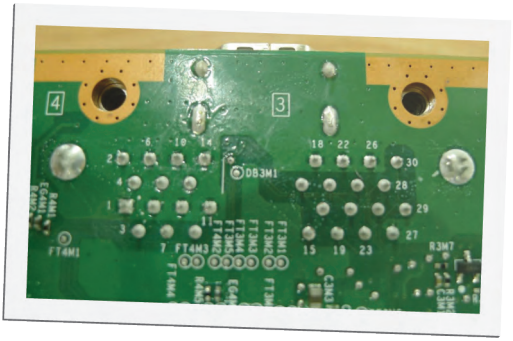


The last set of connections that are now left to be made on the Xbox motherboard are for audio and video signals. Please note that the following instructions are for the 720p screen and driver board. For 1080p screen/driver instructions please refer to an updated version of this manual.

We will be using shielded wires, part #42 of the kit bill of materials, for all audio and video connections. Shielded wires included with the kit have a braided core and a braided shield wrapped around the core. Both the shield and core are insulated from each other and purpose of the shield is to filter out unwanted electromagnetic interference and maintain signal integrity. The shield is normally grounded in common applications.

Prepare five separate 10 inch long shielded wires for video signals and two 20 inch long shielded wires for audio left and right signals.

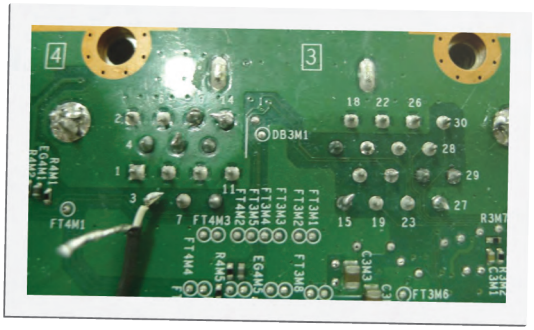
Locate the HDMI and Component Video out port on the Xbox motherboard. Flip the motherboard over. You should see the following pin arrangement under the HDMI and component video out connector



Notice that the Pins are numbered from 1 to 30 in a specific pattern. Starting from Pin 1, pin numbers increase in a column wise manner. Pin 2 is directly above Pin 1 while pin 3 is towards the right and below the first two pins. Similarly pin 4 is in line with and above pin 3 and pin 5 is towards the right and below pin 4. The same arrangement goes on till pin 30.

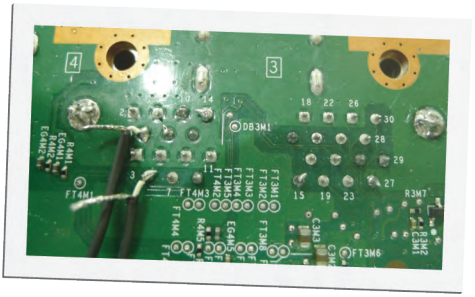
Following is pinout list of Audio and Video signal connections we're interested in:

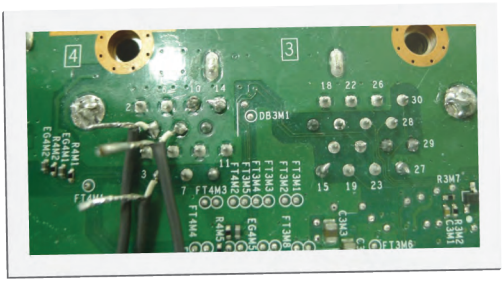
Pin	Signal
3	Red
4	Green
8	Blue
11	Horizontal Sync
12	Vertical Sync
1, 2, 5, 6, 9, 10 ,13, 14, 18, 22, 24, 26, 27	Ground
21	N/C
15	Audio (white)
16	Audio (red)
20	VGA Enable (GND)



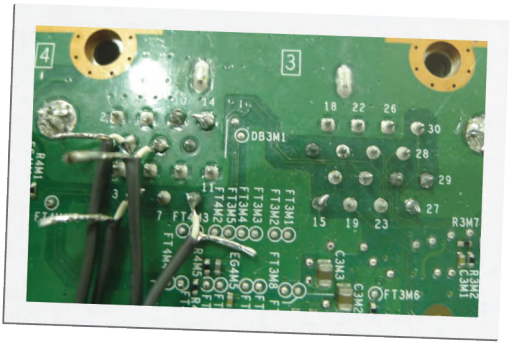
Start by soldering a wire on the 3rd pin (R video signal) making sure to keep the braided shield away from the pin. Only the cores of each wire need to be soldered to the specified pins, except ground which we'll cover later.

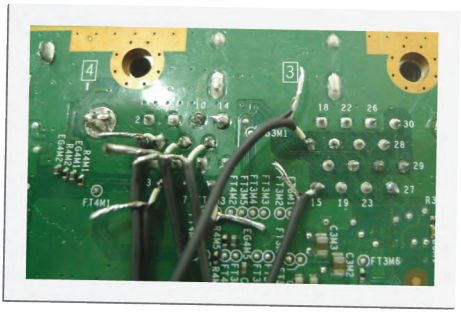
Pin 4 (G video signal) will be soldered next followed by pin 8 (B video signal).





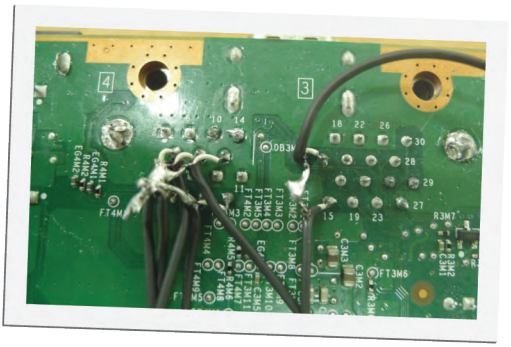
Connections to Horizontal sync and Vertical sync, pin 11 and 12, will be made next.

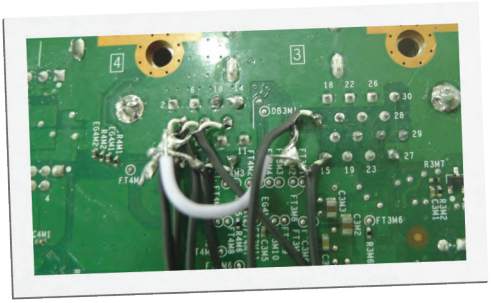




Audio pins (15 and 16) are to be soldered next.

Once connections to all the above mentioned pins are made, we need to connect the braided shields of all the wires and then ground them.

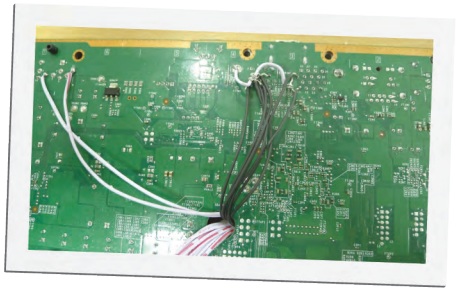


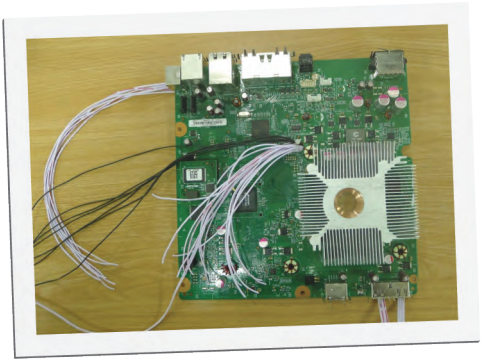


Use small strips of plain braided wire to make these connections and ground the shields to any of the ground pins. The two large pins on either side of the connector are also ground.

Finally, pin 20 (VGA enable Pin) needs to be shorted to ground to enable VGA video output. Use a small length of braided wire to connect Pin 20 to ground.

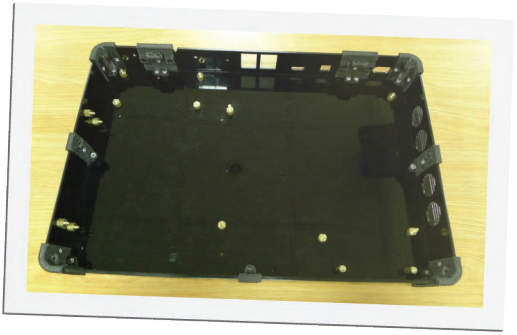
Once done, we'll pass all these wires through the hole in the center of the motherboard to the other side. This way we can keep all the wires/connections neat and manageable.





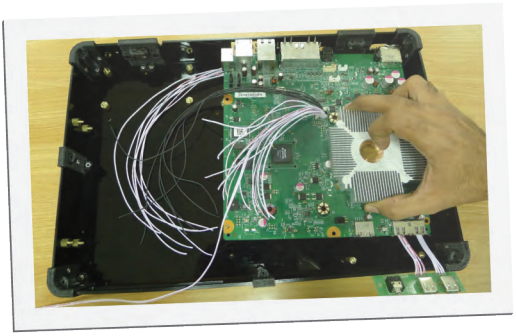
Step 5: Audio/USB Breakout Board Installation

In this step we'll attach the Headphone audio/USB breakout board to the laptop chassis. Allen keys (part #54), soldering station and solder wire will be needed for assembly.



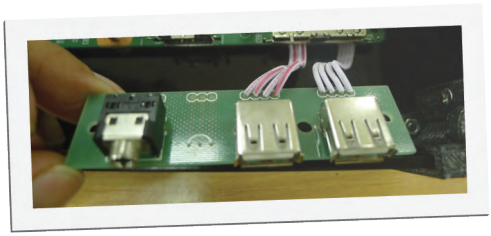
Earlier we had completed the lower half of the Darkmatter laptop casing which houses the electronics, including the Xbox motherboard. In the previous step we also soldered the required wiring connections to the motherboard. We'll now begin attaching the guts of the laptop to this base.

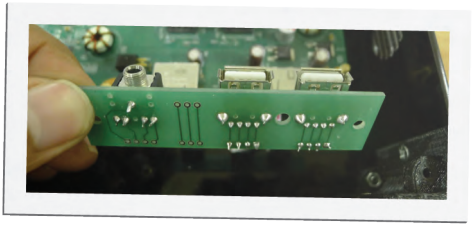
Carefully place the Xbox motherboard over the standoffs towards the right half of the laptop base.



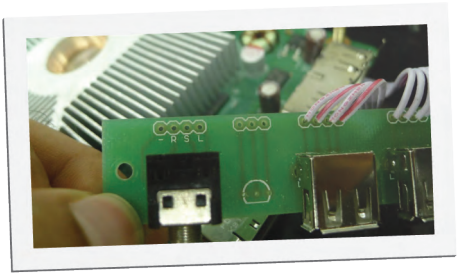
There are five standoffs attached to the base that will hold the motherboard in place. Gently position the motherboard such that the standoff holes in the motherboard align with these five standoffs. Press the board down firmly and nudge it around carefully until the board rests flat with the top flat part of the standoffs.

The Audio/USB breakout board has standoff holes on each side to which we'll attach M3 standoffs that will in turn mount on to the laptop base and will hold this board in place.



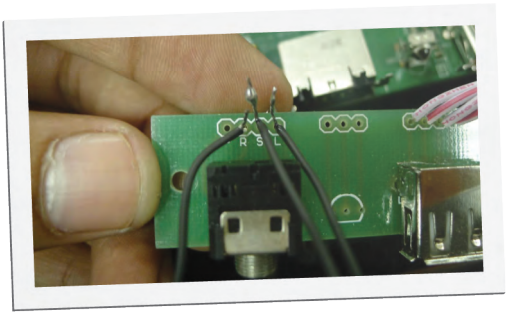


But before we can fix the breakout board to the chassis we need to make a few wiring connections for the headphone audio out jack on the board. Locate the four pin connections marked - R S L on the board.



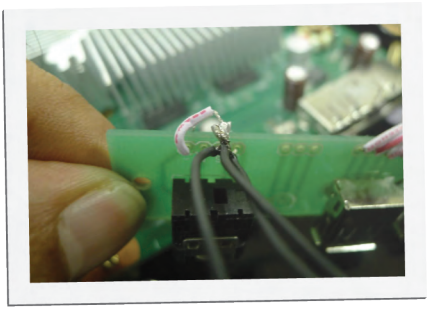
We'll need three shielded wires, part #42 in the BOM, about 15 inches in length.

Solder the shielded cores of these wires to the R, S and L connections making sure the shields don't come into contact with any of these pins.



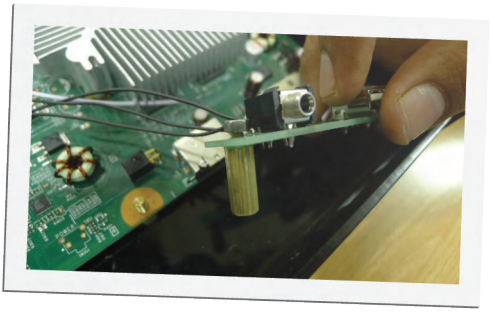
Solder the braided shield wires together and use a small strip of unshielded braided wire to connect them to the leftmost pin marked -.

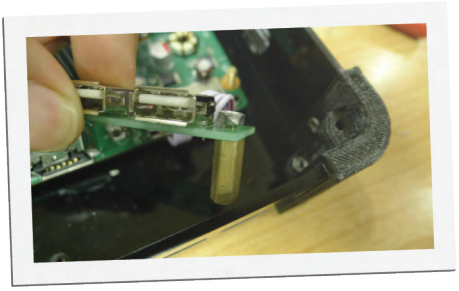
This is what the board should look like with the connections properly made.



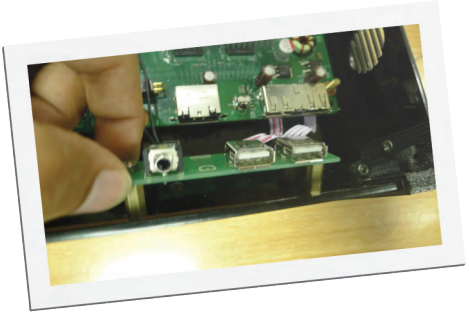
Next we'll fasten the board to the base of the laptop using the following parts. Two 16mm M3 Hex Standoffs (part #24), two M3 x 6 Countersunk screws (part #32) and two M3 Hex nuts (part #29) will be used.

Slip the threaded part of the standoffs through the holes on either side of the board. Fasten the threaded ends of these standoffs to the board using M3 hex nuts.

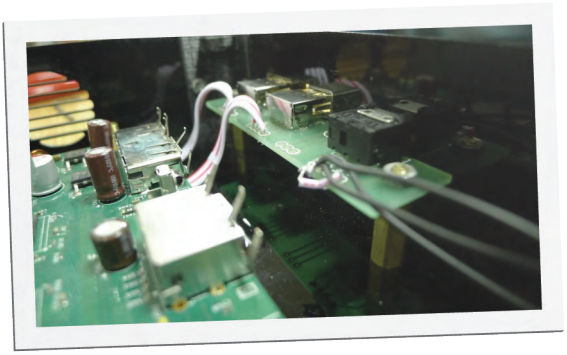




Now align the standoffs with the two holes in the Bottom plate near the front of the laptop casing.



The USB connectors and audio jack should fit within the laser cut recesses in the front panel of the laptop casing as show below. Fasten the standoffs to the base using M3 x 6 screws.



The board front edge should fit flush with the front panel as shown in the picture above.

Step 6: DVD Drive Installation

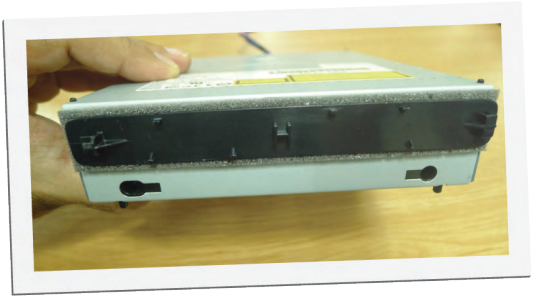
This step involves fixing the Xbox Dvd Drive to the laptop chassis. Allen keys (part# 54), set of files (or rotary dremel tool with a sanding/grinding bit), Epoxy glue (part# 61) and dual tape (part # 66) are the supplies/tools needed for assembly.

A data cable comes attached to the DVD drive. We'll extend this cable in a later step. For now leave it attached to the drive.

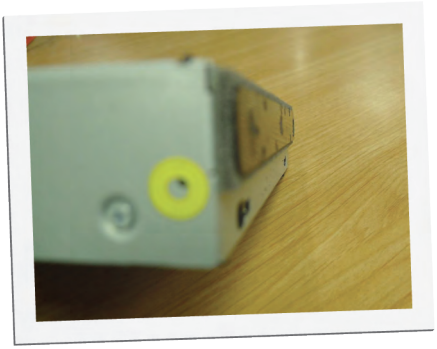
The Xbox DVD drive comes with a plastic bezel attached to the font cover of the DVD tray. This is snap-fitted to the cover with small plastic tabs that hold it in place.

Pull outwards on the left section of this plastic bezel carefully lifting the plastic tab which keeps the bezel secured to the DVD tray cover.

You'll notice that there are several protrusions on the DVD tray cover including the two plastic tabs on either side

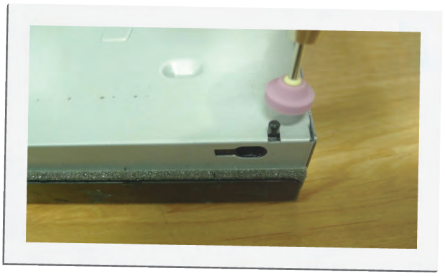


We need to sand these plastic protrusions down such that the DVD tray cover is completely flat and smooth. This can be done with a file or a dremel/rotary tool with a flat sanding bit. Ensure the surface is completely flat and smooth.



