

EarVac: Negative Pressure Wound Therapy Device for Improved Microtia Reconstruction Surgery Recovery

Clients: Ms. Nada Botros

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Team: Bryan Heaton (Leader)
Meghan Kaminski (Communicator)
Dhruv Nadkarni (BWIG)
Serena Evers (BSAC)
Harshad Gunasekar (BPAG)
Muhaison Ibrahim

Date: October 27, 2025 - November 6, 2025

Problem Statement

Newly reconstructed auricles after microtia surgery are fragile, prone to destructive fluid buildup, and difficult to dress securely. Clinicians need a conformal negative-pressure wound therapy device that holds a foam dressing over the ear, maintains consistent negative pressure over complex 3D geometry, and safely collects drainage from existing drains to reduce complications and support consistent healing.

Brief Status Update

The team has begun iterating on our preliminary prototype to make improvements and implement planned ideas. The team is now delegated to various tasks (headphone / headband CAD and rapid prototyping, y-connector logistics and CAD if necessary, and miscellaneous needs with the sticker and headphone part) and should now be able to make quick progress on future prototypes

Summary of Weekly Team Member Design Accomplishments

- Team:

- Show and tell
 - Team meeting
- Bryan Heaton
 - Organized team meeting to establish tangible next steps
 - Met with Harshad to discuss tubing size logistics
 - Looked around BME teaching lab for wall-vac needs
- Meghan Kaminski
 - Sent email regarding purchasing products
 - Created ideas for redesign ideas
- Serena Evers
 - Team meeting
 - Y connector issues solved
- Harshad Gunasekar
 - Researched adhesive and foam options for headphones
 - Keep the budget spreadsheet updated with potential options for purchasing
- Dhruv Nadkarni
 - Redeveloped test methods

Weekly/Ongoing Difficulties

None for now.

Upcoming Team and Individual Goals

- Team:
 - Begin final report
 - Purchase elastic strap and cushioning for headband
- Bryan Heaton
 - Work on purchasing adhesives
 - Work on organizing logistics for wall vac usage
- Meghan Kaminski
 - Work on redesign of headband and ear muff with additional components
 - Incorporate elastic strap in design
 - Initiate client meeting for updates
- Serena Evers
 - Purchase tubes & y connector
 - Testing plan
- Harshad Gunasekar
 - Find a soft covering for headphone comfort for the patient
 - Start purchasing the materials that have been confirmed by whole team
 - Ask known BME Faculty for access to inline pressure sensors for testing
- Dhruv Nadkarni
 - Make additions to the SolidWorks model if needed.

Project Timeline

Project Goal	Deadline	Team Assigned	Progress	Completed
Product Design Specification (PDS)	September 19, 2025	All	100%	X
Design Matrix	September 26, 2025	All	100%	X
Preliminary Presentations	October 3, 2025	All	100%	X
Preliminary Deliverables	October 8, 2025	All	100%	X
Show and Tell	October 31, 2025	All	100%	X
Poster Presentations	December 5, 2025	All	0%	
Final Deliverables	December 10, 2025	All	0%	

Expenses

Item	Description	Manufacturer	Part Number	Date	QTY	Cost Each	Total	Link
Component 1								
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Component 2								
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Component 3								
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TOTAL:								\$0.00