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

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Problem Statement

Newly reconstructed ears after microtia reconstruction 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. Current temporary drains often lose suction and dressings fail to seal around the ear's contours which increases a burden on clinical staff. A device specifically shaped for postoperative ear anatomy would provide a more stable seal, more reliable pressure delivery, more reliable wound drainage, and greater protection during the critical early healing period.

Brief Status Update

The team is preparing for the first semester poster presentation! The team has established a solid CAD / 3D print design for the headphone / headband, completed a first prototype of the dressing, and are beginning to utilize y-connectors.

Summary of Weekly Team Member Design Accomplishments

- Team:
    - Prepared poster
    - Delegated final report sections
- Bryan Heaton
    - Organization of final report, final presentation
    - Fabrication of poster presentation ready dressing
    - Collected materials from Nada
- Meghan Kaminski
    - Final touches on SolidWorks
    - 3D print in TPU
    - Work on the final poster
    - Work on the final presentation
- Serena Evers
    - Final poster print
    - Work on final report
- Harshad Gunasekar
    - Procured materials from Walmart for the poster presentation, ready dressing
    - Work on the final poster
    - Work on the final report
    - Update the budget spreadsheet with materials ordered from the client
- Dhruv Nadkarni
    - Ran SolidWorks simulations
    - Finished test protocols
    - Worked on poster

Weekly/Ongoing Difficulties

None for now.

Upcoming Team and Individual Goals

- Team:
    - Complete final report
    - Deliver poster presentation!
- Bryan Heaton
    - Begin to brainstorm article templates for next semester
    - Begin experimenting with dressing on model ears
    - Work on final report
    - Update lab archives
- Meghan Kaminski
    - Work on the final report
    - Update lab archives

    - Track materials as they come in
- Serena Evers
    - Update lab archives
    - Find new y connector
    - Work on final report
- Harshad Gunasekar
    - Work on the final report
    - Update lab archives
    - Update budget spreadsheet
- Dhruv Nadkarni
    - Work on final report
    - Update lab archives

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	99%	
Final Deliverables	December 10, 2025	All	0%	