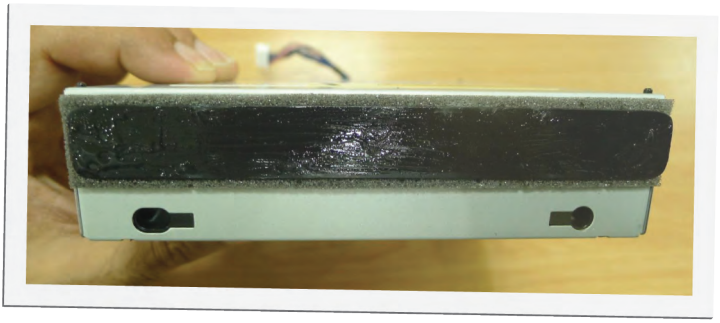
Turn the DVD drive on its back. You'll notice two plastic cylindrical tabs to the front of the drive.

Sand these down until it is completely level with the bottom base of the DVD drive.

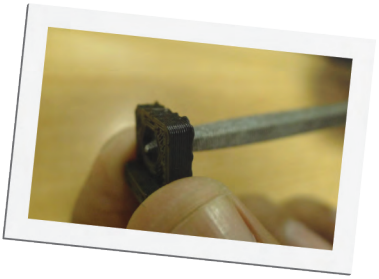


We'll now attach the laser cut DVD cover, part #23 in the kit, to the DVD tray cover using clear epoxy, part #61.

Apply a thin, consistent layer of epoxy to the DVD Drive cover. Press the rear face of the DVD Cover to this and adjust it till it's completely level with the DVD tray cover from all sides. Let the glue dry for about 15 minutes.



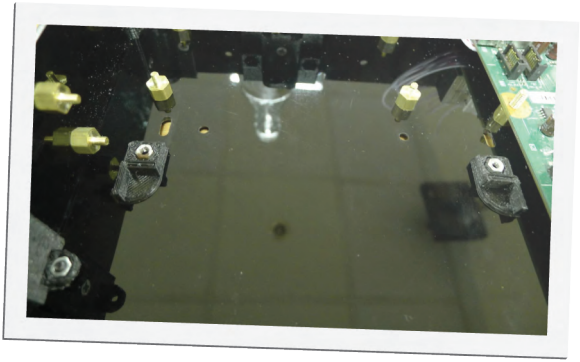
The next part involves attaching the DVD drive plastic bases to the laptop chassis. We'll use parts #5-7, M3 Hex nuts (part #35) and four M3 x 8 Countersunk Screws (part #42).



The M3 holes in these 3D printed parts may need some sanding. Clear these holes using a pointed sanding tool.

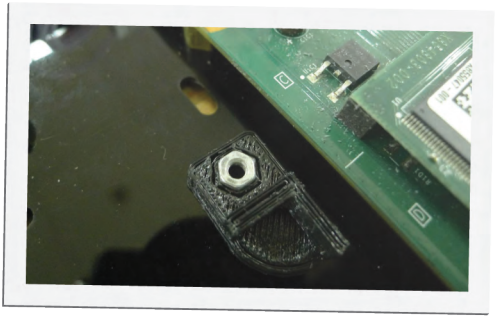
Press insert M3 Hex nuts within the hexagonal recesses on the top surface of these plastic pieces.

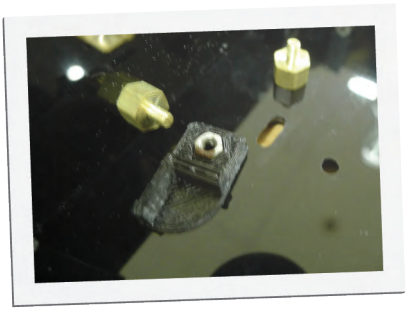
One piece of part # 6 and 7 each will be fixed near the rear wall of the laptop chassis. Note the elongated holes in the picture above. This is where these bits will be screwed on to. The elongated holes are there to allow for adjustment to the exact position of these pieces.



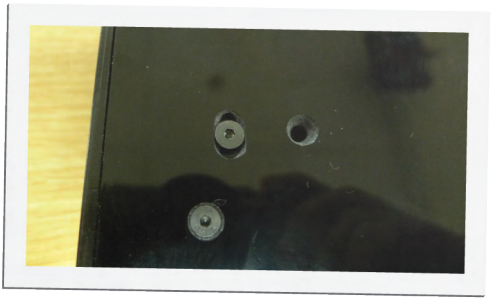
Similarly one piece of part # 5 and 7 will be placed near the front wall of the laptop chassis. There is an elongated hole towards the right where part #7 will be screwed on to.

This is a close up of the DVD Rear Right Support before it is attached to the elongated hole visible in the picture.



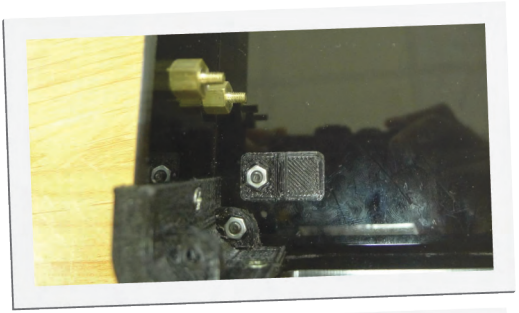


This picture shows the DVD Rear Left Support and the elongated hole it needs to be attached to.

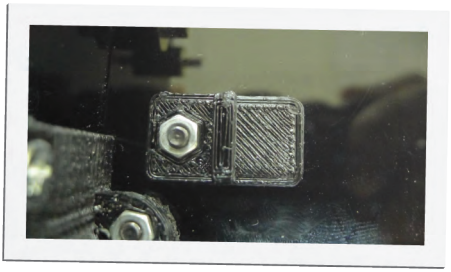


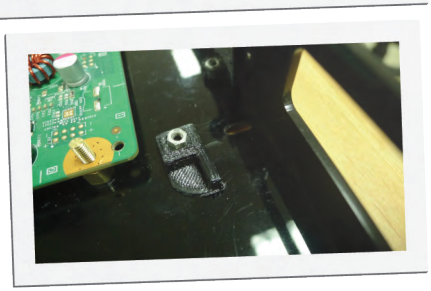
Screw these plastic base parts using M3 x 8 countersunk screws. The picture above shows an M3 x 8 screw attached to one such DVD drive base through an elongated hole.

This is what the DVD Rear Left and Right support parts will look like when secured to the bottom plate with screws.



This is a closeup of the DVD Side Support part screwed to the bottom surface.





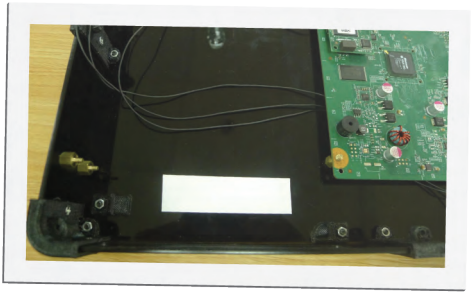
All four plastic base parts are attached to the base now. The rear two and the one on the right are adjustable such that the separation between them can be adjusted. This is useful when fitting the DVD base within the laptop chassis as you'll soon find out.

Test fit the DVD Drive to these plastic base pieces. It should snap in place with ease.

The laser cut DVD Cover should be completely flush with the front panel of the laptop chassis. If not, loosen the screws holding the 3D printed DVD base parts and readjust them until the DVD cover aligns with the front panel.

Once the position of the DVD base plastic pieces has been adjusted, we'll now permanently fix the DVD drive to the laptop chassis. Pass the wires you soldered earlier to the Audio/USB breakout board from under the DVD drive before you fix it in place.

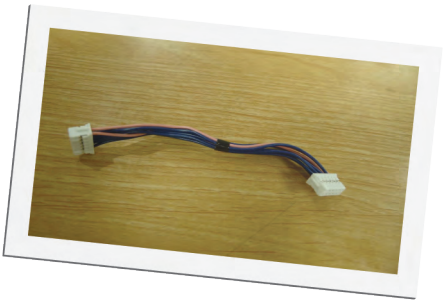
Cut two pieces of dual tape, part #66, about 4 inches in length and paste them on the laptop base where the DVD drive will be placed on.



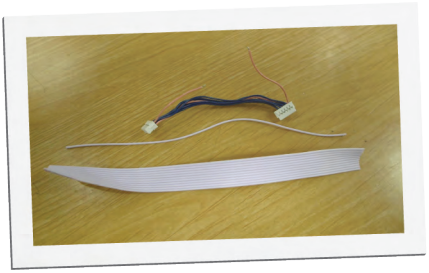
Paste another layer of dual tape over the first. Carefully position the DVD drive over the plastic base parts and press fit it in place.

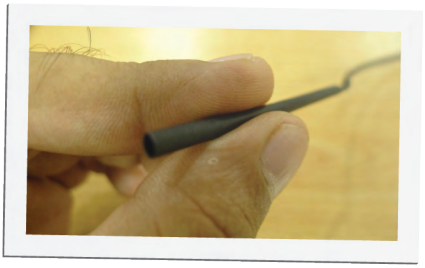
As mentioned earlier, the DVD front panel should be flush with the front panel of the laptop chassis as shown:

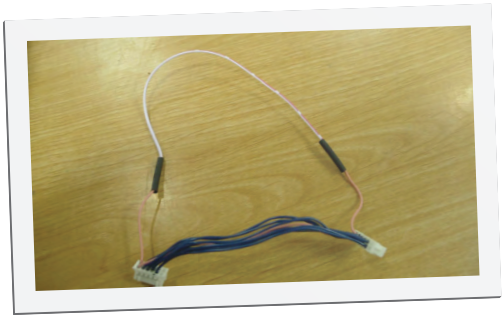
The last step of this section involves hooking up the above DVD connector that comes with the Xbox console. One end of this wire bundle connects to the respective port at the rear of the DVD drive while the other end connects to a connector port on the motherboard. A standard length of around 3 inches is used in the Xbox for this cable bundle. This needs to be lengthened for use in the Darkmatter casing since the DVD Drive is farther apart from the motherboard than in the normal layout within the Xbox console.



Start by preparing 10 different lengths of plain braided wire, part #41. These should be about 7 inches long. We'll also need some length of 2mm heat shrink tubing, part #60, for insulating the wiring solder connections.

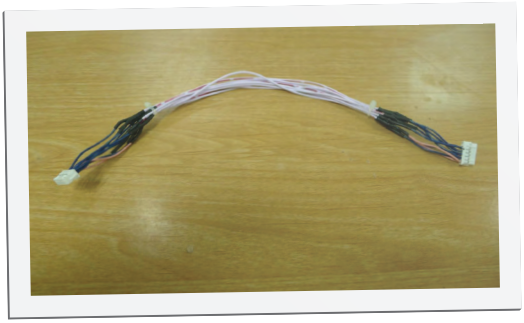






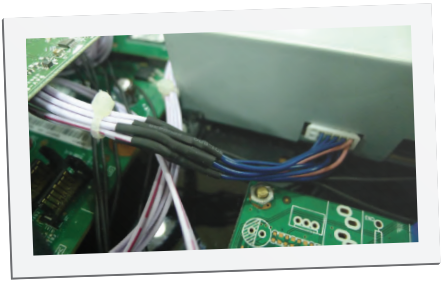
Cut each wire of the DVD connector bundle, solder the additional piece of wire and cover it with a small length of heat shrink tubing in the manner shown. Make sure you heat the heatshrink tubing using a hot air rework station or a cigarette lighter. It should contract and snugly fit over the soldered connection.

Once done with all the wires you should have something like this. Here we have all the connections soldered and insulated using heatshrink tubing. Bundle it together using cable ties.

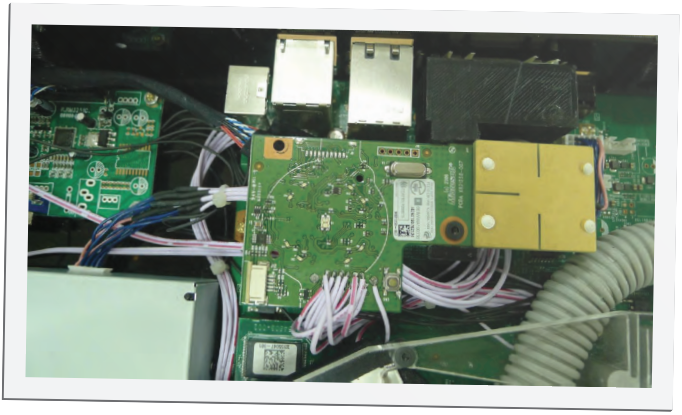


Connect one end of this wire bundle to the DVD drive as shown below. Pass the wires from under the Ring of Lights board.

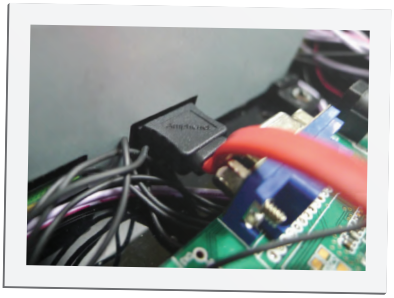
Connect the other end of the wire bundle to the respective connector on the Xbox motherboard as shown:



This is how the assembly should look once the DVD connector bundle has been connected:

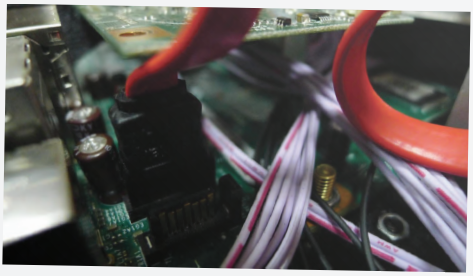


The last connection left to be made in this step is the DVD SATA cable, part #39 in the Bill of Materials.



Connect one end of the SATA cable to the female SATA connector at the rear of the DVD Drive. The SATA connectors are polarized which means they will only connect in one direction.

We will now connect the other end of the SATA cable to the Xbox motherboard. There are two female SATA connectors on the Xbox motherboard near the Wifi connector on the board. One is marked ‘HDD’ (Hard Disk Drive) while the other one is labeled ‘ODD’ (Optical Disk Drive). We will connect the DVD Drive SATA cable to the connector marked ‘ODD’ as shown.



Tuck away the rest of the cable neatly as shown in the image below. The SATA cable connection is now complete.

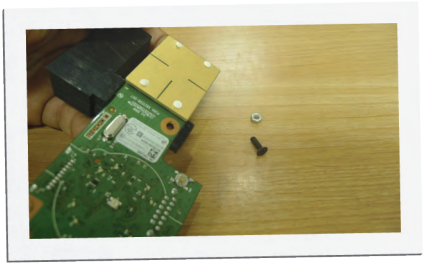
Step 7: Ring of Lights board Installation

In this step we'll solder connections from the Xbox motherboard to the ring of lights board and then attach it to the laptop assembly.

The tools/supplies required for this step are Allen keys (part #54), Dual tape (part #66), soldering station and solder wire.

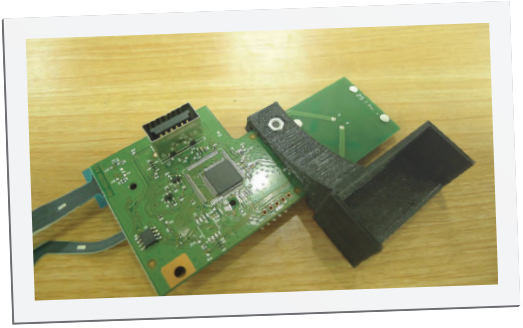
The Ring of Lights board shown below has a flex circuit connected to it which has capacitive touch inputs for Power and Eject on the original Xbox 360 Slim console. We'll reuse these touch based inputs on the Darkmatter laptop and in subsequent steps we'll add more touch inputs for volume up, volume down, sync and mute. For now we need to fix the board to the main laptop assembly.

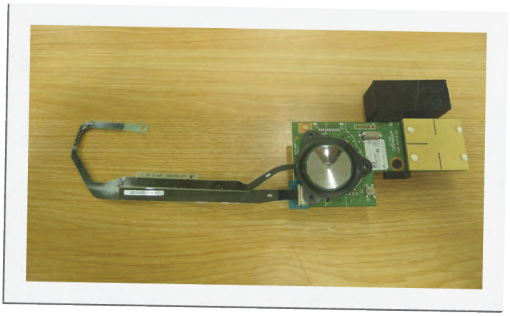
We'll need the Ring of Lights Board Holder 3D printed part (part #4 in the BOM), an M3 x 8 countersunk screw (part #34) and an M3 Hex nut (part #29).



The 3D printed Ring of Lights Board Holder part has a hexagon shaped recess at the back. Press fit the M3 Hex Nut within this recess.

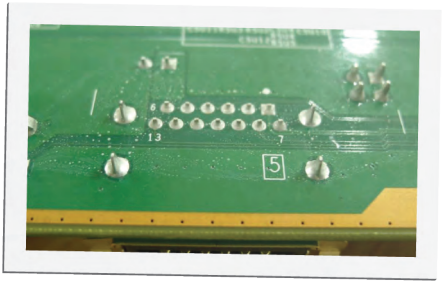
The 3D printed part has a cavity on the top surface the purpose of which is to grip the Ring of Lights Board. Place the board within this cavity. It should snap fit in place. The hole in the board should now align with the hole in the 3D printed part. Insert the M3 x 8 screw from the top and tighten it. It should screw in the M3 Hex nut you inserted earlier.





