Arterial Coupler Re-Design: Adjustable Stent/Cuff Anastomosis
Progress Report 8: 10/30/2025

Client: Dr. Jasmine Craig
Advisor: Prof. Darilis Suarez-Gonzalez
Team:

- Leader: Allison (Ally) Rausch
- Communicator: Jacqueline (Jackie) Behring
- BWIG: Sofia Decicco
- BPAG: Arshiya (Ria) Chugh
- BSAC: Daniel Pies

Problem Statement: Microsurgical arterial anastomosis is a cornerstone of reconstructive surgery, enabling tissue transfer and limb salvage. Current techniques are highly time consuming, technically demanding, and are highly dependent on surgeon expertise. Suturing vessels as small as 1 mm can take even the most experienced surgeons 30-60 minutes, extending operating times and jeopardizing tissue viability. Existing stent-based approaches introduce complications by contracting the vessel lumen and lack adaptability across the wide range of vessel diameters encountered in clinical practice. There is a critical need for a biocompatible, adjustable, and easy-to-use device that can reliably reduce operative time while maintaining vessel integrity and minimizing complications.

Brief Team Status Update: The team met at the MakerSpace to discuss 3D printing the stent design. The team discussed a plan and timeline for the month of November. The client met with representatives for Nitinol to get a quote and understand its manufacturing constraints.

Summary of Weekly Individual Design Accomplishments:

- Allison (Ally) Rausch:
    - Research materials for loader tube
    - Research optimal stent geometries
    - Looked into ideal infills for 3D printed preliminary prototype and discussed feasibility of 3D printing such a small object.
- Jacqueline (Jackie) Behring:
    - Met with Makerspace workers to discuss issues of 3D printing, brainstormed injection molding manufacturing
    - Set up meeting with Jesse Darley in Team Lab to discuss different manufacturing techniques
        - Possibly review laser cutting?
    - Reached out to Medtronic and Boston Scientific medical device representatives requesting a quote, the stent manufacturing process, and a meeting
    - 3D designed and printed larger scale flexible stent
- Sofia Decicco:
    - Worked with team to get initial prototype printed
    - Summarized questions and current obstacles team is facing in a slideshow for show and tell
    - Prepared for show and tell organization and timing
- Arshiya (Ria) Chugh:

    - Conducted additional research on stent geometries and collaborated with the team to address fabrication challenges
    - Assisted in preparing for the upcoming Show and Tell by identifying key areas for feedback and discussion
- Daniel Pies:
    - Brainstormed potential manufacturing techniques and prototype materials
    - Researched stent geometries and design considerations for stent functionality
    - Prepared for Show and Tell with team

Weekly/Ongoing Difficulties: The team is currently trying to remain within the set budget of $1000. The team is also trying to feasibly manufacture the stent while Nitinol sourcing and the small stent size are causing logistical problems. The team must evaluate if Nitinol is feasible for this project and if 3D printing at such a small scale is possible.

Upcoming Team Goals: The team will meet a representative next Wednesday (11/05) from TeamLabs to discuss manufacturing of our stent prototype. The team will then write manufacturing protocols and begin prototyping the stent.

Upcoming Individual Goals:

- Allison (Ally) Rausch:
    - Work on manufacturing protocols
    - Finish some testing protocol documentation
    - Research projected budget and share with client
- Jacqueline (Jackie) Behring:
    - Research different stent geometries and the significance of each shape/size.
    - Meet with Jesse on Wednesday and discuss different manufacturing options - laser cutting?
    - Meet with client to review findings and show large scale stent
- Sofia Decicco:
    - Connect with client to decide how the team will test initial prototypes
    - Continue to meet with resources in the makerspace and TeamLab to get additional opinions on how to fabricate stent
- Arshiya (Ria) Chugh:
    - Prepare for an upcoming design consultation with Jesse Darley to review and refine the current design
    - Begin drafting the testing protocol and finalize the planned testing methods
- Daniel Pies:
    - Meet with TeamLab staff for material/manufacturing consultation
    - Work on testing protocol

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Project Timeline

Project Goal	Deadline	Team Assigned	State of Completion
Initial Research	9/8	All	The team will continuously research throughout the semester.
Product Design Specification (PDS) Draft	9/19	All	Completed
Design Matrix Criteria and Design Ideas	9/26	All	Completed
Preliminary Oral Presentation	10/3	All	Completed
Preliminary Report	10/9	All	Completed
Final Design Selection	10/10	All	Completed
Fabrication and Prototyping	10/16	All	In Progress
Final Poster Presentation	12/5	All	

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

TOTAL:	**$0.00**