

SimplyVent: A Low-Cost Mechanical Ventilator

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Purpose: During the COVID-19 pandemic, there was a fear of a global ventilator shortage for treating patients. This prompted the development of low-cost ventilator designs worldwide. SimplyVent is an innovative, low-cost design that can acquire all essential features and modes of a commercial ventilator whilst remaining accessible in times of crisis. **Procedure:** A prototype was built with readily available components and includes a novel valve control mechanism using stepper motors, an underwater pressure regulator and flow/oxygen sensors. The SimplyVent prototype was designed to be built in three stages, the first two having been completed: Stage one includes the bare minimum ventilator-controlled modes. Stage two involves the addition of sensors to measure applied flows and volumes. In the future, stage three will incorporate patient-controlled ventilatory modes using the sensors of stage two. **Results:** The current design has been tested on an artificial lung. The prototype works with no noted errors for hours on end. SimplyVent is ready for field testing at this stage. **Conclusion:** SimplyVent can support respiratory-compromised patients at 50-150 times lower-cost than a commercial ventilator. The highly configurable design is built with simple materials, accessible at any hardware and electronics store, and can be rapidly constructed and deployed in case of large-scale emergencies. The current prototype can be modified for future expansion to include all essential features and modes of a commercial ventilator. In addition, it can be used in a research environment or as a starting platform for biomedical engineering students who wish to modify the design to develop their own prototypes.

Awards Won:

University of Texas at Dallas: Back-up scholarship recipients