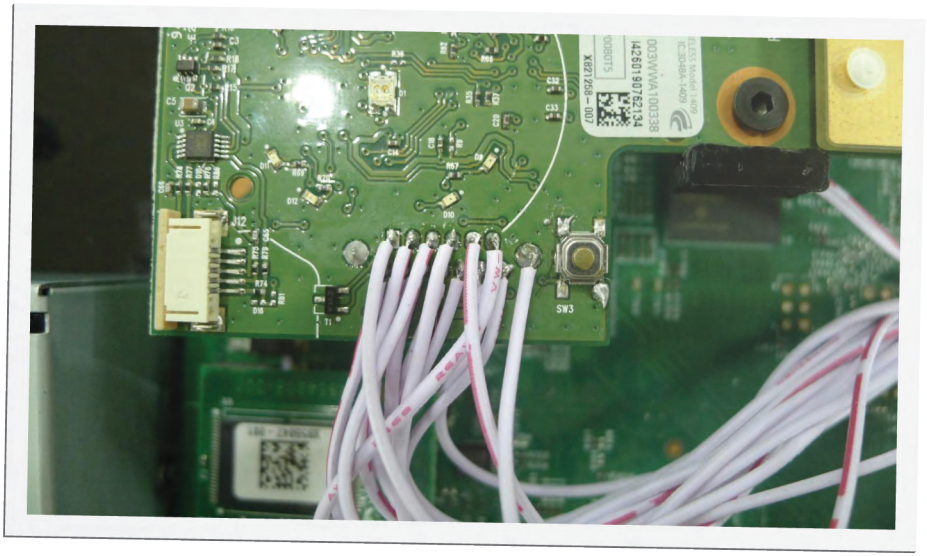
The 3D printed part features an open box like structure on its rear. This feature is supposed to slide over and fit onto the component video out connector on the Xbox motherboard as shown below:

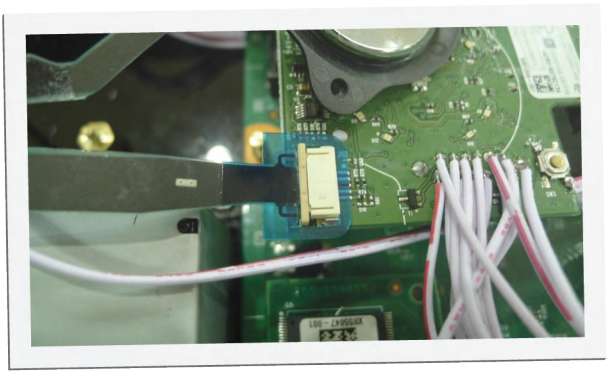
In an earlier step we made wiring connections to the Ring of Lights board port on the motherboard (port pins shown to the right). We'll now solder the other ends of these wires to the Ring of Lights board. The board features the same pin layout as the one on the motherboard.



There is a one to one pin mapping between the ring of lights port on the motherboard and the one on the actual Ring of Lights board. The same numbering sequence applies to the pin layout on the right of lights board so the connections are fairly straightforward. A total of 14 soldering connections need to be made including a ground pin. The ground wire can be soldered to any of the two ground pins on either side of the pin layout on the ring of lights board.

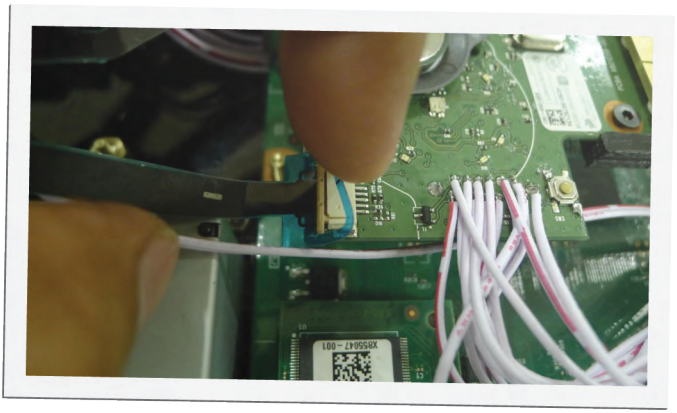
This is a closeup of the soldered connections on the ring of lights board. Note the ground wire soldered to the ground pin on the right side of the board near the momentary push switch.



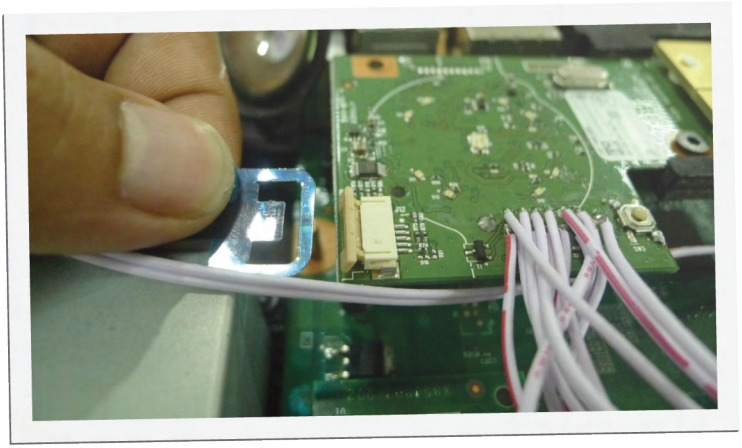


The flex circuit is attached to the Ring of Lights board via a small connector on the left edge of the board. We'll remove the flex circuit from the board for the moment and will reattach it at a later stage of the build.

Gently lift the flex circuit connector tab in the manner shown below.



With the flex tab lifted, gently pull the flex circuit out. The plastic connector on the board should lift up allowing the flex circuit to be easily removed from the board.



The next step is to permanently attach this assembly to the motherboard/laptop chassis.

Cut about an inch long length of some dual tape and paste it on top of the component video out connector. Place the ring of lights board holder assembly over it and firmly press it in place.

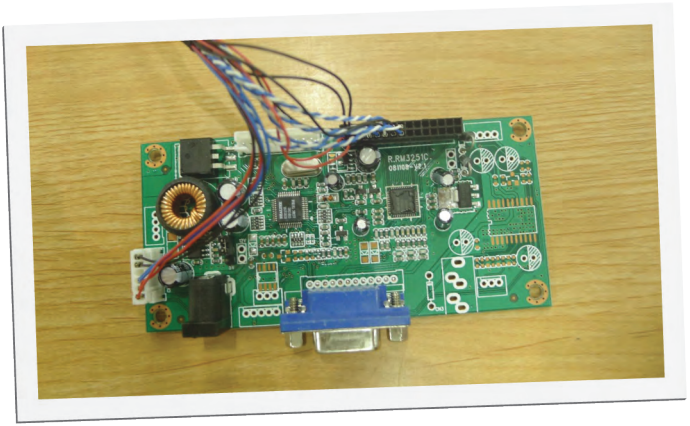
The ring of lights board installation is now complete:

Step 8: Display Driver Board Installation

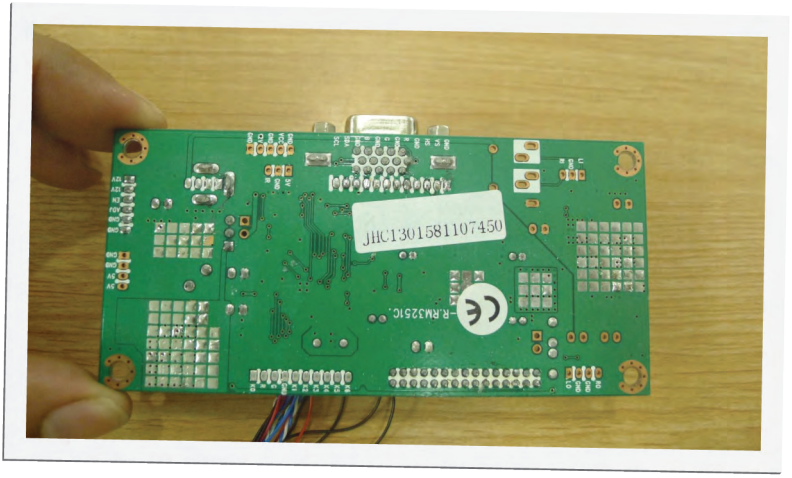
This step involves connecting the video signals from the Xbox motherboard to the display driver board and attaching it to the laptop chassis. The following steps are for the 720p version of the kit. For instructions for the 1080p version please refer to an updated version of the manual.

A soldering station and solder wire is required for this part of the assembly.

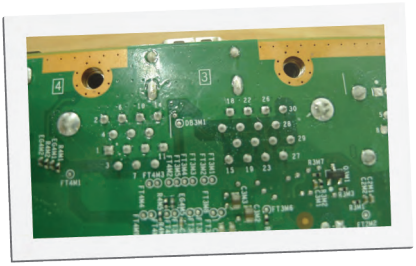
Locate the VGA connector on the Display Driver Board, part #52 of the bill of materials.

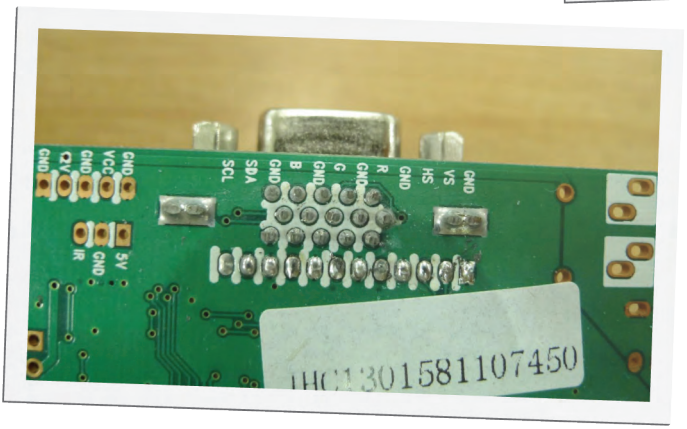


Turn the board over and locate the pins on the underside of the VGA connector. We'll solder video signal connections to these pins - each pin has a corresponding marking on the underside of the board which tells us which signal will be connected to the respective pin.



In an earlier step we soldered shielded wires to the component video out connector pins on the Xbox motherboard. We'll solder the other ends of those wires to the VGA connector on the Display Driver board now.

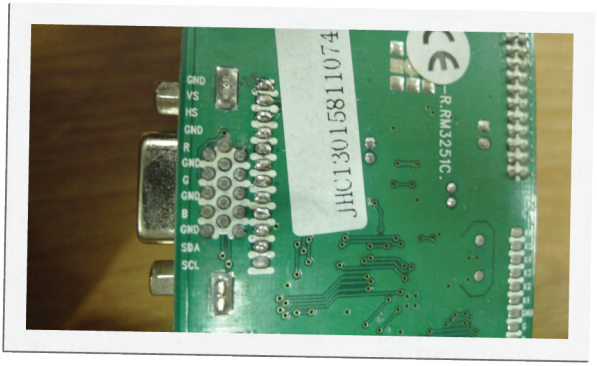




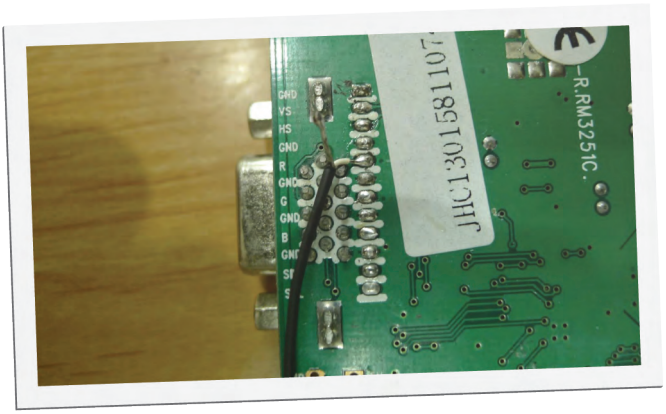
Here are the wiring connections we made earlier. With the exception of multiple grounds (only one ground connection is required) all the following pins have to be connected to the Display Driver Board.

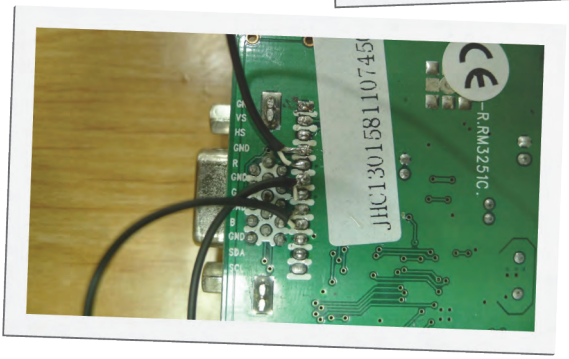
Pin	Signal
3	Red
4	Green
8	Blue
11	Horizontal Sync
12	Vertical Sync
1, 2, 5, 6, 9, 10 ,13, 14, 18, 22, 24, 26, 27	Ground
21	N/C
15	Audio (white)
16	Audio (red)

Here's a closeup of the VGA pin underside before connections are soldered on to it.



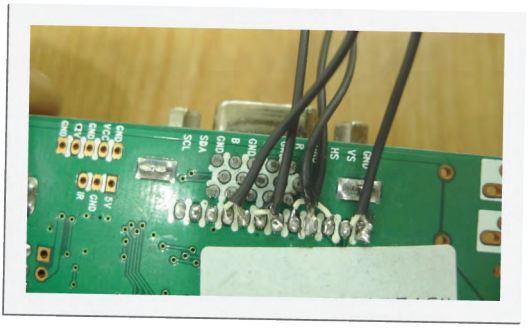
Here the R signal is shown connected to the R pin of the VGA connector. The shield is still unconnected. Note that there are ground pins next to almost every signal pin on the VGA connector. We'll solder shields to these ground pins.

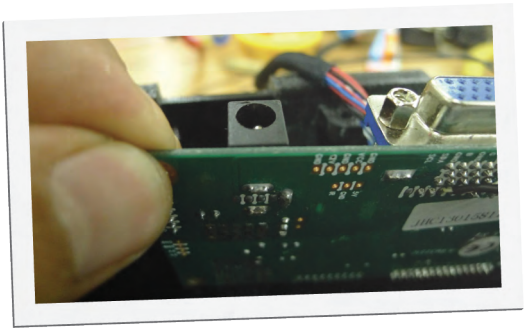




Here the R, G, and B signals are all shown soldered to their respective pins on the VGA connector. The shields have also been grounded.

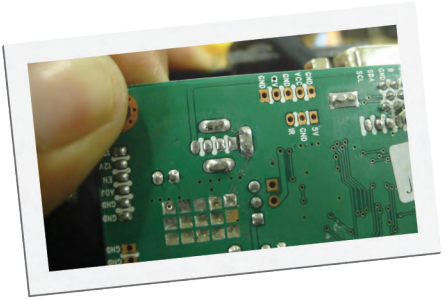
Here the Horizontal Sync and Vertical Sync connections are also shown soldered to the board with their shields also soldered to ground.



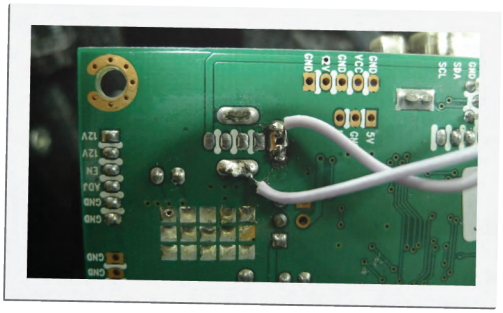


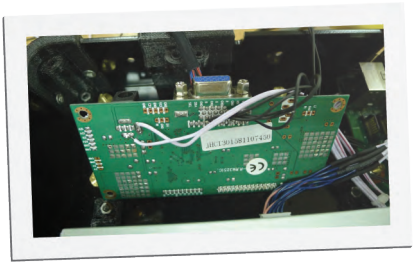
Locate the power jack on the board. This is the black connector shown in the picture to the left.

There are three connections on the board for the power jack. The one of the side (right) is ground while the one below is power input. The board requires +12V to function properly.



In a previous step we made power connections, +12V and GND, to the Xbox motherboard. We'll now connect those wires we soldered earlier to the motherboard to this display driver board. Solder the +12V wire to the bottom pad and the GND wire to the pad on the right:



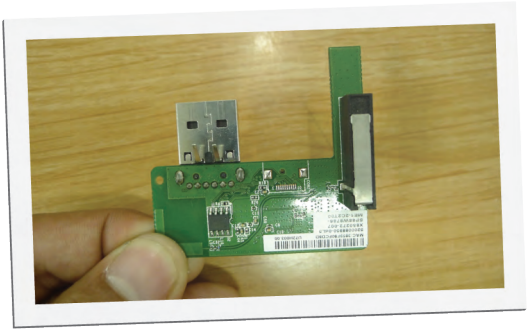


Once all these signal wires have been soldered, place the display board over the four standoffs on the top right corner of the laptop chassis. The board should slide in place with the threaded part of the standoffs sliding in the holes and the board resting on top of the flat section of the standoffs:

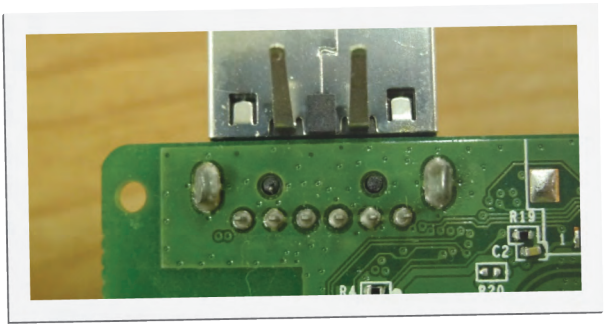
Step 9: Wifi Board Installation

In this step we will hook up the Wifi board to the X box motherboard. We'll need a soldering station, wire stripper, wire cutter and some dual tape.

In the standard Xbox slim console, the wifi board comes connected to the motherboard via a USB type connector shown.



Earlier we removed the wifi board from the USB type connector on the Xbox motherboard. We also soldered some wires on to this port on the motherboard. We'll now solder the other ends of these wires to the male USB type connector on the Wifi board.

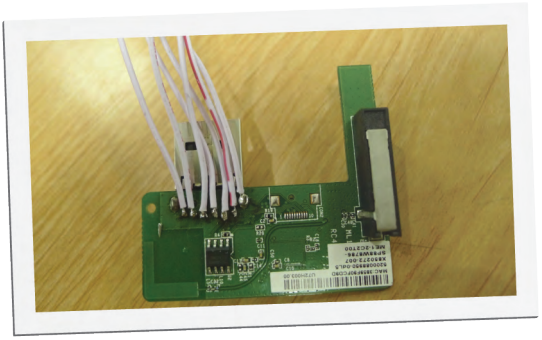


The Wifi port connections on the Xbox motherboard are numbered as shown to the left. We'll use this numbering pattern to connect each wire to the wifi board, starting from the left:-

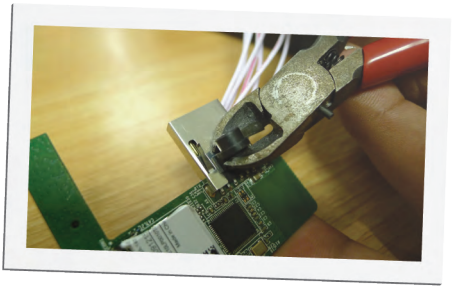
7(GND) 1 2 3 4 5 6 8(GND)

Take note of the pin mapping on the board. Connect Pin 1 of the Wifi port on the motherboard to the leftmost pin on the wifi board, pin 2 on the Wifi port to the second pin from the left on the wifi board and so on and so forth. Connect the ground wire from the Wifi port on the motherboard to any of the large ground pins on either side of the USB connector on the wifi board.

