

Open access hardware and 3-D printing can help tackle demand for health supplies

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An example face shield made using a laser cutter. Credit: André Chagas, University of Sussex

Free open source hardware and 3-D printing could help to alleviate the burden of Covid-19 on global health systems, according to scientists at the University of Sussex.

Free and open source hardware (FOSH) follows an ethos where blueprints for a tool are made freely available so that anyone can study, learn, modify, customize and commercialize them.

In a study published by *PLoS Biology*, Professor Tom Baden and Andre Chagas at the University of Sussex have suggested that this could be a viable option to provide our [health services](#) with the tools and equipment they so desperately need.

The study provides an overview of the blueprints which are currently available for free online and which could be used to help in the fight against coronavirus, focusing on [personal protective equipment](#), ventilators and test kits.

Although some of the designs still need to be tested, many others have already received suitable verification, having been published in peer reviewed papers. The authors therefore believe that FOSH should be seriously considered as a method of quickly providing equipment where it's needed.

Tom Baden, Professor of Neuroscience, said: "Now is the time that Open Hardware could really shine and it's so important that we get on board quickly.

"Previous studies and experiences have shown that free and open source hardware is a brilliant option in disaster situations. Designs can be shared globally, it has typically lower implementation costs than mass manufacturing and it can be easily adapted to meet local resources.

"But the real power—and the way this could really help to tackle Covid-19—is that once a [tool](#) has been designed and tested, anyone can build it. This bypasses the traditional manufacturing and distribution routes and means that it can become a community driven endeavour where anyone with the capacity to do so can help to produce much-needed equipment and supplies for the healthcare services.

"Anyone with the necessary knowhow, tools and time can build on this

knowledge to meaningfully support their community. At a time when global health systems are facing immense pressure and becoming increasingly overburdened, we need a response not just from frontline workers such as [medical staff](#) and scientists, but from skilled members of the public who have the time, facilities and knowledge to meaningfully contribute."

The paper describes existing FOSH designs from simple tools like DIY facemasks to 3-D printed valves which can regulate airflow in ventilator tubes. Others are far more complex including state-of-the-art [scientific instruments](#) for diagnosis, such as an automated pipetting robot, plate readers and a range of other medical tools and supplies.

Some blueprints are already being used to provide support to the NHS. A company in Portslade which produce face visors have recently removed their patent and license and asked for support from anyone with a 3-D printer in order to produce more to meet demand and provide protection to NHS staff.

But for those unverified designs, testing and approval can be a lengthy process.

Andre Chagas said: "One thing governments could do right now, is to figure out a process in which we can legitimately fast track the testing and certification of tools which are in short supply."

"For instance, in Spain a group is already testing their ventilator designs with support from the government. While each country will have different rules and certifications to meet, this is a crucial moment for us to get together and figure out a single set of certification so that implementation can move faster."

Prof. Tom Baden added: "If governments can support this through

financial support to ramp up production of the best tools, that would be incredibly useful right now.

"But besides from [financial support](#), we also need support from those who actually know about the use of these tools, rather than just their design. To make this equipment properly and safely, we don't just need tech-savvy people building it. We need people in the healthcare sector who know how these tools should work and can actually test them. These people should contact ongoing products to see if they can help."

A team at the University of Sussex team recently finished creating 100 face shields which are to be tested within the NHS. Once the design is approved the University will launch a full-scale production operation, hoping to produce 1000 face shields a day by early May.

More information: Andre Maia Chagas et al, Leveraging open hardware to alleviate the burden of COVID-19 on global health systems, *PLOS Biology* (2020). [DOI: 10.1371/journal.pbio.3000730](https://doi.org/10.1371/journal.pbio.3000730)

Provided by University of Sussex

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