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Rapid Response: CAT-scan machine and 3D printers vital in COVID-19

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Rapid Response

CAT-scan machine and 3D printers vital in COVID-19

By Laura Meader

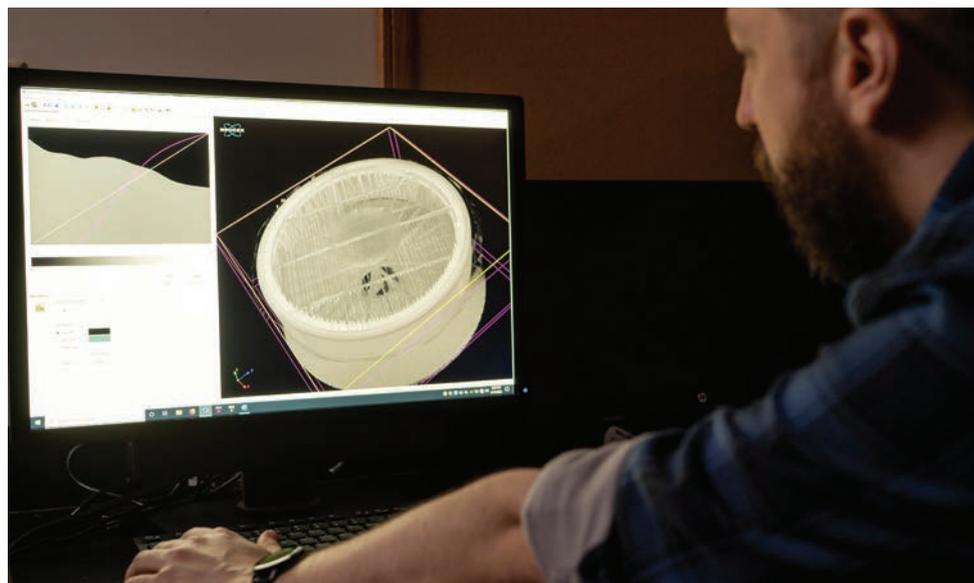
Colby's Assistant Professor of Biology Josh Martin is using his expertise and sophisticated scientific equipment to create face shields, respirator masks, and air filter cartridges for local first responders and hospitals in need of equipment that is crucial to treating patients with COVID-19.

Martin is part of a network of Colby, Bates, and Bowdoin (CBB) faculty and staff collaborating on an initiative that's using 3D printers to create and distribute personal protective equipment (PPE) for Maine's first responders, often low on the priority list for equipment.

PPE that Martin creates is shipped to the Kennebec County Emergency Management Agency.

Martin brings a resource to the initiative his colleagues cannot: a micro-CT, a laboratory-sized CAT-scan machine that uses x-rays to scan items in three dimensions, capturing both internal and external features. Typically used for scientific research, Colby's micro-CT is enabling Martin to try and create items for which no design currently exists.

His first project was an air filter cartridge, requested from Central Maine Healthcare in Lewiston. Using the micro-CT, Martin scanned the cartridge and created a full 3D model of it. "We're able to replicate the pitch of the screws and the internal parts where the filter resides," Martin said. That way, technicians can screw the cartridge into the same place on their existing machine.



Martin collaborated with a colleague at Bates, Andrew Mountcastle, to turn the 3D model into a printable model.

The team is also evaluating tests and models to create air respirator masks that are comparable to N95 masks but made of plastic that can be sterilized and reused with a removable filter. Martin has reached out to hospitals in Waterville offering his expertise to design and create whatever items are needed.

At the same time, Martin is immersed in the original initiative of creating face shields, which were initially created using an open-source design approved by the National Institutes of Health. These designs change quickly, Martin said, and the CBB team, as well as others around the world, have shifted to a design by the 3D printing company Prusa Research in Prague, Czech Republic.

"It's called rapid prototyping," Martin said, and it involves identifying and using innovative designs that increase output and optimize resources. With the first design, the headpiece for each face shield took 1-2 hours to print. The Prusa design, however, allows for printing in batches of eight in about six hours.

Martin is actively seeking others to get involved. Greg Drozd, assistant professor of chemistry, and Amanda Lilleston, visiting assistant professor of art, have helped. And Tim Stonesifer, an instructional technologist who oversees the 3D printers in Colby's maker space Mule Works, is instrumental in the effort. Two local citizens with 3D printers of their own also contributed.

Advice and tips are freely offered by Martin, who started using 3D printers almost 10 years ago to create custom equipment for his biology research that's not available commercially, he said. He's learned from engineers how to perfect his creations, and now he's glad to give back to his local community while he's on sabbatical from teaching.

"A few of my international colleagues have gotten ill from the virus, and a few have died," he said. But by working with others, Martin feels a sense of unity. "I feel a little less useless."

Readers can contact Josh Martin directly at jpmartin@colby.edu if they'd like to get involved.