Clean Air Cville
Breathe Better

DIY Air Purifier Build Guide | Clean Air Cville

cleanaircville.org/buildguide | *Last Updated: July 2026*

This is a step-by-step guide for how to build a DIY air purifier using computer PC fans and MERV13 furnace filters. These units are generally cheaper (about $130 in supplies), more powerful, and quieter than commercially available air purifiers.

If you do not want to build your own, we recommend Clean Air Kits. Use code *CleanAirCville* to get 5% off, and we receive a 5% commission to support our work! For a cheaper alternative, you can make a Corsi-Rosenthal Box with box fan and four MERV13 filters for about $85.

If this guide helped you, consider donating to support us! givebutter.com/cleanaircville2026

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Supplies

Item	Notes / Links
MERV13 Filters (x2) Filter Size: 16 x 25 x 2 in. Can use 1 in. width, less sturdy	Recommended Brands: • 3M: Filtrete 1900 - Single Filter • Nordic Pure: 2-Pack of 1 in. | 3-Pack of 2 in. • TexAir Filters: MERV 13 Pleats Section (12/case) Some cheap brands do not filter at the level advertised.
Arctic P12 PC Fans (x5)	5-Pack
PC Fan Hub (x1)	2-Pack | 6-Pack
PC Fan Hub to Barrel Pin (x1)	Single Adapter | 5-Pack
Barrel Pin to Wall Plug (x1)	Single Charger | 10-Pack
PC Fan Grills (x5)	10-Pack
Foamcore 20x30 in. (x2)	2 Sheets from a craft store | 10-Pack
Screws M4 size (x20)	100 pcs
Craft Knife/Exacto Knife	Single
Awls	5-Pack | 20-Pack
Duct Tape or Gaffer Tape	We recommend Duct Tape, Gaffer Tape is easier to build with but does not hold as long.
Phillips Screwdriver	
Scissors	

Optional Supplies:

- Zip Ties to secure PC fan cables; white recommended to stand out from black cables
- Wall Plug Extension Cube or rooms with few plugs
- Handle to carry more easily
- Rubber Feet to elevate the unit off the ground slightly
- Strain Relief Grommet to create opening for power cable to pass through foam core

Build Overview

This guide walks step by step through constructing the air filter. The general steps are:

1. Cut four panels out of foam core: Fan Panel, Back Panel, Top Panel, Bottom Panel.
2. Assemble Fan Panel with PC fans, fan grills, and screws attached.
3. Connect PC Fan cables to a central hub, and secure the hub to the Fan Panel.
4. Test electronic connections to ensure that all fans spin before continuing.
5. Start taping together the Fan Panel, MERV13 filters, and the other three panels.
6. Put the power cable exiting the box, finish taping, attach handle and feet.
7. You're done! Enjoy cleaner air, and change the filters every 6-12 months.

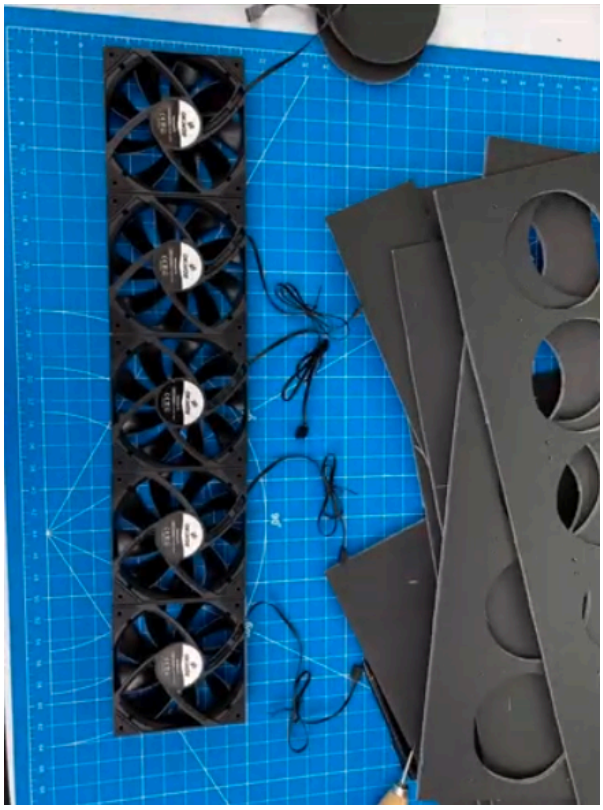
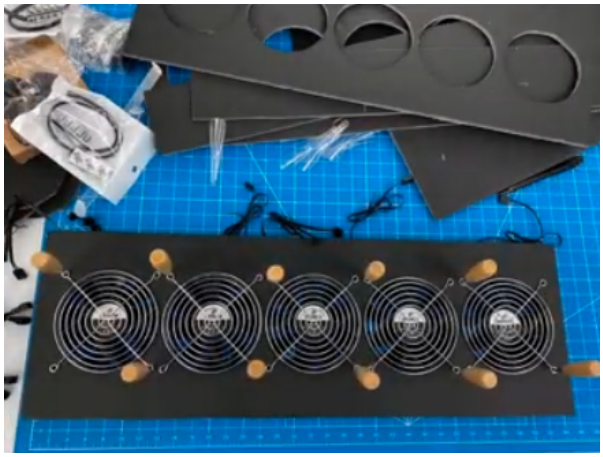
Step-by-Step Guide

