The Knotorious Five

March 6 - March 12

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 set up the camera and successfully ran code to capture images and depict a live camera projection. We drafted and 3D printed a stand to keep the camera still to provide for a constant camera frame before we began coding the full interface.

Team Goals:

Next week, the team will meet with a computer science TA to attempt to put the ML model onto the pi once more. Then, we hope to create a full user interface system from code and obtain more suture material from the client.

Individual Accomplishments:

- Lucy: This week, I communicated with the client to gather more suture materials. I met with the team and a compsci/electrical engineer student to work on uploading the knot model onto the Pi by running jupyter on the Pi platform.

- Presley: This week, I worked with the team to get the HQ camera connected to Pi and working. I set up a meeting with a comp sci student for Friday at 1pm to work on getting the model onto the Raspberry Pi (or an alternate method of implementing it). We also designed a camera stand and met with a student to get help with accessing Jupyter notebook on the pi.
- Maddie: This week I helped the team get the camera connected and running. The team is now able to run the camera with a live output visualized on our computer screen. We are also able to take and save images with varying foci.
- Sadie: This week, I worked with the team to get the HQ camera working. We were able to connect the camera successfully and use it to take pictures. I also met with a friend who is an electrical engineering/comp sci student to hear their perspective on uploading the model. With his help, we were able to re-install the correct version of Python (3.9.11) and access Jupyter notebook on the Pi. We plan to load the model this way for now.
- Kate: This week, I worked with the team to try to get the HQ camera working on the Pi. We were able to connect the camera and get a video through the camera. After that, we designed a camera stand that the camera will be screwed into to create a fixed angle from which the camera will be snapping picture from.

Individual Struggles:

- Lucy: No struggles this week.
- Presley: None.
- Maddie: None.
- Sadie: We are having a hard time successfully loading the model onto the Raspberry Pi, even through Jupyter notebook.
- Kate: No struggles this week.

Individual Goals:

- Lucy: I would like to pick up sutures in order to prepare more suture knots for model refinement using consistent angles and lighting using our Raspberry Pi camera and camera stand.
- Presley: I would like to work with the comp sci student to find a solution to implementing the model with raspberry pi.
- Maddie: I would like to figure out how to get the full ML model onto the Pi this coming week.
- Sadie: Next week, I want to get the model fully implemented and work on improving the physical set-up of the camera in order to take accurate pictures.
- Kate: I would like to get the camera attached to the stand and see if any refinements need to be made to the model. Then I would like to focus the camera and take a picture of the suture knot.

Project Timeline:

Week	Description	Date	Status
1/22 - 1/29 Week 1	Team Meeting 1	1/26	Completed
	Advisor Meeting 1	1/23	Canceled
1/30 - 2/5 Week 1	Team Meeting 2	2/4	Completed
	Advisor Meeting 2	1/30	Completed
2/6 - 2/12 Week 3	Preliminary Presentations	2/6	Completed
	Team Meeting 3	2/9	Completed
	Advisor Meeting 3	2/13	Completed
	Order Raspberry Pi Camera and Board	2/13	Completed
2/13 - 2/19 Week 4	Images Augmented	2/16	Completed
	K-Fold Cross Validation	2/18	Completed
	Receive Materials	2/18	Completed
	Model Trained	2/20	Failed
	Team Meeting 4	2/18	Completed
	Advisor Meeting 4	2/20	Completed
2/20 - 2/26 Week 5	Preliminary Deliverables	2/25	Completed
	Upload Model onto Pi	2/20	In progress
	Team Meeting 5	2/23	Completed
	Advisor Meeting 5	2/27	Complete
2/27 - 3/6 Week 6	Submit Patent to WARF or IDR	3/6	Undecided

	Team Meeting 6	3/4	Complete
	Advisor Meeting 6	3/6	Complete
3/7 - 3/12 Week 7	Team Meeting 7	3/13	Scheduled
	Advisor Meeting 7	3/13	Scheduled
	Get the Pi camera running	3/8	Complete
3/13 - 3/19 Week 8	Team Meeting 8	3/16	Scheduled
	Advisor Meeting 9	3/13	Scheduled
	Implement Pi camera and images into user system		Not started
3/20 - 3/26 Week 9	**Show and Tell**	**3/20**	Scheduled
3/27 - 4/2 Week 10	Select Design Award	4/1	Not Started
	Executive Summary (Draft)	4/1	Not Started
4/2 - 4/8 Week 11			
4/9 - 4/15 Week 13			
4/16 - 4/22 Week 14	**Executive Summary**	4/17	Not Started
4/23 - 4/29 Week 15	Final Pressentations	4/24	Not Started
4/30 - 5/5 Week 16			

Winter Break

Expenses

Item	Description	Manufacturer	Mft Pt#	Vendor	Vendor Cat#	Date	QTY	Cost Each	Total	Link
Force Sensor Resistor	Force sensor that outputs resistance in a voltage divider circuit (2 in pack)	Haosie	N/A	Amazon Prime	N/A	10/1	1	$7.59	$7.59	Link
Raspberry Pi Kit	Contains: Raspberry Pi 5 8GB, 27W power supply, active cooler, 64 GB SD card, card reader, 4K Mico HD out cables, and case	Vemico	B0D2WYFS23			2/8/2026	1	$173.99	$173.99	Link
Arducam IMX477 Pi HQ Camera	HQ Camera + CS 6mm lens	Arducam	B024002			2/8/2026	1	$67.99	$67.99	Link
									TOTAL: $249.57	