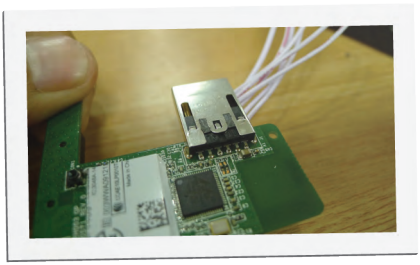
Here all the connections are shown soldered to the wifi board.



There is a small plastic tab on the USB connector on the Wifi board which takes in a screw to keep the board attached to the motherboard. We need to snip off this tab using a pair of wire cutters.



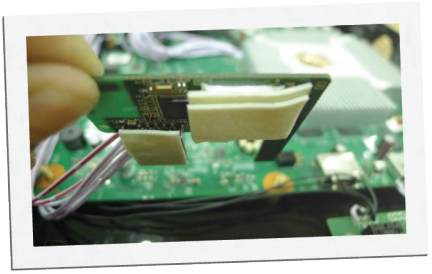
Cleanly cut off the plastic tab. Your board should now look like this:



Once the wiring connections are all made we'll now attach it to the laptop chassis.

The board will be placed near the front panel of the laptop chassis, under and towards the front of the motherboard as shown.

Cut three inch long pieces of dual tape and tape them on to the underside of the wifi board as shown below:



Then firmly place the board on the bottom laser cut panel of the chassis as shown above. The dual tape will permanently hold it in place.

Bundle the wires together using cable ties and neatly tuck the bundle away towards the side of the motherboard as shown in the picture. The wifi board installation is now complete.

Step 10: Fans Installation

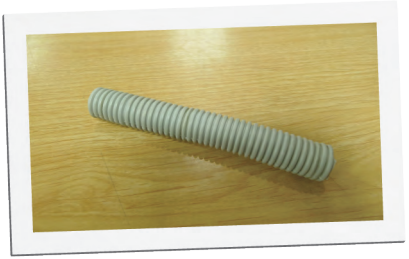
The Darkmatter Xbox laptop utilizes negative air pressure cooling. The two blower type fans included in the kit create negative air pressure inside the casing with respect to the outside ambient pressure. As a result of this pressure difference, air rushes inside the casing from the opening above the Xbox heatsink and keeps it from overheating.

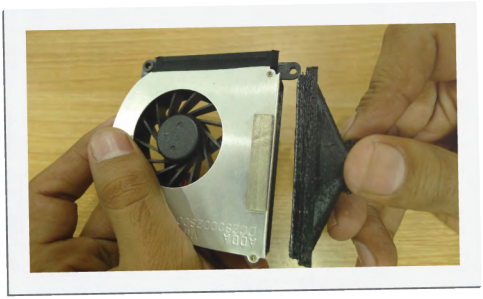
In this step we'll be attaching this cooling assembly within the Darkmatter casing. Tools and supplies needed include a screwdriver, nose pliers, soldering station, wire cutter/stripper, epoxy glue and cable ties.

We start off with this laser cut acrylic piece, part#19 in the bill of materials. Notice the countersunk bores drilled in this part. These will hold screws to keep the fans in place.

We'll also need the pictured 3D printed parts included in the kit for assembly. These are the two fan nozzles and fan ducts, part #8 and #9 in the bill of materials.

Also required are the two pieces of cooling duct, part #48 in the kit.



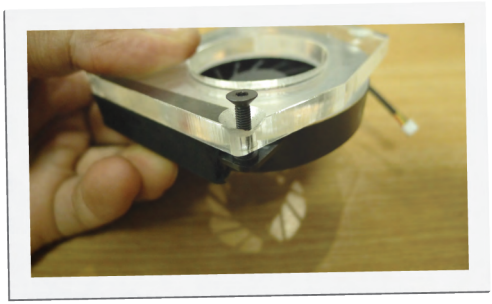


There are also two blower type cooling fans, part #47, that come with the kit. We'll fit the 3D printed fan nozzles within the opening in these fans but before we can do so, we need to lightly sand this part so that it fits with ease.

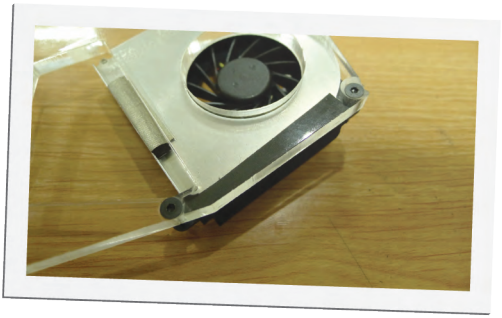
Remove any excess plastic material and lightly sand off the area that will come in contact with the fan. The nozzles should slide and fit without too much force being applied.

Press fit the nozzles on both fans. Once both fans are ready, we'll fit them to the laser cut acrylic fans support panel mentioned previously.

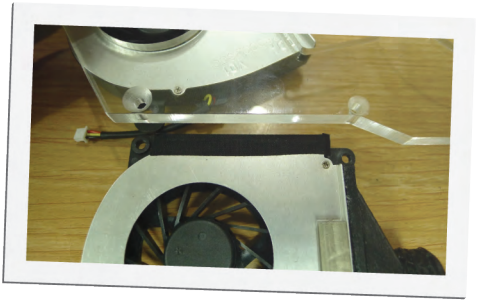
Align the screw holes in the fan with the screw holes on the panel as shown above. Use M3 x 20 countersunk screws, part #31, to fasten the fan to the panel.



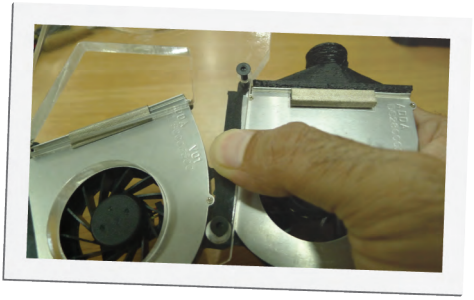
Screw in M3 Hex Nuts, part #29, from the bottom to hold the fans in place against the plastic panel.



Once the first fan is attached, we'll fasten the other fan to the two screw holes on the bottom corner of the acrylic panel as shown.



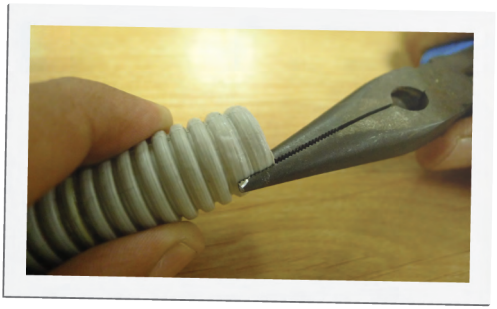
Align the panel with the fan. Screw holes in both should line up like shown below. Use M3 x 20 screws and M3 Hex Nuts to fix the fan in place.



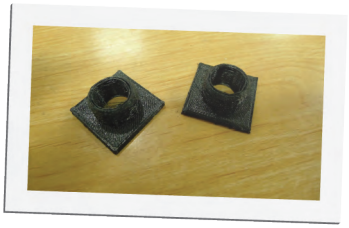
This is how the bolted connection on the bottom left screw hole on the panel should look like.

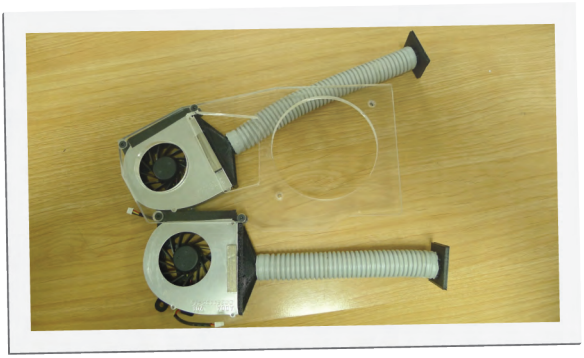
With the fans now in place, next we'll attach the cooling duct and 3d printed fan duct parts to this assembly.

Using nose pliers widen and stretch the ends of the two cooling duct pieces, part #48, so that they can easily fit over the 3d printed fan ducts and nozzles.



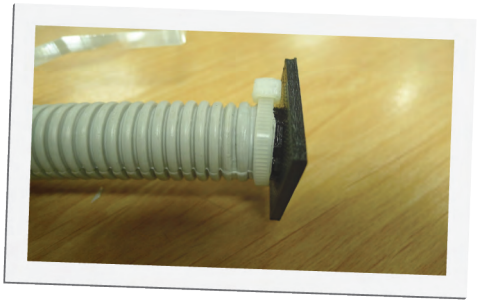
Slip one end of each piece of cooling duct over the 3d printed fan ducts as shown below.



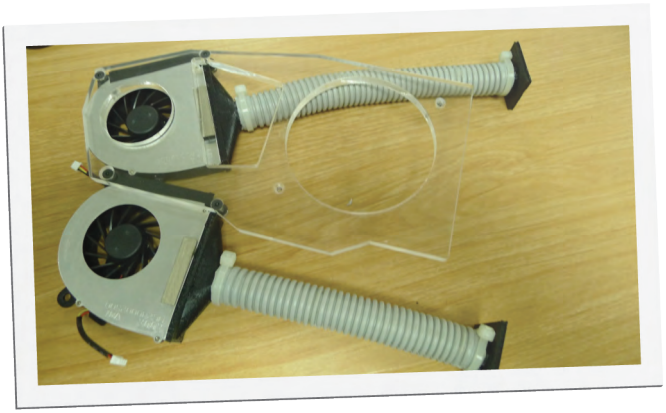


Slip the other ends of these ducts over the 3d printed fan nozzles that are attached to the blower fans. The smaller piece will go on the bottom fan while the longer piece will be attached to the top fan.

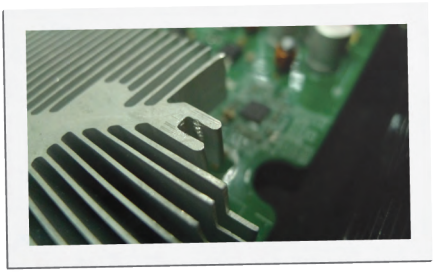
Use cable ties, part #49, to hold the cooling ducts in place over the 3d printed parts and to prevent them from slipping off.

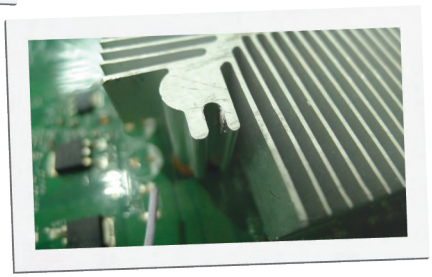


This is how the assembly should look like at this stage of the build.

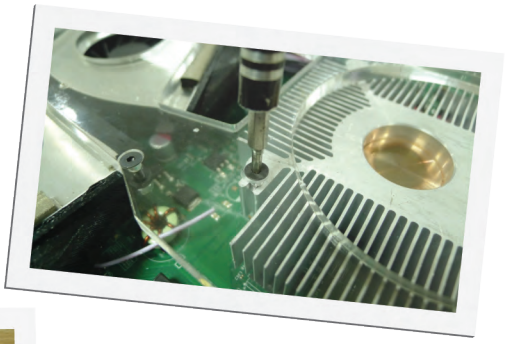


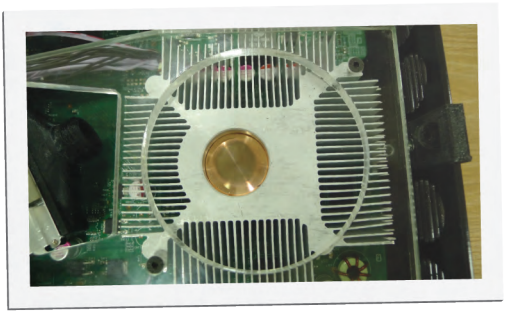
Next step is to fix this assembly on to the Xbox motherboard heatsink. There are two cavities on the top right and bottom left of the heatsink to hold screws in place.





Use two M3 x 10 countersunk screws, part #35, to bolt this assembly on to the heatsink. The screw holes in the acrylic plate should align with the two cavities discussed above which will hold the screws in place.

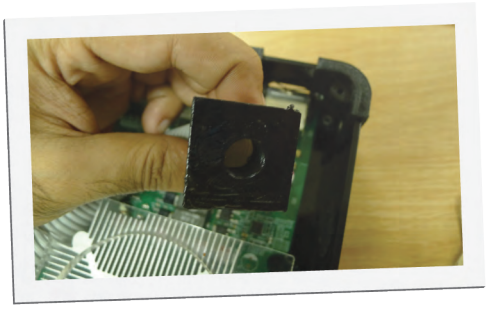


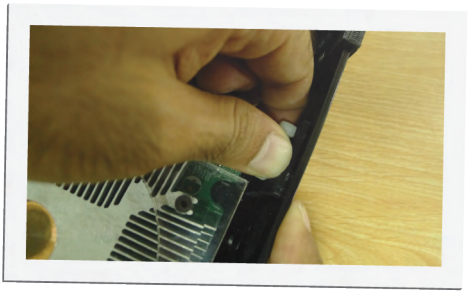


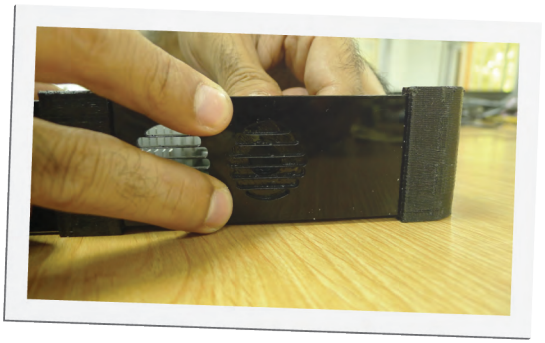
This is how the cooling assembly should look like with the acrylic plate in place.

Now we need to fix the 3D printed fan ducts to the laptop chassis. Note there are 4 fan openings on the right plate of the laptops chassis. We will be attaching fan ducts to the upper most and lower most openings as discussed below.

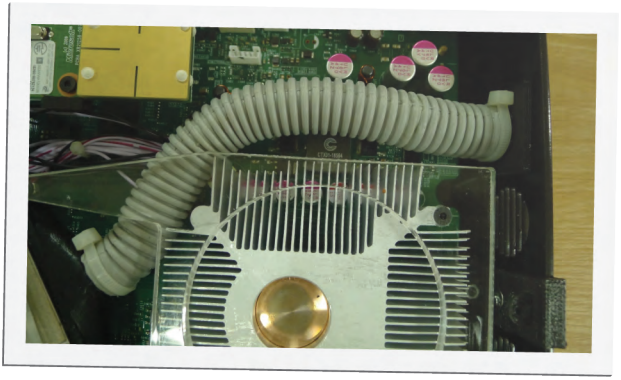
Apply epoxy glue to the flat face of the 3D printed fan duct, then firmly press this against the inside wall of the top most fan opening.





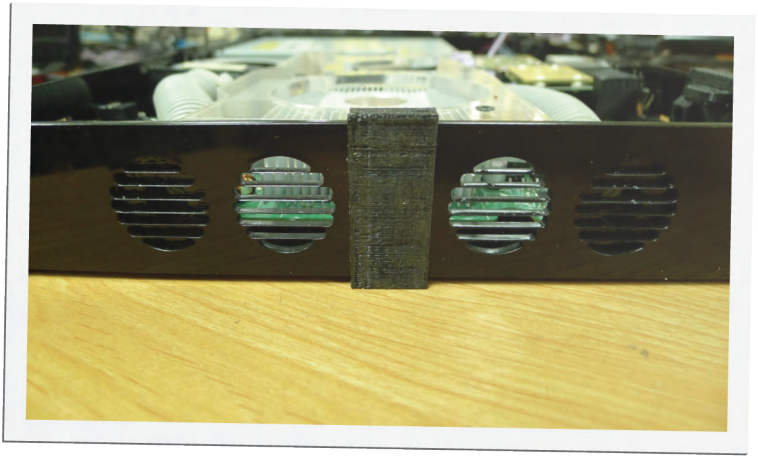


Make sure the opening in the fan duct is centered with the opening. Let the glue set.

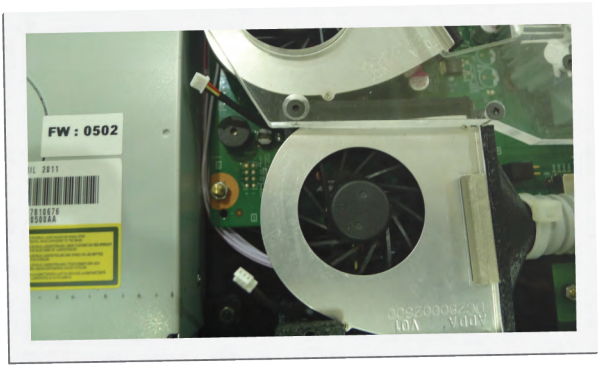


This is how the upper fan duct assembly looks like with the fan duct glued to the chassis. Follow the same steps for the bottom fan duct. Glue the lower fan duct to the side wall centering it with the opening.

The picture below shows the two fan ducts secured to the right panel of the laptop.

