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An Intelligent Ventilation Bag Featuring Automated Pressure Control and Variable Oxygen Range

Varsha G. Kulkarni[1], Vishal Borate[2], Dr. Yogesh Mali[3]
Department of Information Technology, G. H. Raisoni College of Engineering, Pune, India[1]
Department of Computer Engineering, Dr. D. Y. Patil College of Engineering and Innovation, Pune, India[2]
Department of Computer Engineering, Ajeenkya D. Y. Patil University, Lohegaon, Pune, India[3]
varshashri1104@gmail.com, vkborate88@gmail.com, yogeshmali3350@gmail.com

Abstract: *The COVID-19 pandemic highlighted the need for efficient and scalable respiratory support systems in emergency and critical care settings. Despite being widely used, manual ventilation bags provide challenges in ensuring consistent airflow, tidal volume, and real-time patient requirements adaption, especially when medical personnel utilize them for prolonged periods of time. The inability of manual Ambu bags to maintain a constant oxygen supply and pressure A new concept for a "Smart Ambu Bag" that combines an automated pressure regulating system with an adjustable oxygen concentration range is presented in this research. By tackling the challenges of manual breathing in emergency scenarios, the method aims to enhance accuracy and patient outcomes. The main objective is to develop a Smart Ventilation Bag with automated pressure adjustments and real-time oxygen monitoring. The Intelligent Ventilation Bag To measure the oxygen concentration in accordance with the patient's requirements, an oxygen sensor is incorporated into the air mix. When compared to existing manual and automated ventilators during COVID-19 situations, the Smart Ventilation Bag has the ability to bridge the gap between accessibility and performance, particularly in locations with limited resources. Better patient outcomes, less caregiver fatigue, and more reliable ventilation supply are demonstrated by simulation and experiment results. The study highlights how the Smart Ventilation Bag can assist expand the capacity for emergency respiratory care, paving the way for more scalable and reasonably priced respiratory support alternatives.*

Keywords: Ambu bag, ventilation, oxygen sensor, respiratory

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