

Development of a Mechanical Ventilator Using A Manual Artificial Respiration Unit

Authors : Isomar Lima da Silva, Alcilene Batalha Pontes, Aristeu Jonatas Leite de Oliveira, Roberto Maia Augusto

Abstract : Context: Mechanical ventilators are medical devices that help provide oxygen and ventilation to patients with respiratory difficulties. This equipment consists of a manual breathing unit that can be operated by a doctor or nurse and a mechanical ventilator that controls the airflow and pressure in the patient's respiratory system. This type of ventilator is commonly used in emergencies and intensive care units where it is necessary to provide breathing support to critically ill or injured patients. Objective: In this context, this work aims to develop a reliable and low-cost mechanical ventilator to meet the demand of hospitals in treating people affected by Covid-19 and other severe respiratory diseases, offering a chance of treatment as an alternative to mechanical ventilators currently available in the market. Method: The project presents the development of a low-cost auxiliary ventilator with a controlled ventilatory system assisted by integrated hardware and firmware for respiratory cycle control in non-invasive mechanical ventilation treatments using a manual artificial respiration unit. The hardware includes pressure sensors capable of identifying positive expiratory pressure, peak inspiratory flow, and injected air volume. The embedded system controls the data sent by the sensors. It ensures efficient patient breathing through the operation of the sensors, microcontroller, and actuator, providing patient data information to the healthcare professional (system operator) through the graphical interface and enabling clinical parameter adjustments as needed. Results: The test data of the developed mechanical ventilator presented satisfactory results in terms of performance and reliability, showing that the equipment developed can be a viable alternative to commercial mechanical ventilators currently available, offering a low-cost solution to meet the increasing demand for respiratory support equipment.

Keywords : mechanical fans, breathing, medical equipment, COVID-19, intensive care units

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