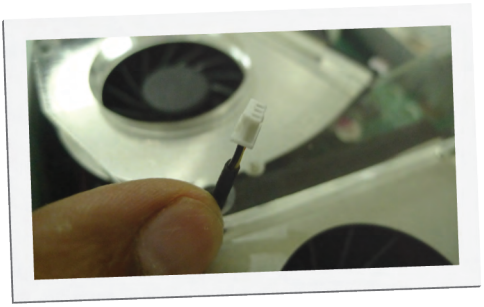


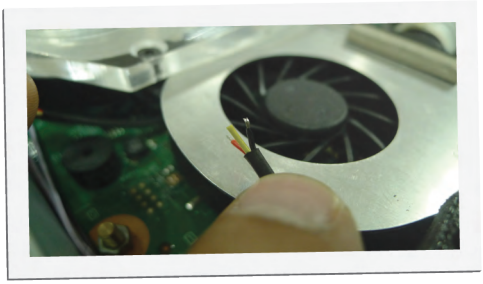
The fan assembly is now in place as shown in the picture below. Power connections to the fans will be made next.



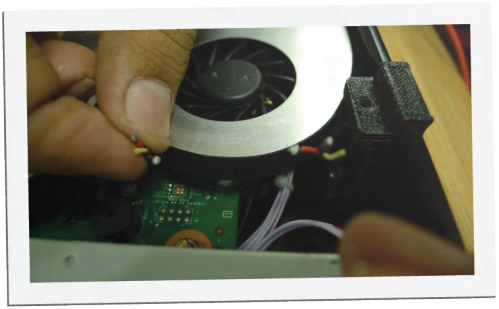
Each fan has a small 3 pin connector wired to it as can be seen in the left picture. There are 3 individual wires coming from each fan; red, black and yellow. We'll be using the red (+5V) and black wires (GND) to power both fans.

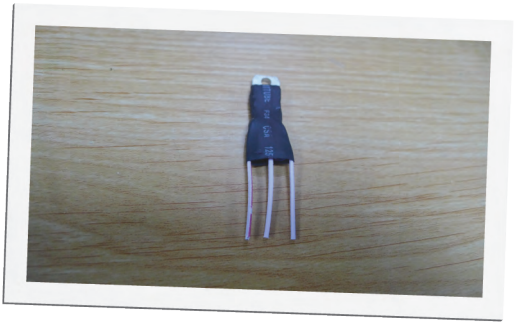
Snip off each connector with a wire cutter/stripper. Then strip some insulation off of the red and black wires.





We need +12V and GND connections from the Xbox motherboard. Refer to Step 4 for power connections. Connect two wires, one for +12V and one for GND to the Xbox power port. We will be connecting these wires to the fans in the following steps.



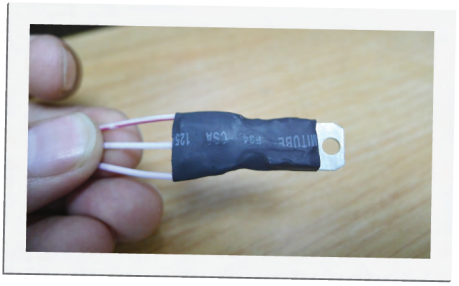


To provide 5 volts power to the fans from the +12V Xbox input we will need the 5V Regulator included in the kit, part #53 In the BOM. It has 3 wires soldered to it when viewed from top (heatsink side on the bottom) from left to right i.e. input, GND and 5V output.

Following are the connections we'll be making to this regulator, from the left:

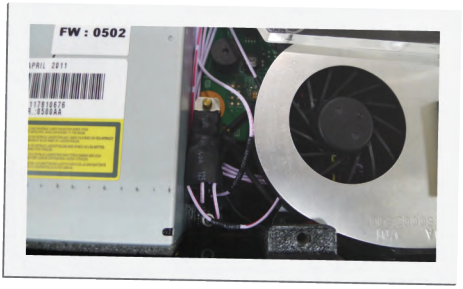
+12V in (from Xbox)	GND (common with Xbox + Fans)	+5V (output to fans)

Solder the +12V power input from the Xbox motherboard to the left most wire. The middle wire of the regulator will be soldered to the Xbox ground and to the fans ground. The last wire on the right will be soldered to the +5V fans power input wire. Use a 2mm heatshrink, part #60, to insulate the soldered connections.



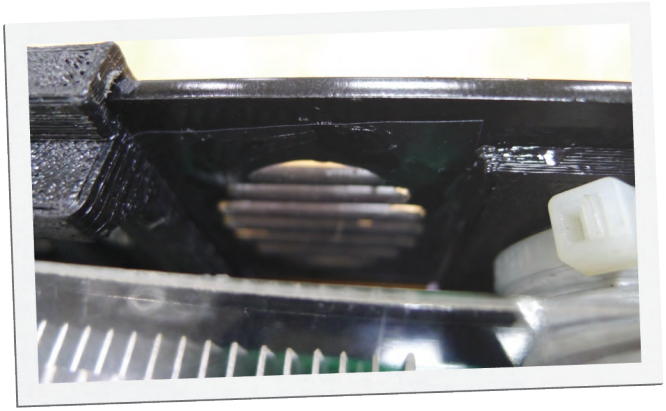
Here you can see all the above mentioned connections soldered and about to be covered in heatshrink sleeving.

Note that the regulator has a metal heatsink tab with an M4 hole in the middle. Place the Regulator as shown in the picture below to the nearest M4 standoff on the laptop chassis and fasten it with an M4 hex nut.



Finally, we need to cover the remaining two fan outlets on the right panel of the laptop chassis with plastic film, part #55 in the BOM.

Cut two 1 inch by 1 inch squares out of the plastic film as shown.



Apply glue on the inside wall of the two fan openings in the middle of the right laptop panel and cover the openings with the plastic film squares. Make sure the openings are sealed well and air cannot pass through. This is important for the cooling system to work properly.

Step 11: HDD Installation (Optional)

The Darkmatter laptop is designed to house a standard 250Gb hard drive as an expandable storage media for the Xbox. In this step we will detail how to install and connect an HDD within the Darkmatter laptop. For info on which particular HDD makes/models are compatible with the Xbox and how to format a standard HDD for the Xbox please refer to the following link:

http://digiex.net/guides-reviews/console-guides/xbox-360-guides/3152-how-hack-250gb-320gb-sata-drive-work-xbox-360-xbox-360-slim.html

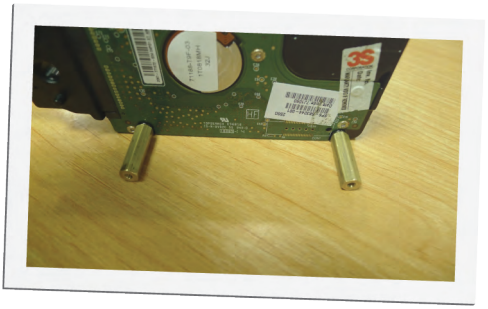
For this guide we used a Western Digital 250Gb HDD (Model no: WD2500BEKT).

Tools and equipment required for this step include a soldering station, solder wire, wire strippers/cutters and allen keys.

We start off with the 250 HDD and the HDD connector we salvaged from the Xbox teardown in Step 2:

We will need two 22mm M3 Hex standoffs, part #27 in the BOM, to mount the HDD to the laptop chassis.

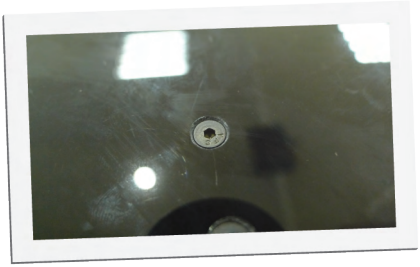
Locate the four threaded screw holes on the underside of the HDD. With the HDD positioned with the I/O and SATA connectors on the left, the two standoffs will be mounted to the bottom two threaded holes. Rotate the standoffs clockwise and tighten them against the HDD.



With the HDD connector and the standoffs in place on the HDD, this assembly is now ready to placed within the laptop chassis.

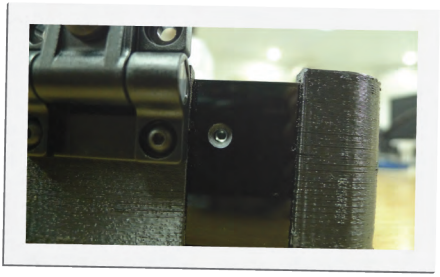
With the front of the laptop chassis oriented towards you, this HDD assembly will be slid in from behind the right end of the DVD drive. Position the HDD in the manner shown.

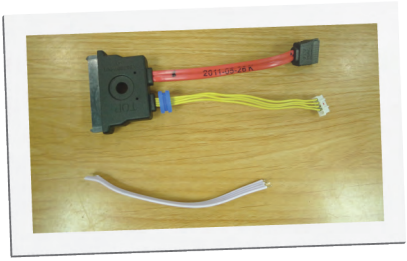
Two M3 screw holes on the bottom plate of the laptop should align with the standoff holes of the HDD assembly.



Screw in two M3 x 6 countersunk screws, part #32, to fasten the HDD standoffs against the laptop bottom plate.

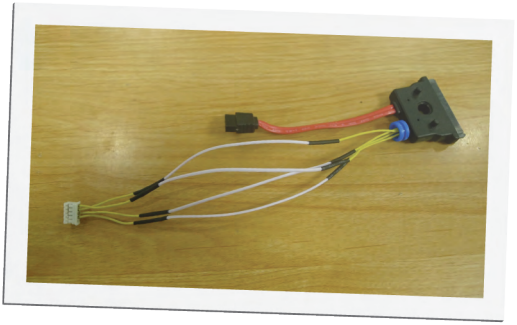
Now locate two holes on the rear panel of the laptop chassis that should align with the threaded holes on the sides of the HDD. Insert two M3 x 12 countersunk screws and tighten until the screw head is flush with the rear panel and the threads have gripped the HDD sides.



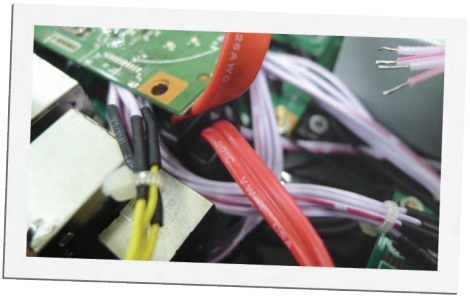


Before we can connect the HDD to the Xbox motherboard the yellow wires on the HDD connector pictured above need to be extended. Take five 4 inch lengths of braided wires and extend the yellow wires.

Solder the joints and insulate them using heatshrink tubing to give the final look as shown. Tie the wires together using cable ties.



The white connector on the HDD connector will be attached to the respective connector on the Xbox motherboard as shown above. The SATA connector on the HDD connector will be connected to its respective connector marked 'HDD' on the Xbox motherboard. This is pictured below:



Finally the HDD connector will be attached to the HDD in the manner shown. The HDD assembly is now attached and ready.

Step 12: Display Screen Installation

In this step we will assemble the laptop lid and install the display panel within it. Tools and equipment required include epoxy glue, set of files, soldering station, solder wire, allen keys and dual tape.

Please note that the following instructions detail how to install the 720p Display Panel within the laptop lid. For instructions on the 1080p HD Display Panel installation please refer to an updated version of this manual.

Start by placing the laser cut Lid Top Panel, part #22 in the BOM, on your workstation with the Darkmatter logo cutout facing you as shown below.

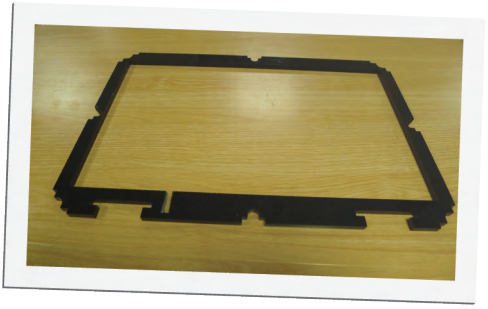
We will be gluing the white laser cut Darkmatter Logo, part #67, within the cutout in the Lid Top Plate.

Turn the Lid Top Panel over on its back with the Darkmatter logo inverted as shown below.

Carefully apply epoxy glue on the sides of the white Darkmatter logo and place it within the cutout in the lid top panel.

Clean off any excess glue and let it set and harden.

Next we'll need the Upper Hinge Support 3D printed parts, part #10 in the bill of materials. Using a set of files, carefully sand and even out all the rough surfaces.

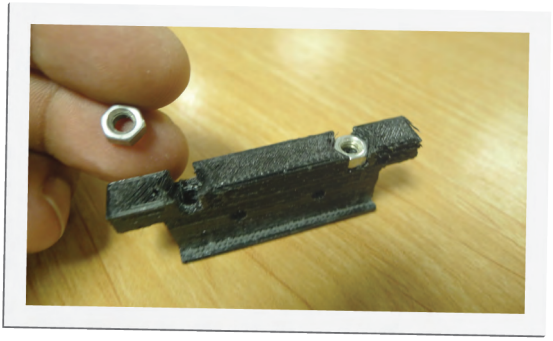


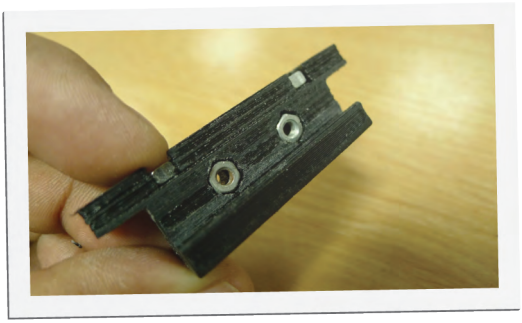
Next we'll need the laser cut Lid Middle Panel, part #20 in the BOM.

This part will be glued on to the rear side of the Lid Top Panel we worked with earlier. Note the notch towards the bottom left side of the Lid Middle Panel. The Lid Middle Panel will be glued to the rear side of the Lid Top Panel such that the notch is towards the left side of the assembly.

Evenly apply a thin layer of epoxy glue to the bottom of the Lid Middle Plate.

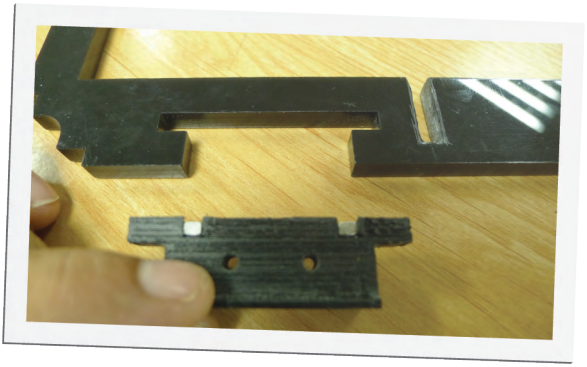
Take the Upper Hinge Support parts we were working with earlier and insert two M4 Hex Nuts in the cavities on top (to each part) as pictured.



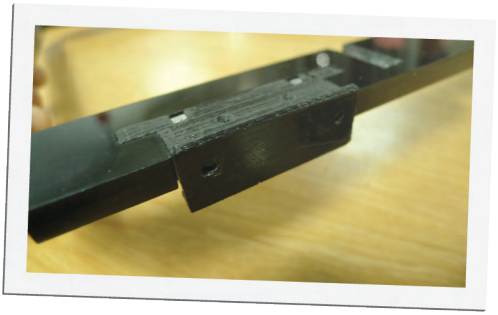


Insert two M3 hex nuts to the hexagonal cavities on the sides of the Upper Hinge Support parts as shown.

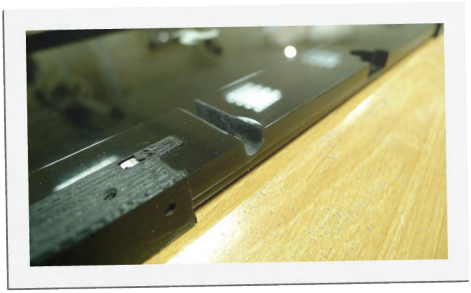
Now keeping the M3 nuts side of each part towards the bottom slip these parts within the Lid Middle Panel cutouts as shown here.



The top and bottom surfaces of the Upper Hinge Support parts should be flush with the top and bottom faces of the laser cut part.



With both Upper Hinge Support parts in place, glue the Lid Middle Panel to the Lid Top Panel as shown above. There is an elongated tab on each Upper Hinge Support part. These should grip the Lid Top Panel firmly. The side edges of the both laser cut parts should also be flush with each other.

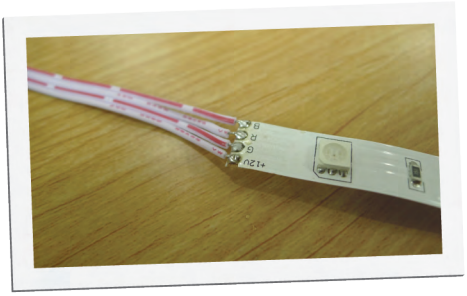


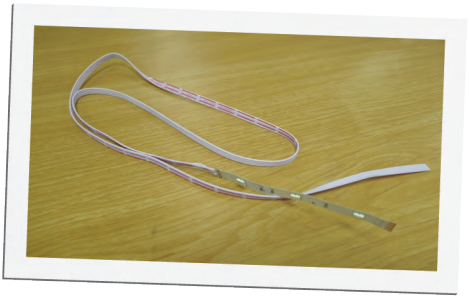
Note the small notch in the assembly. This recess is there to allow the LED wires to pass through to the main laptop chassis.

Take the display panel, part #51, and turn it over on its back

We will paste an LED strip right in the middle of the bottom surface of the display screen. This is to illuminate the white acrylic Darkmatter logo on the laptop lid.

We'll need an RGB LED Strip, part #40 in the BOM. Prepare four 20 inch long lengths of braided wire, part #41, and solder these to the four R, G, B and +12V points on the RGB LED Strip.