1. Cut the foam core into 4 pieces that will form the chassis of the device:
   Fan Panel: 25 x 8.5 in.
   Back Panel: 25 x 8.5 in.
   Top Panel: 16 x 8.5 in.
   Bottom Panel: 16 x 8.5 in.

2. The Fan Panel holds the fans, so you'll also have to cut out holes for the fans and mark the placements of the four screws that will hold each fan in place. Arctic provides a paper template of the PC fan with measurements. Make sure to print this at 100% scale and compare to your fans to make sure the size is correct. You can cut out the inner circle of the template where the fan blades are and trace this circle onto your Fan Panel, or you can use a drawing compass or circular cutter to mark and cut the circular opening.

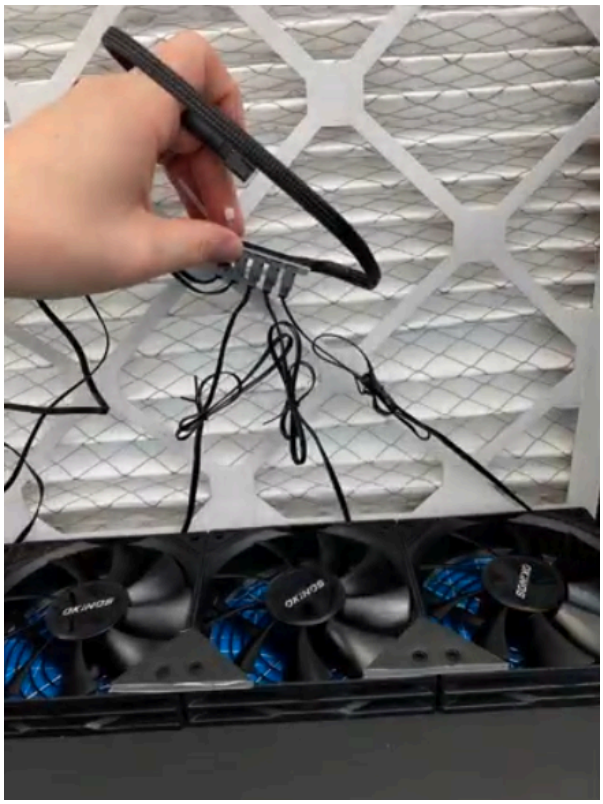
   Pro tip: *If you're making more than one air purifier, make a template of the Fan Panel that you can use to trace future Fan Panels.*

From Left to Right: excess foam core, Fan Panel, Top and Bottom Panels, Back Panel.

