

The Knotorious Five

October 24th - October 30th

Client: Dr. Margene Anderson, Dr. Sara Colopy, Dr. Paul Merkatoris

Advisor: Professor Wally Block

Team Members:

Madison Michels (mmichels2@wisc.edu), Leader

Lucy Hockerman (lhockerman@wisc.edu), Communicator

Presley Hansen (pmhansen3@wisc.edu), BWIG

Sadie Rowe (skrowe2@wisc.edu), BPAG

Kate Hiller (khiller@wisc.edu), BSAC

Problem Statement:

In veterinary training, mastering the skill of applying appropriate suture tension is essential for successful wound closure and patient recovery. However, novice practitioners often struggle to judge the correct amount of force needed, leading to either insufficient tension or excessive tension, which can cause plastic deformation of the suture material or tissue damage. Currently, the evaluation of suture technique relies heavily upon subjective instructor feedback, lacking objective, real-time metrics to guide learners. This gap hinders consistent skill development and increases the risk of procedural errors. There is a critical need for a real-time suture tension measurement and feedback system to help students learn to apply optimal tension, prevent material or tissue compromise, and improve surgical outcomes through data-driven training.

Brief Status Update:

This week, the team continued to work on our individual prototypes. Presley and Kate added an LED to the FSR circuit and created code that causes the LED to light up when the FSR receives a certain amount of force. Sadie, Lucy, and Maddie took, cropped, and sorted images of tight and loose knots.

Team Goals:

- In the upcoming week, the team plans to meet with the client to confirm the knot classifications and begin training the model on those images. The team will participate in Show and Tell on Friday to get possible solutions from peers regarding current project difficulties.

Individual Accomplishments:

- Lucy, Sadie, and Maddie: We took images with a camera of the knots we tied last week. Then, we cropped the images to place one knot in each image and sorted them individually into their respective folders. We emailed the client in an attempt to set up a meeting early next week to classify the images into tight and loose knots.
- Kate and Presley: Worked on the FSR circuit, adding an LED component and updating code for Show and Tell.

Individual Struggles:

- Lucy: No struggles this week.
- Presley: I am struggling with the feasibility of the FSR circuit as well as finding a way to calibrate it above 600 g.
- Maddie: N/A
- Sadie: No major struggles this week, just need to coordinate timing to meet with the client in order to validate our image classifications.
- Kate: I am struggling with the feasibility of the FSR circuit, as I believe it will not be accurate.

Individual Goals:

- Lucy: Next week, I hope to classify our knots and begin training the model. I also want to look more in-depth on potential camera options and determine the minimum magnification/camera quality necessary for our prototype.
- Presley: My goal for next week is to help the AI model team where needed, such as gathering more materials and tying more knots.
- Maddie: My goal next week is to train the model on the images we took this week and potentially gather more materials from the client.
- Sadie: Next week, my goal is to meet with the client early in the week to confirm the group's classification of images in order to train the models. I also want to begin thinking through how we will indicate the output from the ML model to the user.
- Kate: Transition from the FSR circuit and contribute to the AI model team.

Project Timeline:

Week	Description	Status
9/5 - 9/11 Week 1	Initial research	Complete
	Client Meeting 1	Complete
	Team Meeting 1	Complete 9/12

	Advisor Meeting 1	Advisor did not attend
9/12 - 9/18 Week 2	Product Design Specifications	Due 9/16
	Team Meeting 2	Complete 9/18
9/19 - 9/25 Week 3	Design Matrix	Due 9/25
	Team Meeting 3	Complete 9/22 Complete 9/24
	Advisor Meeting 2	Complete 9/19
	Meeting with Dr. Numinkar	Complete 9/24
9/26 - 10/2 Week 4	Client Meeting 3	Complete 9/26
	Team Meeting 4	Complete 9/29 and 10/1
	Preliminary Presentation Review	Complete 10/1
10/3 - 10/9 Week 5	Preliminary Presentation	Complete 10/3 at 12:35 PM
	Preliminary Report	Due 10/8
10/10 - 10/16 Week 6	Advisor Meeting 3	Scheduled for 10/10
	Team Meeting 5	Scheduled for 10/10
10/17 - 10/23 Week 7	Advisor Meeting 3	Scheduled for 10/17
	Team Meeting 5	Scheduled for 10/17
	Force Sensor Resistor Value Testing and Research	Goal by 10/17
	Calibrate Sensor	Goal by 10/17
	Determine Output Force Equation	Goal by 10/17
	MTS Testing	Goal by 10/17
10/24 - 10/30 Week 8	Advisor Meeting 4	Scheduled for 10/24
	Team Meeting 6	Scheduled for 10/24
	Add Visual Queue to Circuit	Goal by 10/24

	RoboFlow Model	Goal by 10/24
	MTS Data Analysis	Goal by 10/24
	Python Model	Goal by 10/24
10/31 - 11/7 Week 9	Show and Tell	Due 10/31
	Team Meeting 7	Scheduled for 10/31
11/8 - 11/14 Week 10	Advisor Meeting 5	Scheduled for 11/08
	Team Meeting 8	Scheduled for 11/08
11/15 - 11/21 Week 11	Advisor Meeting 6	Scheduled for 11/15
	Team Meeting 9	Scheduled for 11/15
Thanksgiving Break 11/22 - 11/28		
11/29 - 12/5 Week 13	Final Presentation	Due 12/05
12/6 - 12/12 Week 14	Final Report	Due 12/10
	Advisor Meeting 7	Scheduled for 12/6
	Team Meeting 10	Scheduled for 12/6
12/13 - 12/18 Week 15	Advisor Meeting 8	Scheduled for 12/13
	Team Meeting 11	Scheduled for 12/13
Winter Break		

Expenses

Item	Description	Manufacturer	Mft Pt#	Vendor	Vend or Cat#	Date	QTY	Cost Each	Total	Link
Force Sensor Resistor	Force sensor that outputs resistance in	Haosie?	N/A	Amazon Prime	N/A	10/1	1	\$7.59	\$7.59	Link

