SDSU

San Diego State University

MedMask DESIGN TEAM

HIROPPE

Description

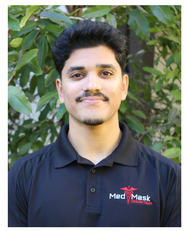
The Elastomeric Half Mask Respirator, sponsored by Hiro PPE, seeks to provide a more breathable protective mask for individuals in polluted environments and healthcare professionals. The EHMR incorporates a filter made of pleated electro-spun nanofibers, supplied by Hoff Engineering, and integrates gas sensors to provide information on air quality. Designed to accommodate five different CDC/NIOSH 3D-scanned head shapes, the EHMR utilizes silicone molding to enhance user comfort and facial fit.

Team Members

Tyler Jacobs

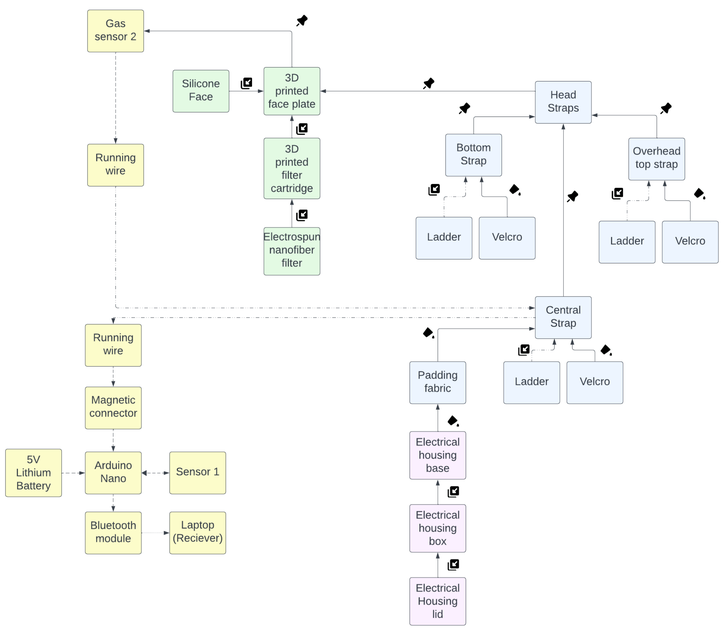
Jessica Munoz

Katie Naretto



Fawaz Hakim

System Level Diagram



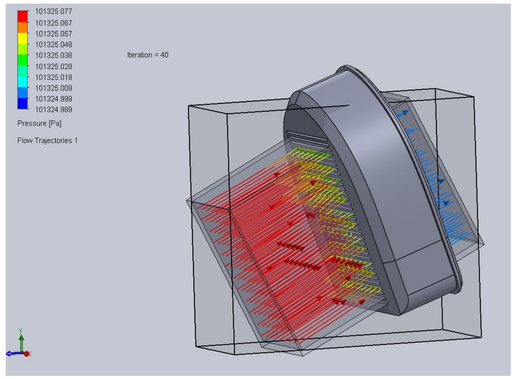
Symbol	Mechanical Connection Type
	Interlocking Components
	Glued
	Anchor Connections

Symbol	Connection Type
	Fed Through
	Bluetooth Connection
	Electrical Connection
	Mechanical Connection

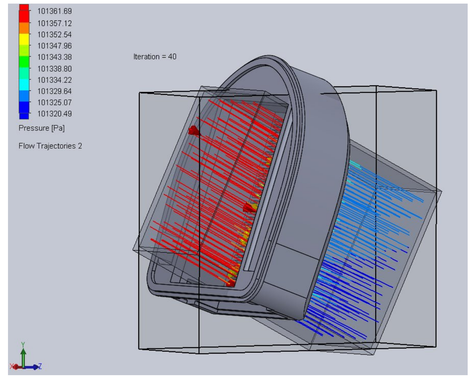
Color	Subsystem
	Face Ergonomics
	Head Straps
	Mask Electronics
	Electrical Housing