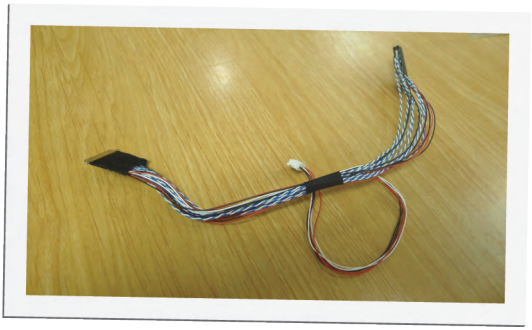




The RGB Strips are adhesive backed. We'll remove the protective covering from the back before we can paste it on to the display screen.

Measure 110mm from the top edge of the display screen and 180mm from the side edge. Mark this point on the rear of the display panel with a marker/pencil.

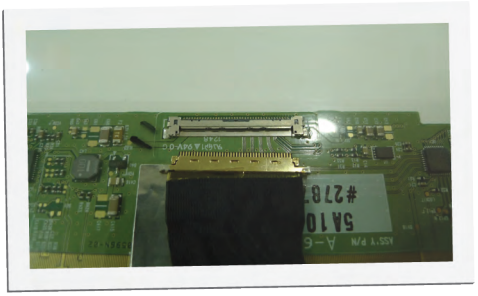
We'll paste RGB strip over this point such that the middle RGB LED on the strip is positioned exactly above the marked point. Remove the adhesive protective covering on the rear of the strip before you paste it.



Next we'll be attaching the display driver cable that comes attached with the Display Driver board, part #52, to the Display Panel.

There's a thin connector on one side of the display driver board cable pictured above. We will hook this up to the Display Panel.

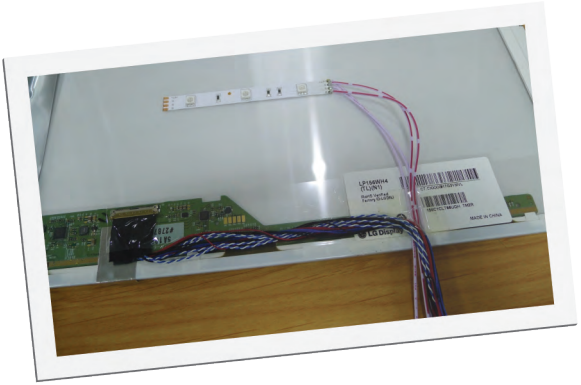
Locate this connector on the rear of the Display Panel. The above mentioned connector will slide in to this.



Carefully align and position the connector as shown above and slide it in.

This is how the connectors should look when attached together correctly.

Bundle both the display driver board and RGB strip cables together as shown below.



Before we place the Display panel within the lid assembly we need to paste a couple of layers of dual tape to secure the panel in place with the Lid Top Panel.

Place two parallel strips of dual tape, part #66 in the BOM, on the Lid Top Panel as shown to the left. Stack two more layers of dual tape on top of this strip. Now place the display panel within the assembly carefully routing the cables through the notch on the lower left of the lid assembly.

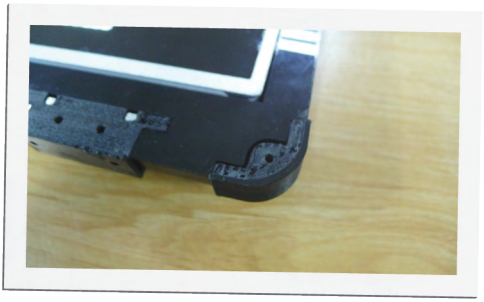
The top face of the display panel should now be flush with the top surface of the Lid Middle Panel.

We'll now need four Upper Side Support 3D printed pieces, part #11 in the BOM, for the following assembly steps.

Using a set of files sand down any rough edges on these parts.

Now slip an M3 hex nut within the hexagonal cavity towards the inside of the part as shown above.

Once the M3 hex nuts have been placed within all four pieces, fix these Upper Side Support parts to the four corners of the lid assembly as highlighted in the following set of pictures.

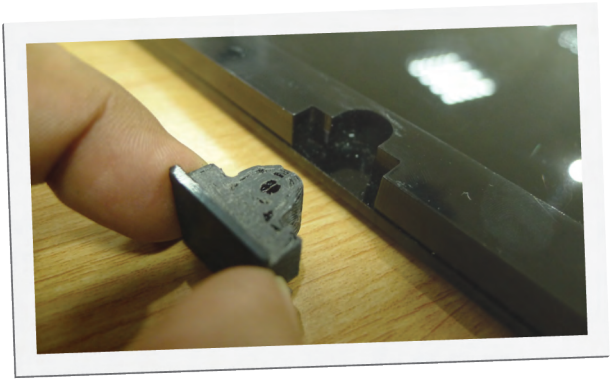


The elongated edge of this part should firmly grip the Lid Top Panel from its rear.

Next we'll attach the Upper Middle Support 3D printed parts, part # 12, to the lid assembly. Before these get fixed to the lid we would need to sand any rough edges so that they fit nicely.

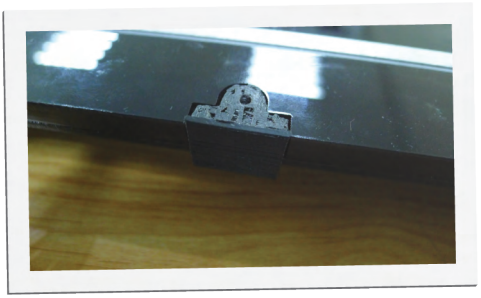
Use a set of files to carefully sand down the parts.

Insert M3 hex nuts within the hexagonal cavities in the Upper Middle Support parts as shown.



Once this is done these will then be attached to the cutouts in the laser Lid Middle Panel.

A total of four of these will be attached to each side of the assembly.

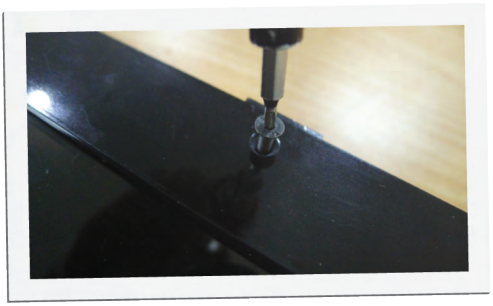


This is how the assembly should look with all the 3D printed parts in place.

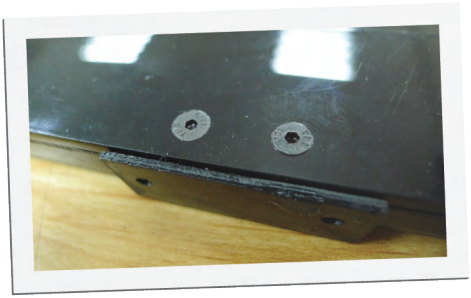
The final piece that is left to be attached to this assembly is the laser cut Lid Bottom Panel, part #21 in the BOM, pictured to the right.

Now carefully align and place the Lid Bottom Panel over the assembly.

Align the countersunk screw holes in the panel with the holes in the 3D printed parts. Now, starting with the left side of the panel screw in an M3 x 10 countersunk screw (part #35) using the required Allen key.



Do the same for the opposite side and then for the top and bottom sides.



Next screw in M3 x 10 countersunk screws in the Upper Hinge Support parts.

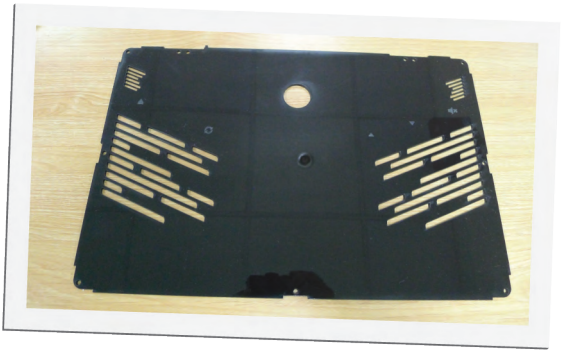
Upper Side Support parts will come next. These are four in total and are attached to the four corners of the assembly.

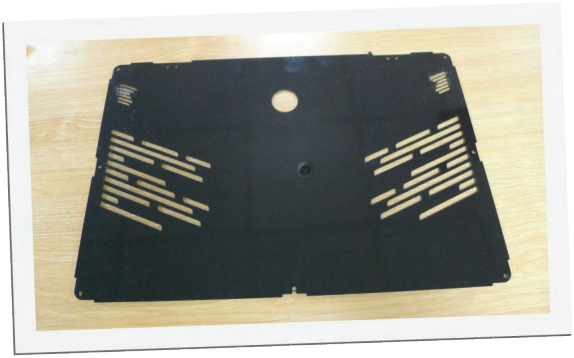
With all the screws in place, this is how the assembled laptop lid should look like.

Step 13: Top Plate Installation

This step involves preparing the top plate of the laptop chassis for final assembly. Tools and supplies required are epoxy glue, set of files and tape.

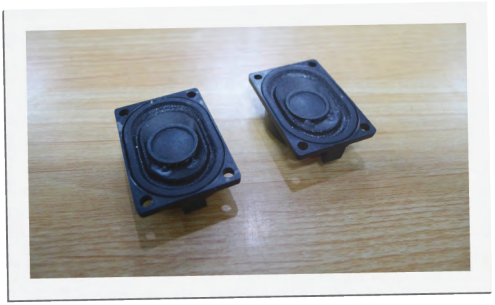
Place the laser cut Casing Top Panel, part #18, on top of your workstation. Note the slanting cutouts near the top edge. Speakers will be mounted directly under these cutouts.

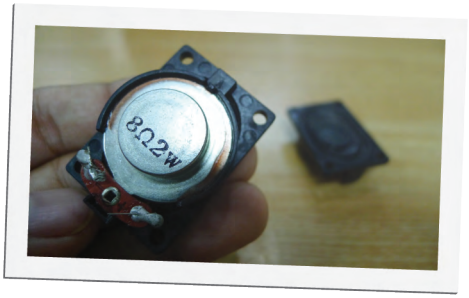




Turn the panel over on its back. We'll permanently fix speakers to this side of the plate.

The kit comes with two 2W 8ohm laptop speakers, part #43 in the bill of materials.

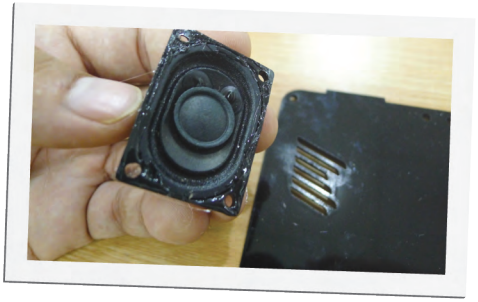




Notice the solder points at the back of the speakers. These are marked with a – and + sign indicating the negative and positive terminals.

Apply a thin layer of epoxy/glue to the outside edges of the front face of the speakers.

Press the speakers firmly over the laser cut speaker grille. Let the glue set.



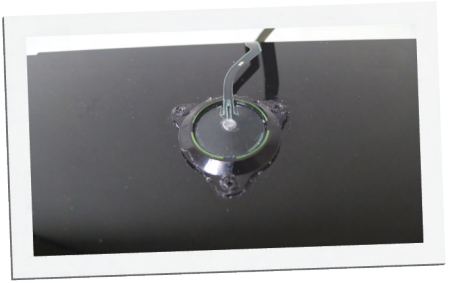
This is how the Casing Top Panel should look like with the speakers glued on.

Next we'll need the Power button/Flex Circuit we salvaged out of the Xbox Teardown in Step 2.

Notice the three plastic tabs on the outside edges of the power button. We'll apply glue to these and attach this to the hole in the middle of the Casing Top Panel from its underside.

Also notice there's a plastic protrusion at the rear of the power button. Sand this down carefully to about an mm with a file. Take care not to damage the flex circuit while filing since any damage can render the power button useless.

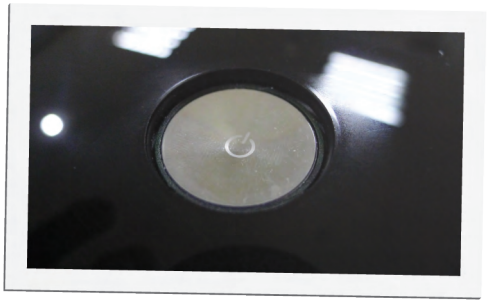
Now apply epoxy to the black plastic on the outside edge of the power button and firmly press this against the underside of the Casing Top Panel aligning it with the hole.



The green rings visible in the picture should be visible from the top of the Casing Top Panel.

Locate the 'eject' engraving on the top face of the Casing Top Panel. This is supposed to function as the eject button on the Darkmatter laptop. To make this button functional, we need to tape the eject flex circuit on the underside of this engraving.

Locate the above 'L' shaped part of the flex circuit. This needs to be taped directly below the 'eject' engraving:

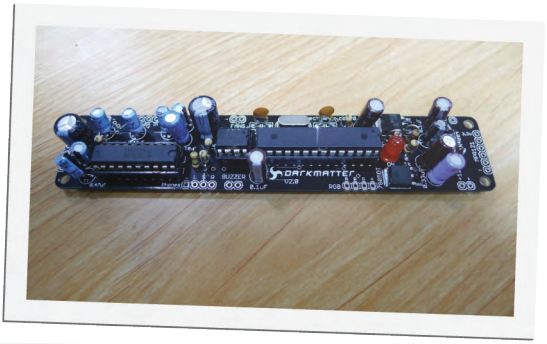


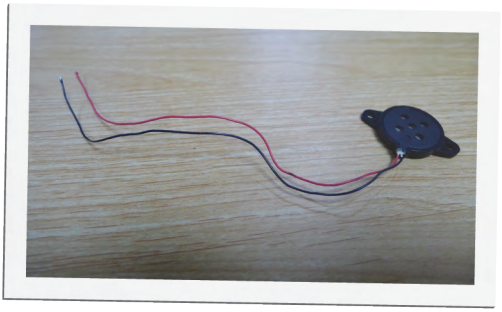
Once the flex circuit and power button is in place this step is complete.

Step 14: Xduino360 Installation

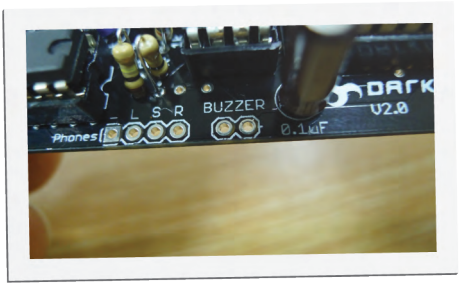
In this step we will hook up the Xduino360 board to the laptop. This board handles the capacitive touch inputs and also features an onboard amplifier to power the laptop's speakers. Tools and equipment required in this step include soldering station, solder wire, glue and Allen keys.

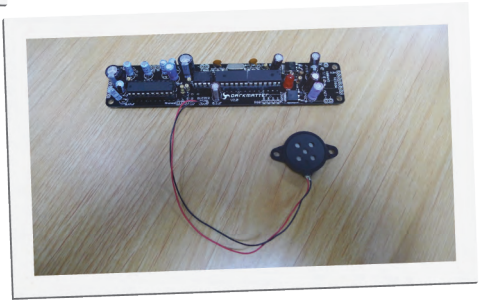
The Darkmatter Xduino360 board, part #44, comes with most items pre-soldered. The first step is to solder the piezo buzzer (included with the Xduino360 board) to the Buzzer pins on the board.



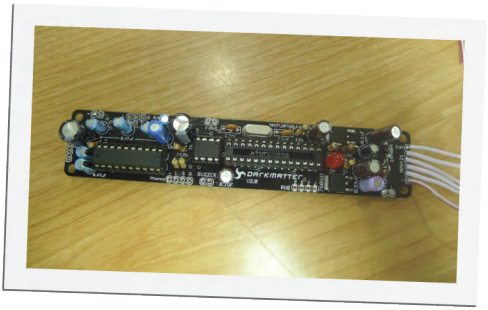


The piezo buzzer has two wires connected to it, the red is positive while the black one is negative. We will solder the black wire to the pin marked – and the red pin to the adjacent pin. We will glue the buzzer to the laptop chassis at a later stage of the build.

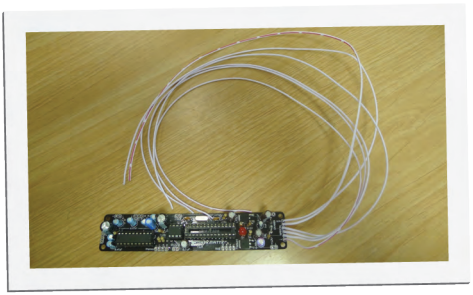


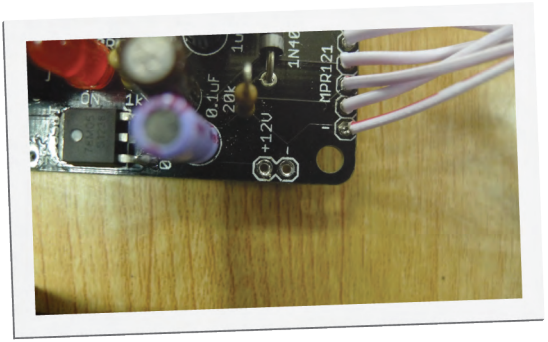


Next prepare six 20 inch long braided wires. Solder one end of these to the MPR121 pins on the right end of the board as shown below



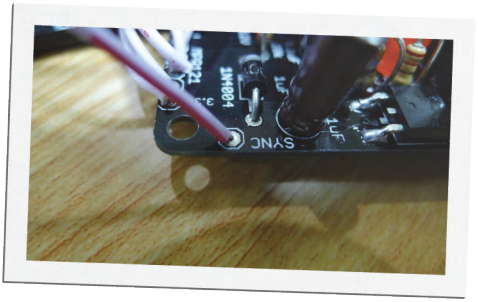
We will solder the other ends of these wires to the MPR121 breakout board (also included in the kit) in a later step.

