Ultra Low Cost Artificial Lung
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Clinical Need

Acute Hypercapnic Respiratory Failure (AHRF)
- Occurs when lungs are unable to remove CO\textsubscript{2} from the blood
- Excess CO\textsubscript{2} can cause blood pH to drop below normal pH 7.35\textsuperscript{1}
- Many possible underlying causes
  - Damaged lung tissue, COPD, emphysema, etc.\textsuperscript{2}
  - Imbalance between the load and capacity of respiratory muscles
- Must be treated in an intensive care unit (ICU) while underlying cause is also addressed.

Hemolung RAS Overview

Blood from body removed through catheter
Blood pumped back into the body through catheter
Blood pumped into cartridge for gas exchange
- Air pumped through fibers in cartridge
- Gas exchange allows CO\textsubscript{2} to diffuse from blood into air

Design

Updated Cartridge Design
- Altered design for more compact and simplified overall device

Figure 1: Conditions and underlying causes that can result in respiratory failure. AHRF is a specific kind of respiratory failure.\textsuperscript{1}

Sensors
- Selected based on recommendation by ALung

Updated Housing
- Housing design is scalable for future design modifications
- Controller components are all contained in back compartment

Future Work

- Find and implement a more powerful motor driver to provide better motor speed control to achieve similar flow rate as Hemolung
- Integrate remaining sensors into the system and perform testing to verify their performance
- Conduct more testing to assess hemolysis, gas exchange, and motor performance

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References