

Could a cheap, DIY air filter help rid your home of viruses?

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A cheap, do-it-yourself air purifier is powerful enough to effectively protect a home from free-floating flu and COVID-19 viruses, according to test results from the U.S. Environmental Protection Agency.

The filter, crafted with common hardware store supplies costing \$60, outperformed pricey off-the-shelf air filters in [tests](#) performed at an advanced EPA chamber that simulates real-world conditions, scientists said.

It's also simple to put together. In fact, a group of Connecticut fifth-graders built one of the filter cubes used by the EPA in its testing.

The schoolkids' DIY [air purifier](#)—decorated as their school's owl mascot and named "Owl Force One"—performed just as well as similar boxes built by EPA scientists.

EPA tests showed that these homemade filter boxes removed 97% of airborne viruses from a room after running 30 minutes, and more than 99% of [virus particles](#) after an hour.

"That is pretty impressive, considering the DIY low-cost nature of this technology," said [Katherine Ratliff](#), a physical scientist with the EPA's Office of Research and Development. "They performed better than a lot of the more expensive commercially available technologies that we've tested, in terms of their infectious aerosol removal."

The DIY air purifier is called a Corsi-Rosenthal Box. It's named after the two men who first thought it up—[Richard Corsi](#), dean of engineering at the University of California, Davis, and [Jim Rosenthal](#), CEO of the Texas-based company Tex-Air Filters.

The air filter box is created by duct-taping four furnace filters into a cube, then taping a standard 20-inch box fan to the top. A cardboard square cut from the fan's container is used for the bottom of the filter box.

"You're taking a mechanical fan, and you're basically drawing air

through the filters," said [Marina Creed](#), director of the University of Connecticut's Indoor Air Quality Initiative. "The clean air is being released up through the top of the fan."

The filters used to create the box should be rated MERV 13, which is efficient enough to filter out very small particles in the air, Creed said.

"I have personally purchased them at Ace Hardware, Home Depot, Lowe's, Amazon," she said. "They are simple furnace filters. You also use them in air conditioners."

For more than two years, Creed's team has been building and donating CR Box air purifiers throughout Connecticut, including 150 in June to protect [vulnerable people](#) from smoke created by Canadian wildfires.

The team also has donated materials and lesson plans for 100 box filters to the Connecticut Education Association, so schools could improve [indoor air quality](#) while teaching students some scientific and technological concepts.

A fifth-grader at Commodore Macdonough STEM Academy in Middletown, Conn., caught wind of the university's project and wrote a letter to Creed asking to be included.

"My class and I were amazed by your invention, and we wanted to see if we could try to make one ourselves," 9-year-old Eniola Shokunbi wrote. "My school was built in 1925, and it could use some improvement. Your invention could help us with that. Would you be willing to share the plans of the Corsi-Rosenthal?"

Inspired by the letter, University of Connecticut researchers went to the school and guided students through the construction of several CR Boxes, Creed said.

In July, Creed took the kids' Owl Force One box to the EPA's Office of Research and Development in Research Triangle Park, N.C., for advanced testing.

Testing took place in a 3,000-cubic-foot chamber filled with airborne saliva-like particles containing a virus called MS2, Ratliff said.

MS2 "is technically what's called a bacteriophage, so it's a virus that infects bacteria instead of humans, which makes it much safer to work with than something like the COVID virus or flu," she said. "We're trying to generate particles that are more representative of what would be emitted from humans."

The MS2 virus is also hardier and smaller than coronaviruses or flu viruses, so anything that works against it should also be effective against those human pathogens, Ratliff added.

Researchers tested Owl Force One against three CR Boxes crafted by the EPA's own scientists.

"They all performed about the same," Ratliff said. "The one that was built by the students performed just as well as the ones that were assembled at EPA."

The EPA tested Owl Force One on a low speed, which is what teachers have been using to keep the fan noise down in their classrooms, Ratliff said.

At low speed, Owl Force One worked just as well as EPA-crafted filter boxes that were tested at high speed, she said.

"It didn't actually impact our results," Ratliff said. "They still performed well whether they were on low or high."

The EPA researchers are preparing a paper on their testing for publication in a peer-reviewed journal, Ratliff said.

But since the United States is entering cold and flu season—and facing continual COVID surges—researchers decided to publicize the results early so folks could build their own filter boxes and protect themselves against disease.

"We know that with COVID-19, the dose of [virus](#) that one is exposed to can often influence the clinical severity of an infection," Creed said. "By trapping viruses in the air instead of another person breathing them in, we're able to reduce the exposure to these viruses and thereby reducing the risk of contracting an infection."

Homemade CR Boxes also can protect people from other indoor air pollutants, including smoke from fireplaces and emissions from cooktops, Creed said.

"I would encourage people of all ages and ability levels to make one for themselves, because once you start breathing in clean air, you can really tell the difference," Creed said. "Your brain works better. You feel better."

Creed compared the air produced by a CR Box to that of fresh mountain air.

"That type of air is accessible to us all with just \$60 worth of materials and a little bit of rolling up your sleeves and duct taping," Creed said.

More information: The University of Connecticut has more about [creating your own Corsi-Rosenthal Box](#).

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