

A Low Cost Portable Ventilator using PIC 16F877A Microcontroller

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Abstract: Ventilators are critical life-support devices used in hospitals to assist patients with respiratory difficulties. However, their high cost and limited availability, especially in low-resource settings, make access challenging. This project aims to develop a low-cost, portable ventilator using a microcontroller-based system, providing an affordable and accessible alternative for emergency and home care applications. The ventilator design incorporates an Arduino (or other microcontroller) to control airflow, pressure, and respiration cycles. It utilizes sensors to monitor oxygen levels, airflow rate, and patient conditions, ensuring proper ventilation. A servo or stepper motor-driven mechanism controls the air delivery to the patient, simulating manual Ambu bag compression in a controlled and automated manner. The system supports multiple ventilation modes, including volume-controlled and pressure-controlled settings, which can be adjusted according to the patient's needs. A simple LCD or touch screen interface allows users to set parameters such as breath rate, tidal volume, and inspiratory/expiratory ratio. Additionally, a battery-powered option enhances portability for field and emergency use. By leveraging cost-effective electronic components and 3D-printed parts, this project offers a reliable, scalable, and affordable ventilator solution for low-income communities and remote areas. Future improvements could include IoT-based remote monitoring and AI-driven adaptive control for enhanced patient care. This low-cost ventilator design could significantly contribute to addressing ventilator shortages during pandemics, natural disasters, and emergencies, ensuring more accessible respiratory support worldwide..

Keywords: Arduino; Ventilator; Prototype