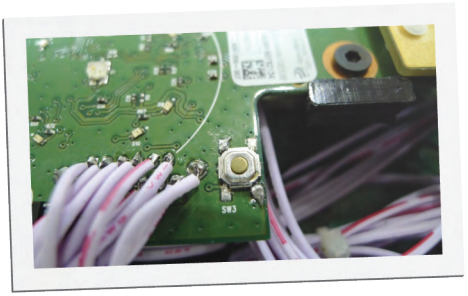




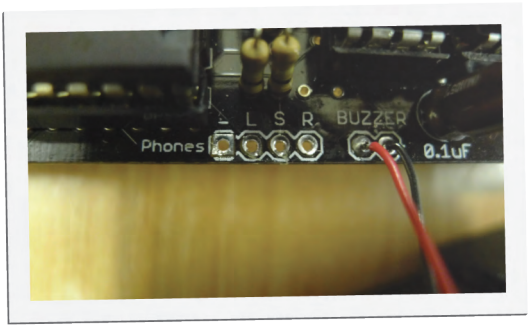
Locate the Power pins on the lower right corner of the board marked +12V and -. Connect these to the +12V and GND wires we soldered in an earlier step to the Xbox motherboard.

Now, prepare a single 15 inch long braided wire and solder it to the Sync pin on the top right corner of the Xduino360 board. The other end of this wire will be soldered to the momentary push button on the ring of lights board pictured below.



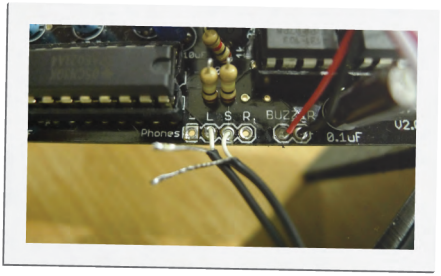


Solder it to the top left pin of the momentary push button as shown below.

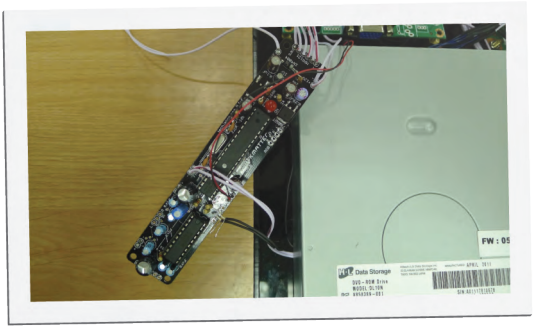


Next we will make connections to the pins marked 'Phones' on the Xduino360 board. These are to be connected to the headphone jack on the USB/Audio breakout board we installed earlier to the laptop chassis. In an earlier step we soldered shielded wires to the USB/Audio breakout board. We will use the same wires and solder these to the above mentioned pins on the Xduino360 board.

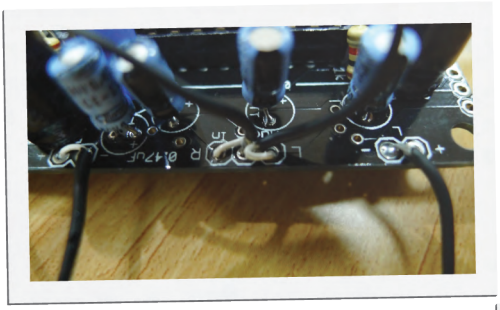
The Left (L) pin on the USB/Breakout board will be wired and soldered to the L pin on the Xduino360 board as shown above. Same goes for the S and Right (R) pins as shown in the following pictures. The shields (GND) of each wire will be bundled together and soldered to the – pin on the left.



The Xduino360 board, once all connections are soldered to it, will be installed in the cavity to the left side of the DVD drive when the chassis is viewed from front. It is advisable that you keep the board as close to the cavity as possible while soldering connections to it to keep excess wire lengths to a minimum.



Locate the L, R and 'Audio In' pins on the top left section of the Xduino360 board. Audio signals from the motherboard (pins 15 and 16 of the component video out port) will be fed to the 'Audio In' L and R pins and their shields will be soldered to the third pin in the middle. In an earlier step we made wiring connections for the audio out left and right signals on the Xbox motherboard. The other ends of these wires will now be soldered to the Audio In pins in the manner discussed above.

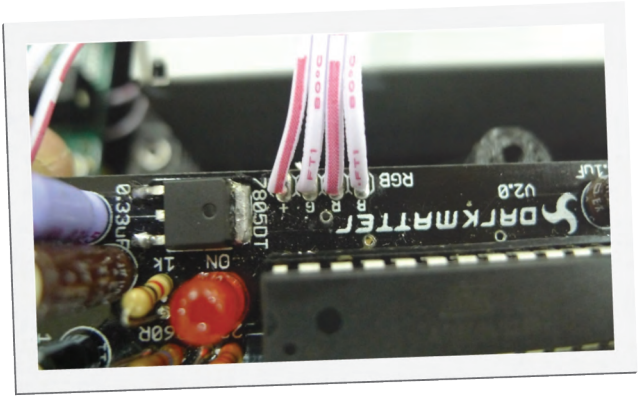


The above picture shows the Audio In connections soldered to the board. Prepare two lengths of shielded wires for the laptop speakers. Solder the core of each wire to the pins marked + for both the L and R outputs. The shields of both these wires will be soldered to the adjacent pins marked -.

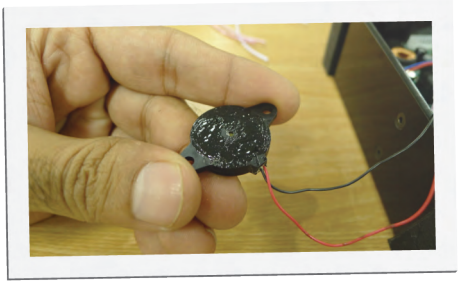
With the L and R wires in place on the Xduino360 board, now solder the other ends of these wires to the laptop speakers. The core will be connected to the + pin while the shield will be soldered to the – pin as pictured.

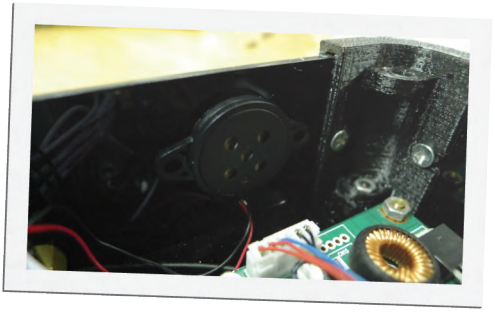
This is how the underside of the Casing Top Panel should look like with the speaker connections made.

Now we'll solder connections to the RGB pins on the lower right side of the Xduino360 board. Solder approximately 10 inch long braided wires to the B, R, G, + pins. We'll connect these later to the three RGB strips in the laptop.



Apply glue to the underside of the piezo buzzer we connected earlier to the Xduino360 board and fix it to the inside wall of the left laser cut panel of the laptop as pictured below.

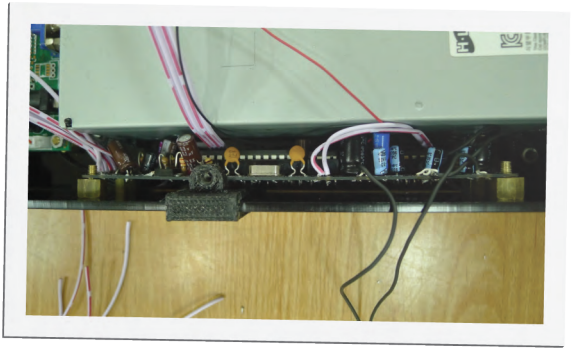


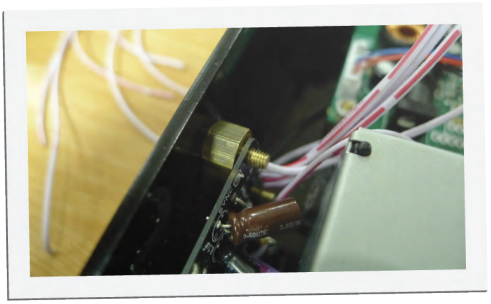


Next we'll attach the Xduino360 board to the left panel of the chassis with four 6mm M3 Hex standoffs, part #25 in the BOM.

Note the countersunk screw holes drilled in the left panel of the laptop chassis. The standoffs will be bolted to the assembly with screws through these holes.

Mount the four standoffs to the standoff holes on the board. Slip the Xduino360 board in the cavity between the DVD drive and the left laptop panel. You may need to remove the DVD drive temporarily to fix the Xduino360 board in place. Once in place, align the standoffs with the screw holes and fasten these with M3 x 6 countersunk screws, part #32 in the BOM.



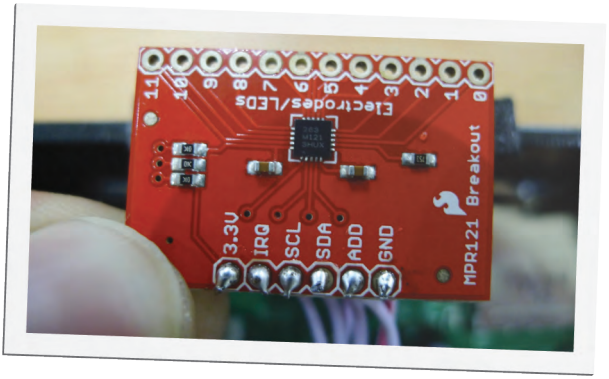


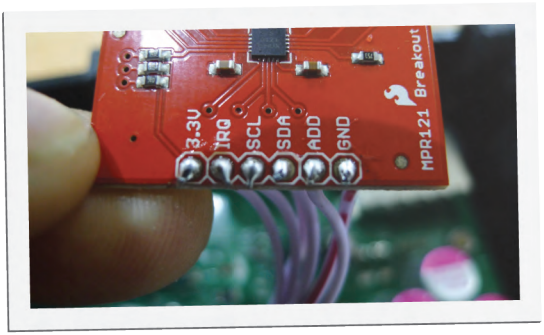
Use M3 Hex nuts to secure the board in place with the standoffs as shown in these images. Xduino360 assembly is now complete.

Step 15: Touch Board Installation

In this step we will install the MPR121 Breakout board the purpose of which is to enable capacitive touch inputs for Volume Up, Volume Down, Sync and Mute. Tools and supplies required are dual tape, soldering station, solder wire, cable ties, wire stripper/cutter, epoxy glue and tape.

In the previous step we made wiring connections to the Xduino360 board for the MPR121 breakout board. There were six wires we soldered to the pins marked 'mpr121'on the right edge of the Xduino360 board. The MPR121 breakout board features the same pins on the bottom edge of the board and there is a one to one mapping between these and the ones on the Xduino360 board. Solder these together making sure the correct pins are connected together.

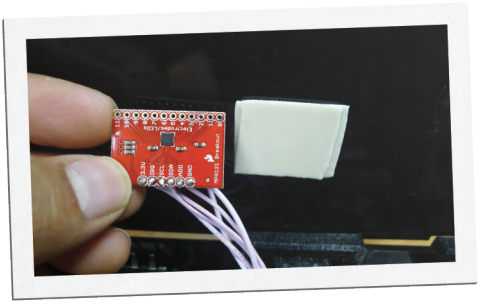




Once these connections are made, bundle the wires together using cable ties and route these from under the ring of lights board. Position the MPR121 breakout board near the right corner of the laptop casing as shown below.

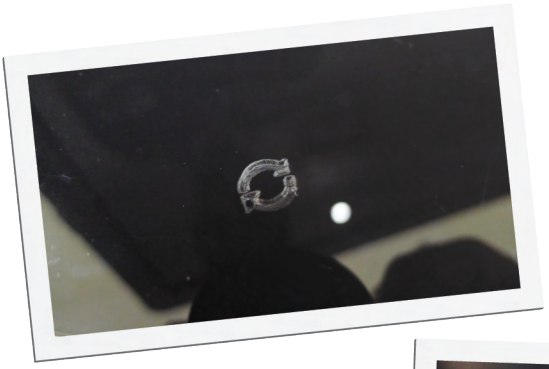
Keep the Casing Top Panel propped up as pictured above. The breakout board will be fixed to the underside of the Casing Top Panel near the right speaker.

Cut two pieces of an inch long dual tape and paste it near the right speaker on the underside of the Casing Top Panel as shown below.

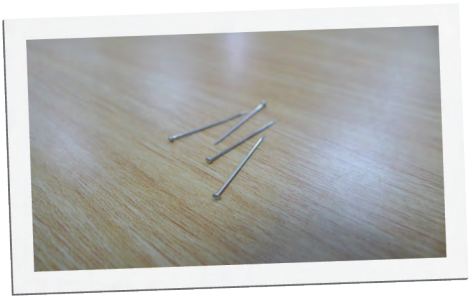


Press the board firmly against the dual tape and fix it permanently to the assembly.

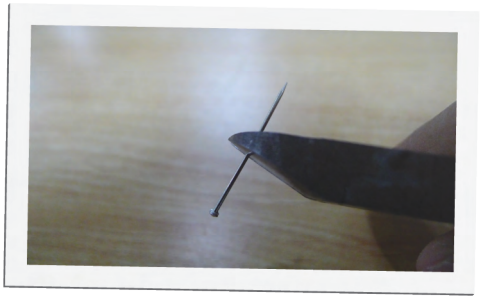
Flip the Casing Top Panel over and locate the engravings for sync, volume up, volume down and mute. Notice there is a small hole drilled in each engraving (see close-ups below). These are supposed to take in electrodes for the MPR121 breakout board for the touch inputs to work properly. Electrodes register touch inputs and the MPR121 IC can tell when a change of capacitance has occurred when an electrode has been touched.

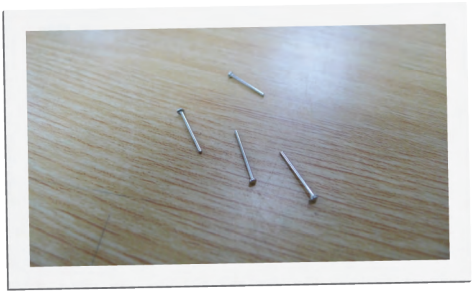


We will use common pins as electrodes for the MPR121 board. These are included with the kit and can be found as part #56 in the bill of materials.



Using a pair of wire cutters, snip of the pointed edge of the pin from the middle as pictured here.



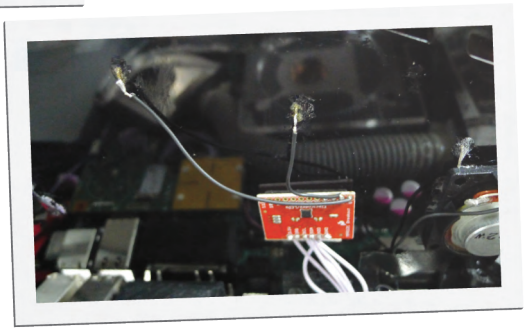


Now insert the pins within the holes in the engravings keeping the pin heads on the top side of the Casing Top Panel as pictured below.

Bend the pins from the underside of the Casing Top Panel as shown below.

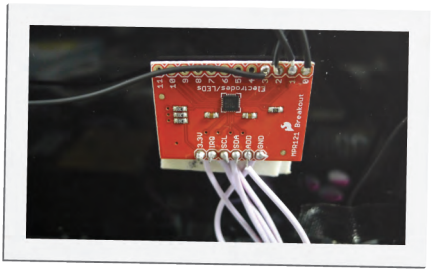
Once all these pins have been bent in the manner shown above, carefully apply epoxy to the holes from the underside of the panel to permanently fix these pins in place.

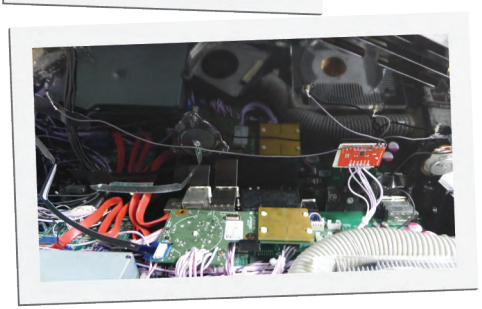
Once the epoxy is set and the pins are fixed in place, we will use shielded wires to connect the pins to the electrode inputs on the breakout board. The breakout board features a total of 12 electrode inputs from 0 to 11. We will solder connections to pins 0, 1, 2 and 3. Here is the Pin mapping for the Sync, Vol Up, Vol Down and Mute inputs:



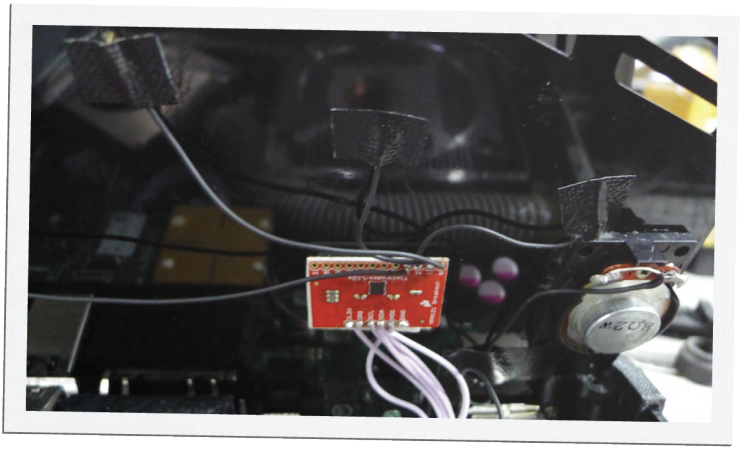
Input	Electrode No. (MPR121 board)
0	Volume Down
1	Volume Up
2	Mute
3	Sync

Solder the connections given in the above table. Use the core of the shielded wires to connect the pins to their respective electrode inputs on the MPR121 board.





Once all the connections have been soldered, cover the pins with tape.



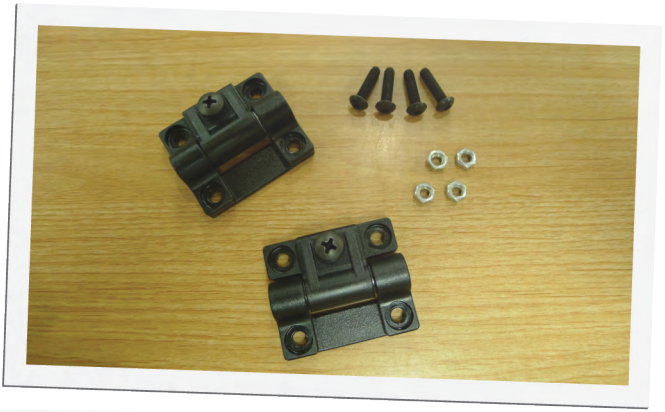
And with this step this section is complete.