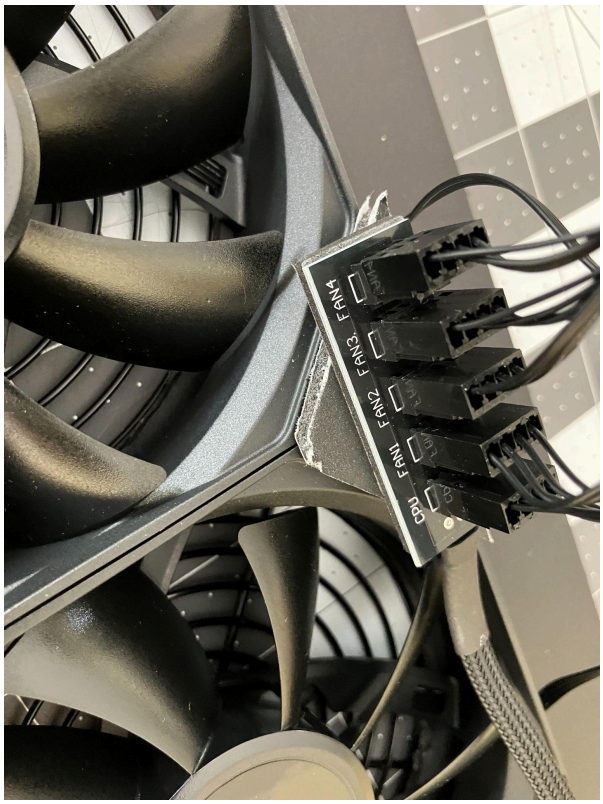
Making the fan panel:	
3. First, ensure you know which direction the fans blow. Take one PC fan, plug it in to the PC fan hub, then the hub to the barrel adapter, then the barrel adapter to the wall plug, and plug in the wall plug. Feel which side of the fan pulls air in, and which side pushes air out. Write down which side pushes air out and what that side looks like. This side of the fan needs to be on the front of your purifier pushing clean air into the room and sucking dirty air through the filters. 4. Arrange the 5 PC fans flush and in a row: 4.1. Make sure the wires coming off the PC fans are all facing the same direction; this will make it easier to collect and tidy all the box's internal wiring later! 4.2. Some PC fans have a logo that may be visible from the outside; consider lining these up in the same orientation for a polished aesthetic.	
5. Place the Fan Panel on top of the row of fans, lining up the cut out holes with the PC fans. 6. Arrange a protective fan grill over each PC fan. 6.1. Check that all fan grills have the same orientation for the most polished look. 7. Start with one PC fan and grill. Push the awls through the corner of the fan grill, through the foam core, and into the screw hole on the corner of the PC fan. Do the same on the opposite corner. Repeat for all 5 fans on the panel so that 10 awls are holding the	

	Fan Panel, grills, and PC fans together.	
8. 9.	Remove one of the awls, replace it with a screw, and screw the grill, foam core, and fan together. Aim for the screw to be tight enough to securely grip the plastic of the fan casing, but not so tight as to warp the grill or bite too much into the foam core—a little bit of a snug indent is ideal. Repeat this process for each of the 4 screws for each of the 5 fans. It's helpful to complete all screws on one fan before moving on to the next.	
10.	Flip the Fan Panel over. Cut four small foam triangles. Each triangle connects the corner of one fan to the corner of the neighboring fan - this helps the Fan Panel's overall stability and lessens rattling. Use two screws to connect the foam triangle to the corner of each fan, on the side that the PC cables are coming out.	 Δ Δ Δ Δ
11.	Look at the front of the Fan Panel and decide which side is the top, and which side is the bottom (this only matters if you oriented the PC Fans a certain direction based on logos). Turn the Fan Panel to the back, and mark/note the foam triangle connecting the bottom two fans. This foam triangle will be the anchor point for our wires, to keep everything tidy and ensure no wires get stuck in the fan blades. Placing it lower down the panel lessens the tension on the cable that will connect to the power cord.	

12. Get the PC Fan Hub adapter that has 5 spots for PC Fans to plug in, and orient the hub so that it is near the bottom foam triangle from the prior step, and with the one cable leaving the hub facing towards the bottom of the Fan Panel and heading away from the fans - this cable exits the back of the filter to the wall plug.
    - 12.1. Connect each PC fan wire to the PC Fan Hub.
    - 12.2. This is a good time to test that all the fans are working. Connect the PC Fan Hub to the barrel adapter, the barrel adapter to wall plug, plug in the wall plug, and make sure all fans spin and are blowing air out the front of the Fan Panel.