CAD Assembly

Test and Analysis



Inhalation

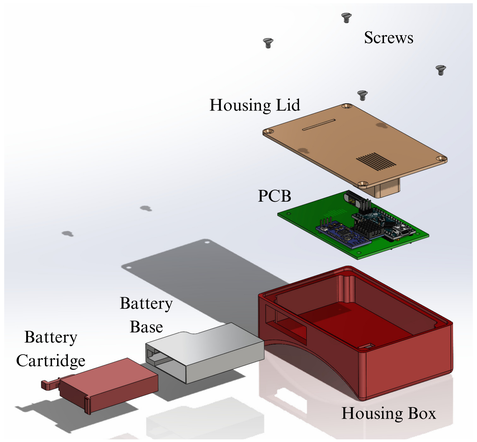


Exhalation

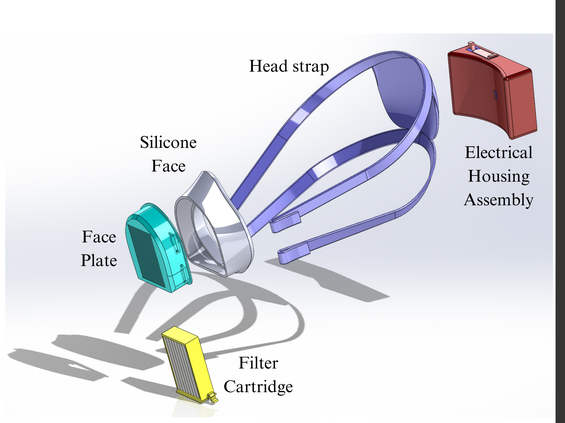
NIOSH Requirement (N-95 Requirements): Face velocity - 9.4 cm/s
Maximum Exhalation Pressure Differential - 245 Pa

Medimask Simulation (With Filter): Face Velocity Simulation - 9.4 cm/s
Pressure Differential Simulated - 108.1 Pa

CAD Exploded View

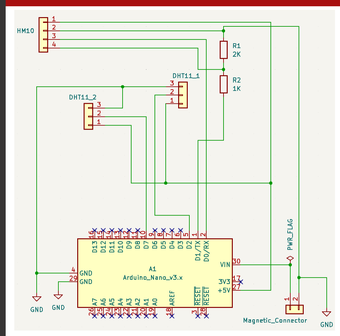


Electrical Housing Assembly

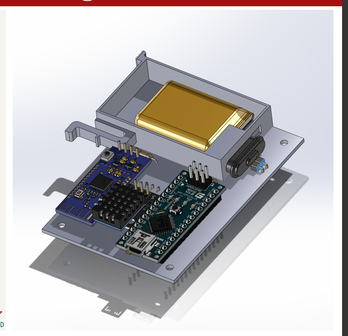


Full Mask Assembly

Electrical Design



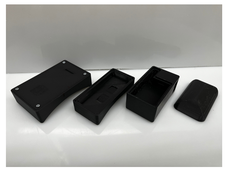
PCB Schematic



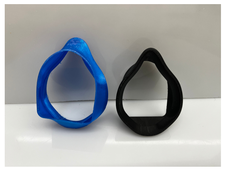
Mask Electrical Assembly

Prototypes

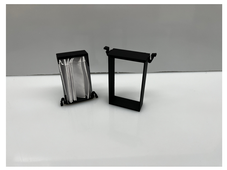
Face Plates



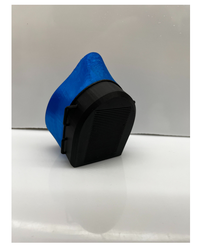
Housing Box



Silicone Face



Filter Cartridge



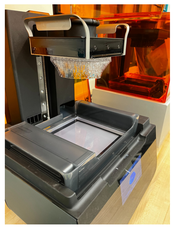
Mask Face Sub-Assembly

Acknowledgments

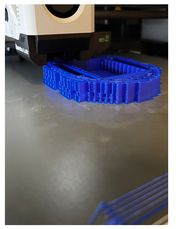
The team thanks Dr. Scott Shaffar for advising this project. We also wish to highlight those who have assisted in the prototyping and manufacturing process including and the ZIP Launchpad, Barry Dorr, and Mark Bruno. We also wish to acknowledge Hiro PPE for sponsoring and supporting the team, specifically Dr. Mike Frank who has been keen on uplifting the team and providing guidance.

Manufacturing

Electrical



Resin Print



3D Printing

Spring 2024