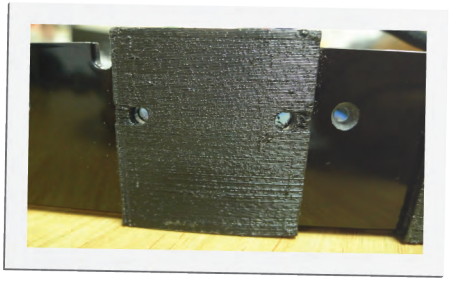
Step 16: Final Assembly

In this section we will assemble the lid to the laptop chassis via friction hinges and solder on the RGB strips for accent lighting. This will be followed by chassis top lid assembly and preparing the laptop for testing and regular use.

Tools and supplies required are Allen keys, Philips head screwdriver, soldering station, solder wire, tape and glue.

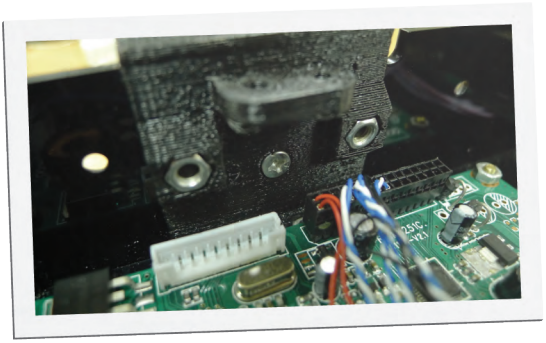
There are two adjustable friction hinges included with the kit, part #28 in the bill of materials. We will need these, four M4 hex nuts (part #30), four M4 x 16 pan head screws (part #37) and four M4 x 20 pan head screws (part #38).





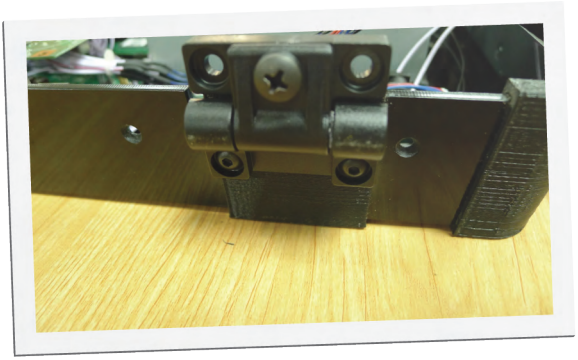
Locate the two M4 sized holes in each of the Lower Hinge Support parts. The lower half of the adjustable friction hinges will be mounted through these screw holes using M4 x 16 pan head screws.

Insert two M4 x 16 pan head screws in each of the adjustable friction as pictured below.

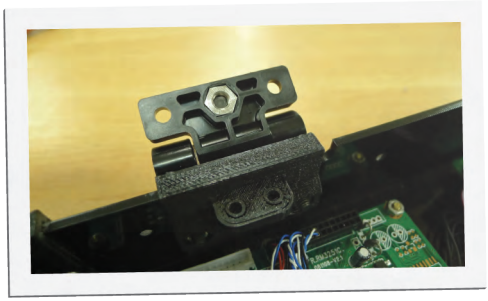


Locate the hexagonal cutouts towards the inside wall of the 3D printed Lower Hinge Support parts. Insert M4 hex nuts in each of the hexagonal recesses in both the Lower Hinge Support parts as shown below.

Screw in the lower half of the adjustable friction hinges with the M4 x 16 pan head screws. These will screw in the M4 hex nuts we placed within the recesses.



Here the adjustable friction hinge is shown fastened to the assembly.



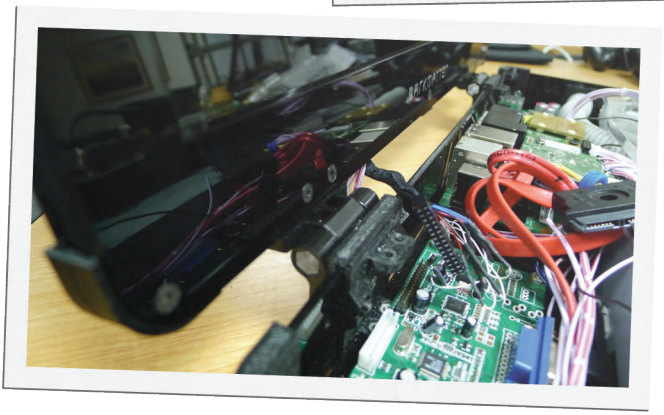
Now place the laptop lid we assembled in an earlier step on top of the laptop chassis with the Upper Hinge Support part flush with the Lower Hinge Support part as shown below.

The screw holes in the upper half of the adjustable hinge should align perfectly with the screw holes in the Upper Hinge Support parts on the lid assembly as shown here.

We now need to fasten the upper half of the adjustable friction hinge to the laptop lid via M4 x 20 pan head screws, part #38 in the bill of materials. Two of these will be needed for each friction hinge.

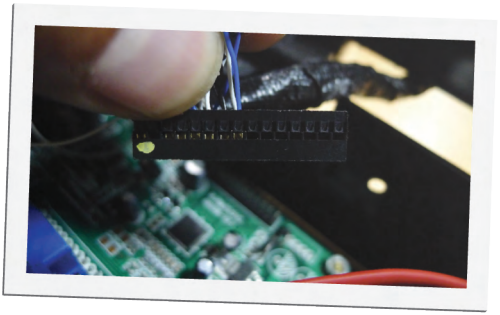
Here the hinge shown fastened to both the lower casing and the upper lid with pan head screws.

The Philips head screw in the middle of the hinge is there to adjust the friction in the hinge. Tighten the screw by a quarter or half a turn till the lid can stand upright on its own as shown below.



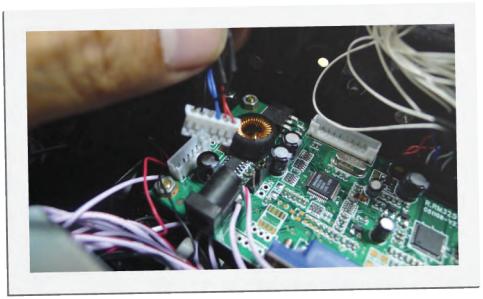
Bundle the wires coming from the lid together and wrap them up in fabric tape, part #68 in the BOM, as shown below. There's a notch in the rear panel near the left friction hinge. The wire bundle will be passed through this notch as pictured here.

Locate the 30 Pin header on the upper edge of the display driver board. The 30 Pin display panel connector pictured below is to be connected to this header. Note the white dot on the lower left corner of the 30 pin connector. This connector will be hooked up to the header on the board with the dot facing the front.

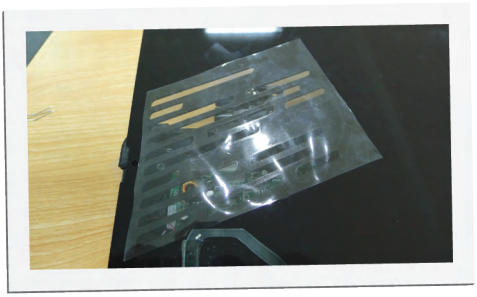


Here the connector is shown hooked up to the board.

Locate the 6 pin polarized female header on the lower left corner of the display driver board shown above. The display panel power male polarized header pictured below is to be connected to this header.



Next cut out a piece from the plastic film included in the kit, part #55, to cover the left large grille of the Casing Top Panel from its underside as picture below.

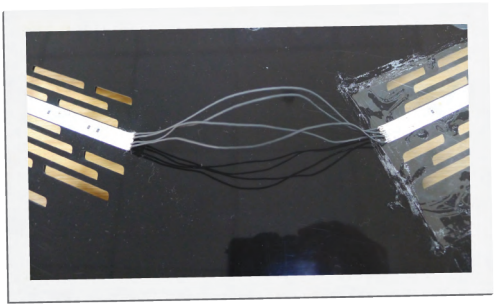


Carefully apply glue to the underside of the grille taking care not to let it spill into the grille and press the plastic film piece firmly over it. Make sure that there aren't any gaps and air cannot pass through.

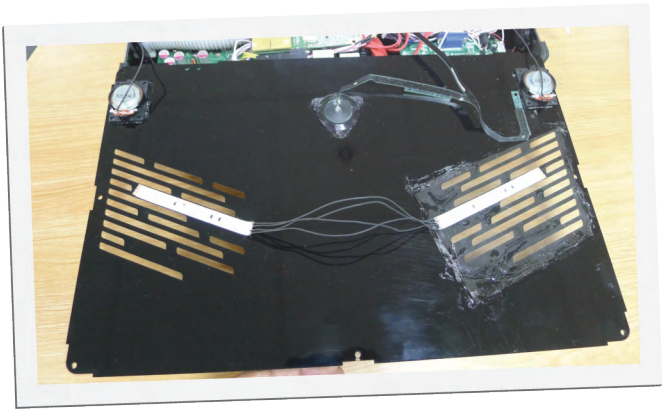
Next we'll need two RGB LED strips for accent lighting under the Casing Top Panel grilles.

Remove the adhesive protective covering from the back of the LED strips and paste them under both the Casing Top Panel grilles as shown below.

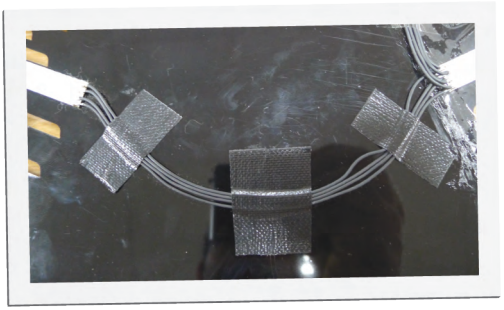
Solder braided wires to the R, G, B and +12V lines on the RGB strips and connect them together as shown below.



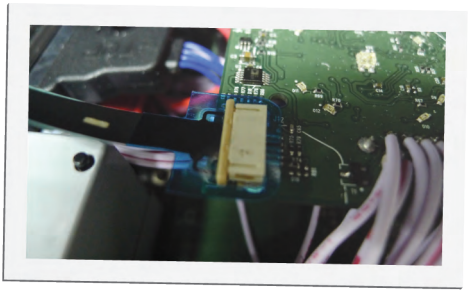
Now we need to connect the RGB lines from these strips to the RGB wires we soldered earlier on the Xduino360 board. Prepare four lengths of braided wires about 15 inches long and solder one end of these to one of the RGB strips as pictured below.

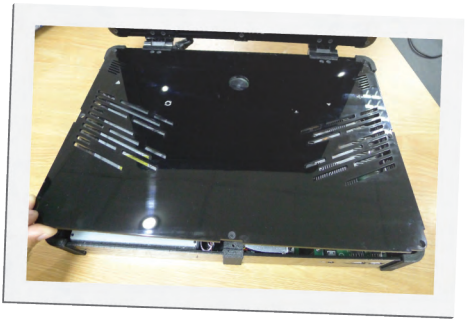


Tape down all connections with fabric tape as pictured here.



The Casing Top Panel is now ready to be attached to the chassis. Connect the power button/eject capacitive touch flex circuit connector to the ring of lights board as shown in these images:

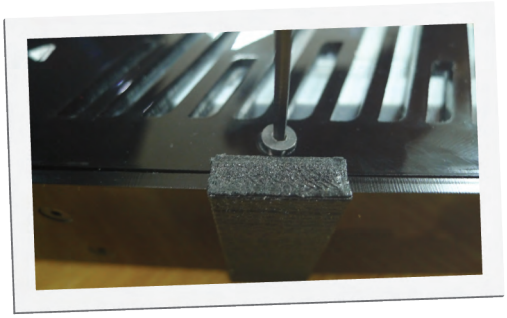




Once this is done we will screw the top panel to the chassis using eleven M3 x 8 countersunk screws, part #34 in the BOM.

Place the top panel over the assembly and screw it down to the chassis with the required Allen key.

The screw holes in the top panel should line up with the screw holes in the 3D printed parts as can be seen in these images.

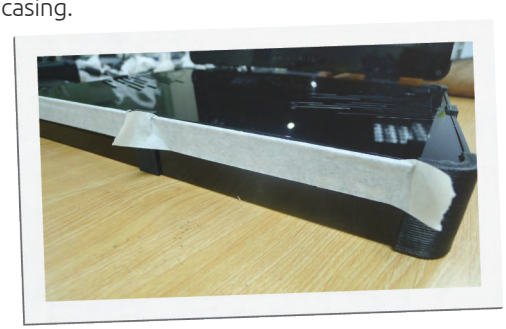


Here the top panel is shown bolted down to the chassis with all the M3 x 8 screws in place.

The final step in this section involves sealing up the chassis with RTV silicone sealant and ensuring that the sides are all airtight. This is to ensure that the cooling fans only draw air from the vent above the heatsink and that air can't get in from the edges and I/O port cutouts etc. The heatsink can only be adequately cooled if air only gets through from the vent right above it. Therefore this step is a must for the unit to function properly. Failure to carry out this sealing procedure properly may result in the motherboard overheating and shutting down.

First, we will need to tape up the edges of the casing to keep the silicone sealant from smearing up the acrylic finish of the chassis. We will be applying silicone to the gaps between the laser cut panels near the edges of the casing.

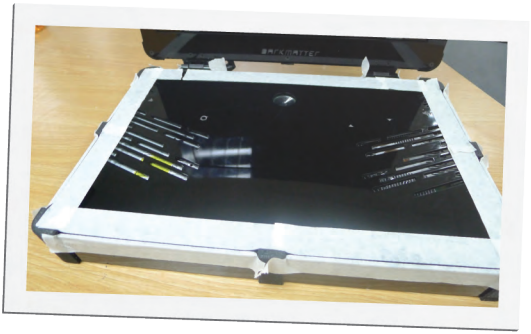
Tape up the edges as shown in these pictures with masking tape, part #65 in the BOM.



Be careful not to cover the gaps between the panels with tape.

Next cover the inside edges of the Casing top panel with masking tape as shown below.

Only the gaps between the panels that are to be sealed should be left uncovered.



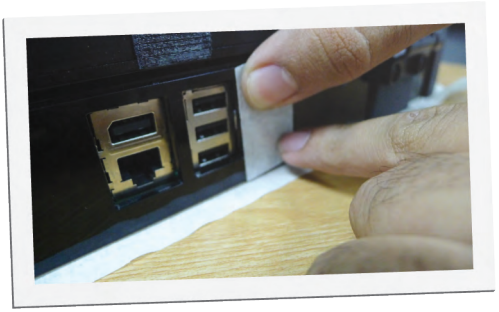
Once the chassis top is covered with masking tape in the manner shown above, carefully squeeze the RTV silicone sealant between the panels.

Apply a consistent bead of silicone throughout the length of the gap. Once done remove any excess silicone with a tissue paper.

Repeat the same process for the Casing Bottom Panel and the bottom edges of the chassis. The bottom half of the casing should be sealed up in the same manner as above.

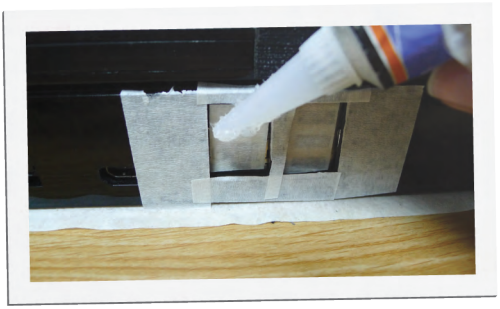
Locate the I/O ports at the rear of the laptop. These also need to be sealed up to prevent any air from leaking inside.

Tape up the rear laser cut panel near the USB/Kinect ports in the manner shown below. The idea is to apply silicone in the gap between the ports and the acrylic panel but prevent any smudging on the gloss acrylic finish.



Then tape up the ports using masking tape as well.

Once this is done apply silicone sealant in the gaps between the ports and the rear panel.



Once all the gaps have been filled, carefully remove the masking tape and let the silicone set for a while.

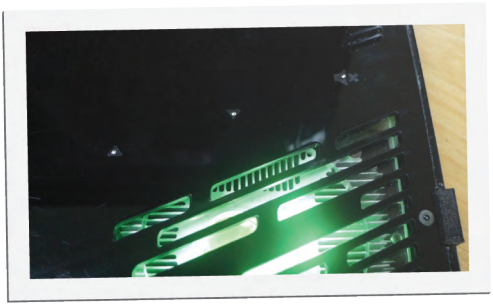
Do the same for any other major gaps where air might get in. Once the entire chassis has been sealed using silicone let the sealant set for 24 hours. Do not turn on the console till the silicone dries.

Congratulations, the build is complete! Move on to the next step to carry out some final testing/tweaking.

Step 17: Testing

We're ready to play now! Power the laptop with a standard Xbox 360 Slim power brick and let the unit run for a while to test out the cooling system and other controls. The unit is powered on (and turned off) by simply touching the Xbox power button as you would do on a standard Xbox 360 console. The green accent lighting under the top panel grilles and the Darkmatter logo behind the lid of the laptop should light up.

Try out the touch controls on the Darkmatter laptop by touching each of the volume up, volume down, mute and sync and eject buttons one by one. In case any one or more don't respond normally please refer to the troubleshooting section. The volume up button should turn up the volume of the built in speakers in the laptop, the volume down button would do the opposite, sync would sync any controllers to the console and the mute button would cut-off sound to the speakers.



Hook up a headphone to the headphone jack on the front of the laptop which would bypass the sound to the built in speakers. Connect a USB storage device to the USB ports on the front to test them. If anything doesn't work as designed please refer to the troubleshooting guide.

Make sure the fans are running and the negative air pressure cooling is working as designed. In case there any major leaks in the chassis, the motherboard may overheat. Please refer to the troubleshooting section in case you encounter any overheating issues.

Troubleshooting:

<to-be-constructed>