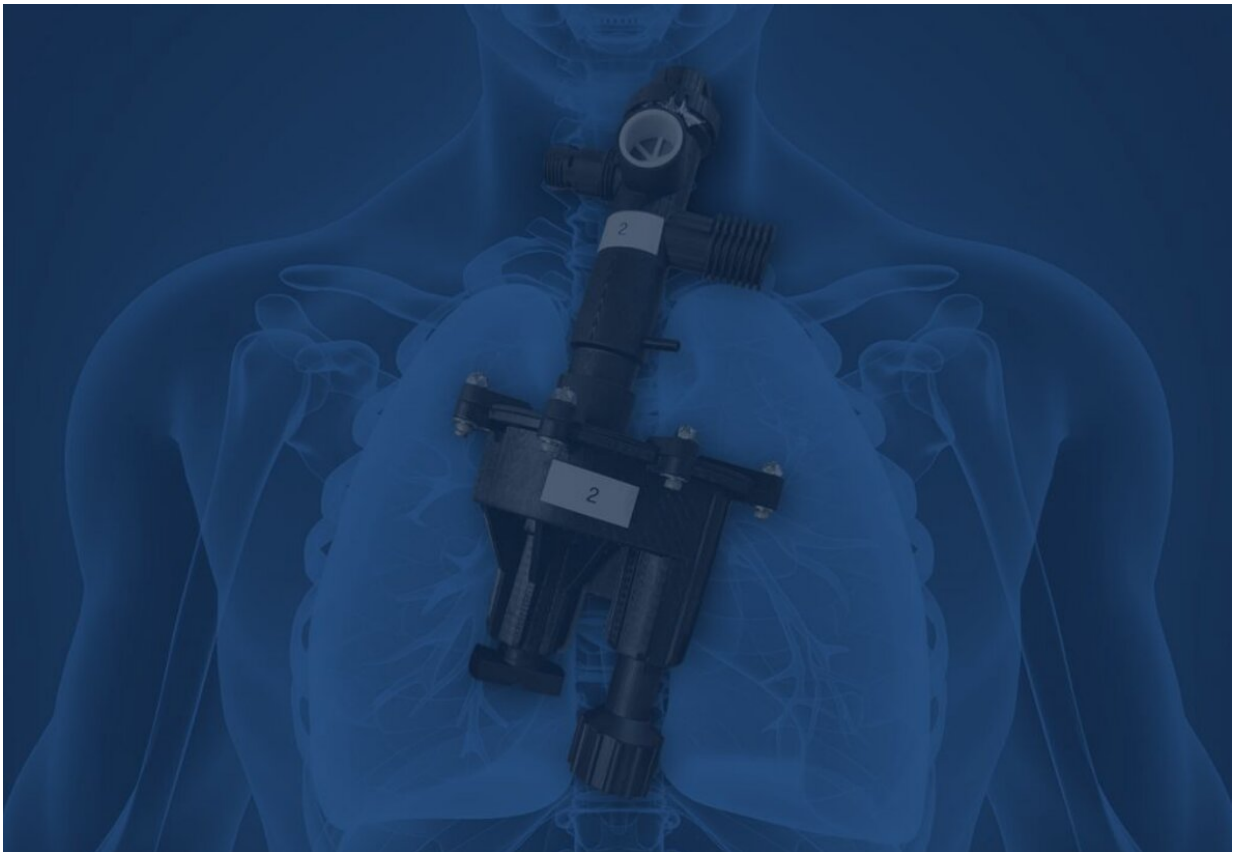


Researchers publish article describing Illinois RapidVent Emergency Ventilator

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RapidVent Graphic. Credit: The Grainger College of Engineering

The design, testing, and validation of the Illinois RapidVent emergency ventilator has been published in the journal *Plos One*. The article, "Emergency Ventilator for COVID-19," by University of Illinois Urbana

researchers, is the first of its kind to report such details about an emergency ventilator that was designed, prototyped, and tested at the start of the COVID-19 pandemic in 2020.

"This article reports the development and testing of the RapidVent emergency ventilator," said William King, professor at The Grainger College of Engineering and Carle Illinois College of Medicine, and leader of the RapidVent project. "The research shows integration of different disciplines to develop a [medical device](#), including science-based engineering, ultra-rapid design and manufacturing, functional testing, and [animal testing](#)."

The Grainger College of Engineering, Carle Illinois College of Medicine, and industry partners launched the Illinois RapidVent project to address ventilator shortages in spring 2020. The goal was to design an emergency ventilator that could be rapidly and inexpensively produced.

"Publication of this work helps to share our knowledge with the public and acknowledge the outstanding intellectual contributions of our team members," said King Li, Dean of the Carle Illinois College of Medicine.

The RapidVent team consisted of more than 50 people who worked together to develop an emergency ventilator in less than three weeks. The Illinois RapidVent is easy to produce in part because it has few components and can be powered from pressured air or oxygen.

"The rapid development and successful delivery of the functional Illinois RapidVent is yet another amazing display of collaborative interdisciplinary research, and a testament of what can be achieved here at Illinois for our community, society, and global health," said Stephen Boppart, Executive Associate Dean and Chief Diversity Officer of Carle Illinois College of Medicine. "It's a primary example of how engineering- and technology-based [medicine](#) can support the land-grant

mission of our university. The [team members](#) from Carle Illinois College of Medicine were proud to help catalyze this effort."

"Emergency Ventilator for COVID-19" reports how the team developed their [ventilator](#) design based on the needs of physicians. The team then used digital design and advanced manufacturing for ultra-rapid development of prototypes, followed by detailed functional testing, durability testing, and animal testing.

To support safe use of the device, the team also developed an electronic monitoring system and detailed training materials that can be used by physicians. The monitoring system became Illinois RapidAlarm, an open-source sensor and alarm system that makes emergency ventilators, such as the Illinois RapidVent, more useful during a crisis.

"The RapidVent team built upon relationships forged through Carle Illinois College of Medicine. This focus on engineering and medicine is the exact vision we shared—one that would generate practical solutions to healthcare opportunities and challenges," said Dr. Mark Johnson, Carle Health physician and RapidVent team member.

The University of Illinois made the RapidVent technology available through a free license in April 2020. The license includes access to device designs, training materials, and a testing report. Since then, more than 70 organizations have accessed the technology from 15 different countries. There are multiple efforts underway to make use of RapidVent, including two companies that have announced their intention to commercialize the technology.

More information: William P. King et al, Emergency ventilator for COVID-19, *PLOS ONE* (2020). [DOI: 10.1371/journal.pone.0244963](https://doi.org/10.1371/journal.pone.0244963)

Provided by University of Illinois at Urbana-Champaign

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