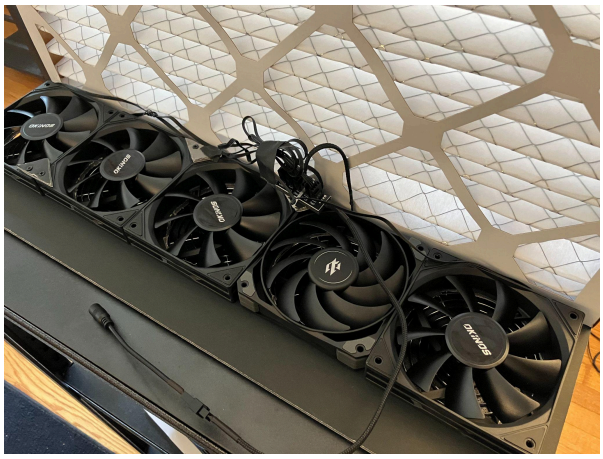
13. Peel off the backing to the adhesive on the PC Fan hub and attach it to the bottommost foam triangle on the back of the Fan Panel. Make sure the one cable leaving the PC Fan Hub is pointing toward what will ultimately be the bottom of the box.
    - 13.1. For additional stability, slip a zip tie underneath the single foam triangle and around the PC Fan Hub to secure all these parts together in case the PC Fan Hub glue ever weakens.
14. Plug the fan hub into a barrel pin adapter. Tape around the plastic connection point between the two cables to prevent the cables from accidentally becoming unplugged from each other.



15. At this point, before assembling the rest of the device, it can be helpful to test that the wire connections are secure and all of the fans are working. To do so, attach the barrel pin adapter into a wall plug adapter and plug that into a power source. All fans should be blowing air outward, away from the filter out into the room. Disconnect the barrel plug from the wall adapter to continue assembling.
16. Gather up the extraneous wires and tidy them into bundles with twist ties or zip ties, to keep the wires from getting sucked into the fans when running. It can also be helpful to use a zip tie to secure the wire bundles to the fans via any empty corner screw holes that are close enough.

Assembling and taping the device:
Note: You can tape the panels and filters in any order, below is our

17. With the Fan Panel flat on the table (fan grills- down), place a MERV-13 filter lengthwise along the side with the wires.
    17.1. Get the filter more or less flush with the fans, coaxing the wires out of the way as needed.
    17.2. Make sure the air flow indicator arrow on the side of the MERV-13 filter is facing <u>inward</u>, toward the fans.
18. Using duct tape or gaffer tape, tape along the edge of the filter to connect it to the fan panel.
    18.1. It helps to position the edge of the fan panel slightly over the edge of the table, to give yourself clearance to secure the tape.



18.2. It can be tricky to hold the filter in place while taping, so having a 2nd person can be helpful for this step. 19. Repeat this process taping the second MERV-13 filter to the other side of the Fan Panel. 20. Tape the Bottom Panel to the MERV-13 filters and the Fan Panel; remember that the bottom is the side with the PC Fan Hub cable that will exit through the back of the device near the bottom.	
21. Take the Back Panel and punch a hole, or cut a small square, centered roughly 2 inches up from what will be the bottom edge of the panel (closest to the trailing end of the barrel plug adapter). Punch the end of the barrel plug adapter through the hole. 22. Cut an “X” in a square of duct tape or gaffer’s tape, punch the end of the barrel plug adapter through the “X”, and then secure the tape around the cord around the hole to seal any potential airflow gaps. 23. Tape the Back Panel to the MARV-13 filters and Bottom Panel. 24. Connect the barrel plug adapter to the power cord and plug into the wall for your final test. Set the device upright or in whichever orientation you plan to use it and make sure no cables are rubbing the fans, that all fans spin, and that you feel air exiting the fans into the room. 25. Tape the Top Panel to the device. 26. You’re done! Happy dance.	 

Optional finishing steps:
Extras you can add to make your new air purifier that much spiffier.

27. **Adding Feet:** place rubber stick-on feet in each corner of the bottom panel, about ½ inch in from the edges of the panels. Avoid placing the feet on the tape, for easier retaping when replacing filters later!

28. **Installing a Handle:** find the point where the device is level by holding the filter in the air on both sides at the top; the filter will tilt forward or back until your hands on both sides are at the level point and Top and Bottom Panel are parallel to the ground.
29. Using the level point as a rough guide, make two ½-inch incisions using a craft knife roughly 3.5 inches apart from each other, and roughly 2.5 inches in from the edge of the panel. You can use the base of the handle anchor as a guide for how long to make your incisions.
30. Position the handle roughly where you want it placed, with the larger, rounded ends of the handle anchors facing in, towards each other.
31. Punch the larger, rounded end of the handle anchor into the incision, far enough for the rest of the anchor to catch on the interior side of the panel.
32. Repeat this process for the other side of the handle.
33. To seal off any potential airflow around the incisions, cut a 1.5–2” piece of tape, slice it ¾ of the way lengthwise, and arrange around the base where the handle meets the incision in the panel.