Arterial coupler re-design: Adjustable stent/cuff anastomosis

Client: Dr. Jasmine Craig and Dr. Weifeng Zeng

Advisor: Prof. Justin Williams

Team:

Simon Fetherston (Leader)
Catie King (communicator)
Megan Lee (BWIG)
Lydia Miller (BSAC)
Drew Hay (BPAG)

Date: October 16, 2026 - October 22, 2026

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 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 status update

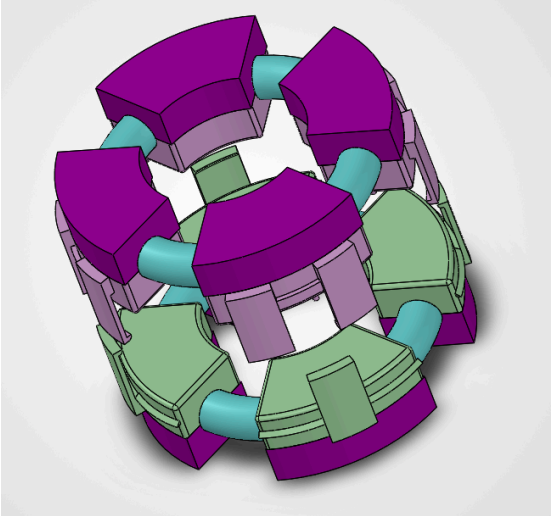
The team is continuing to develop prototypes of the design. Each iteration is bringing in different ideas. One issue last week was the strength of the connective parts; this was a focus of the group to improve this week.

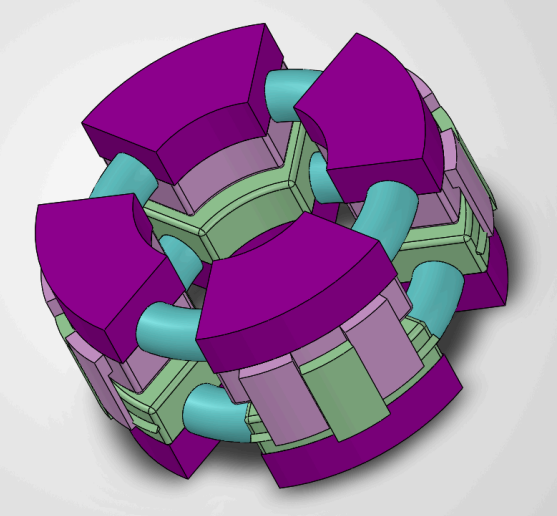
Difficulties/advice requests

The team is currently developing a fabrication plan. Guidance on ordering materials and fabrication payment options would be helpful.

Current design

The team has chosen a preliminary design based on feedback and ideation from Dean. The SolidWorks snapshots below show an expanded and clamped view of the final design pieces





Materials and expenses

Item	Description	Manufac-turer	Mft Pt#	Vendor	Vendor Cat#	Date	#	Cost Each	Total	Link
Category 1										
									$0.00	
									$0.00	
Category 2										
									$0.00	
									$0.00	
								TOTAL:	**$0.00**	

Major team goals for the next week

1. Continue prototyping
2. Finalize testing plans
3. Prepare deliverables for show and tell

Next week's individual goals

- Simon Fetherston
    - Make further revisions to solidworks design and 3D print

    - Get ready for show and tell
    - Revise fabrication protocol
- Catie King
    - Continue to iterate prototype and prepare for show and tell
    - Work on fabrication protocol
    - Begin brainstorming for compression and application tools
    - Begin modeling cuff idea in SolidWorks
- Megan Lee
    - Prepare for show and tell
    - Continue prototyping and create a scaled version that can be used in testing
    - Discuss testing plans
- Lydia Miller
    - Continue prototype iteration in preparation for show and tell
    - Finalize fabrication plan document
    - Discuss use of secondary “tool” for use with the coupler
    - Discuss testing plans
- Drew Hay
    - Continue iterative design of prototype (focus on coupling mechanism
    - Gather client feedback on current designs
    - Determine 5x scale and 1x scale silicone ring
    - Begin drafting testing protocols

Timeline

Task	Sep			Oct					Nov				Dec
	10	17	24	1	8	15	22	29	5	12	19	26	3
Project R&D													
Empathize	X	X	X										
Background…	X	X	X	X	X	X	X						
Prototyping						X	X						
Testings													
Deliverables													
Progress Reports	X	X	X		X	X	X						
Prelim presentation				X									
Final Poster													
Meetings													
Client		X		X									
Advisor	X	X	X	X	X	X	X						
Website													
Update	X	X	X	X	X	X	X						

Filled boxes = projected timeline
X = task was worked on or completed

Previous week's goals and accomplishments

- Individual:
    - Simon Fetherston
        - Completed Biocabinet safety training
        - Researched relevant scaling laws for arterial sizes
        - Worked on solidworks texture design
    - Catie King
        - Completed biocabinet safety training
        - Continued fabrication/prototyping
        - Brainstormed idea for cuff to hold coupler top and bottom rings together
    - Lydia Miller
        - Make edits to fabrication plan
        - Modify solidworks based on initial prototype feedback
        - Continue prototyping
    - Megan Lee
        - Met with client to get feedback on prototype
        - Brainstormed other ideas for clamping the device together
    - Drew Hay
        - Researched small artery mechanics for flexible ring compliance matching
        - Drafted Fabrication Protocol
        - Completed disposal of chemicals training
        - Met to discuss prototype modifications
- Team:

Activities

Name	**Date**	**Activity**	**Time (h)**	**Week Total (h)**	**Sem. Total (h)**
Simon Fetherston	10/16-10/22	- Completed Biosafety cabinet training - Worked on solidworks model for atraumatic surface - Researched scaling laws relevant to shear stress and flow for arteries	0.5 1.5 1	3	25
Catie King	10/16-10/22	- Biosafety cabinet training - Met with team to discuss prototype iteration (x1) - Sketched out idea for mechanism to hold coupler top and bottom rings together	0.5 1.5	2	23
Megan Lee	10/16-10/22	- Met with client to get feedback on prototype - Met with team to continue prototyping	1 3	4	25

Lydia Miller	10/16-10/22	- Met with client to show initial prototype - Met with team to discuss modifications to initial prototype (x2)	1 3	4	24.5
Drew Hay		- Researched small artery mechanics for flexible ring compliance matching - Drafted Fabrication Protocol - Completed disposal of chemicals training - Met to discuss prototype modifications	1 0.5 1 2	4.5	26