

Smart Oxygen Deprivation Mask: An Improved Design with Biometric Feedback

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Abstract : Oxygen deprivation masks operate through the use of restricting valves as a means to reduce respiratory flow where flow is inversely proportional to the resistance applied. This produces the same effect as higher altitudes where lower pressure leads to reduced respiratory flow. Both increased resistance with restricting valves and reduce the pressure of higher altitudes make breathing difficultier and force breathing muscles (diaphragm and intercostal muscles) working harder. The process exercises these muscles, improves their strength and results in overall better breathing efficiency. Currently, these oxygen deprivation masks are purely mechanical devices without any electronic sensor to monitor the breathing condition, thus not be able to provide feedback on the breathing effort nor to evaluate the lung function. That is part of the reason that these masks are mainly used for high-level athletes to mimic training in higher altitude conditions, not suitable for patients or customers. The design aims to improve the current method of oxygen deprivation mask to include a larger scope of patients and customers while providing quantitative biometric data that the current design lacks. This will be accomplished by integrating sensors into the mask's breathing valves along with data acquisition and Bluetooth modules for signal processing and transmission. Early stages of the sensor mask will measure breathing rate as a function of changing the air pressure in the mask, with later iterations providing feedback on flow rate. Data regarding breathing rate will be prudent in determining whether training or therapy is improving breathing function and quantify this improvement.

Keywords : oxygen deprivation mask, lung function, spirometer, Bluetooth

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