Abstract

This paper aims at designing a cost-effective, portable and easy-to-use brushless DC (BLDC) motor driven continuous positive airway pressure (CPAP) based respirator for patients with acute breathing trouble. The proposed system is intended to facilitate continuous monitoring of patient's condition with positive airway support provided by a brushless DC (BLDC) motor
driven respirator blower fan by measuring Respiration Rate (RR). To measure the respiration rate, a pair of capacitive type respiration rate sensors are mounted below Right Nostril (RN) and Left Nostril (LN), in such a way that the nasal airflow during inspiration and expiration impinge on the sensor diaphragms directly. Due to irregularities in nasal airflow in some respiratory diseases, the respiration rate (RR) varies from the normal rate (12-20). Thus, a supporting airflow regulatory system has been designed to reduce abnormalities in respiration rate (RR). In this case a low cost sensorless commutated BLDC drive is implemented with a three phase inverter and microcontroller by using feedback of rotor rpm. A suitable cost effective algorithm has also been developed to generate an appropriate six transistor switching sequence to commute the BLDC motor according to the RR of the subject. The characteristics of the implemented drive give satisfactory outputs over a wide range of controlled speed variation from 200 to 2440 rpm which requires a match with the patient’s breathing demand. The effectiveness of the designed system is populated by the real time experimental results.

Refernces

- Debjoity Chowdhury, Madhurima Chattopadhyay, Priyanka Roy, "Modelling and Simulation of Cost Effective Sensorless Drive for Brushless DC Motor"); International Conference on Computational Intelligence: Modelling, Techniques and Applications (CIMTA), 2013, pp. 279-286.
- Santanu Mondal, Arunabha Mitra, Debjoity Chowdhury, Madhurima Chattopadhyay, "A new approach of sensorless control methodology for achieving ideal characteristics of brushless dc motor using MATLAB/Simulink"); IEEE conference on Computer,
Index Terms

Computer Science
Embedded Systems

Keywords
Positive Airway Respirator  Blower Fan  Brushless Dc Motor  Respiration Rate  Chronic Obstructive Pulmonary Diseases.