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Design, build and test of an in-house made ventilator system¹ MOHAMED AMINE ABASSI, XIAOFENG LIU, BRADLEY ZELENKA, JOSE MORETO, JESUS FIGUEROA, GUSTAAF JACOBS, San Diego State University, JAMES FRIEND, JESS MANDEL, University of California San Diego — The Covid-19 outbreak presented a serious challenge to the world healthcare. Its rapid spread overwhelmed the hospitals' capacity to efficiently contend with the increasing number of patients requiring immediate respiratory assistance. As the ventilators are relatively expensive (typically ranging from \$5,000 to \$50,000), and in case the healthcare capacity is outnumbered, the design of a cost-effective and a quick-homemade ventilator becomes crucial. This project represents an answer to this emergency. It is about the design, build and test of a ventilator which is affordable at low cost, easy to be operated, while meeting the essential requirements set by the Food and Drug Administration. The ventilator is composed of a valve to regulate and monitor the air pressure, a timer that controls a solenoid valve to provide pulsating air flow, a humidifier to add moisture to the air flow and a PEEP (Positive End of Expiratory Pressure) value to maintain the pressure in human lung. An air compressor or a plant air serves the source for the air supply. A lung simulator is used to test the performance of the ventilator at different pulmonary compliance settings. The parameters including the air pressure, the inspiration time and the PEEP are fully controllable.

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