BME Design: 200, 300, 301, 400 and 402

Progress Report #9

Title: Helmet for continuous laryngoscopy with exercise

Date: 10/15/2026

Client: Mr. Jacob Tangney MS, CCC-SLP

Advisor: Dr. Randolph Ashton, PhD

Team:

Evan Zheng, BME 300 - Team Leader

Hangjay Liu, BME 300 - Communicator

Joseph Hegeman, BME 200 - BSAC

Kavin Yedlapalli, BME 200 - BWIG

Katherine Fletcher, BME 200 - BPAG

Reghan Ziegler, BME 200 - BWIG

Problem Statement

Continuous laryngoscopy during exercise (CLE) is the gold standard diagnostic tool to assess exercise induced laryngeal obstruction (ELIO). In order to observe the laryngeal obstruction, CLE is performed by attaching a laryngoscope to a head mounted apparatus which is inserted into the patient's nose and into the larynx. The patient would sprint or use a stationary bike at 50% and 100% exertion during the laryngoscopy. Currently, there is no single standardized helmet for CLE testing and all current helmets are custom made. To design a successful helmet for CLE, the laryngoscope mount must resist 6N of force and a 1.5N*m moment applied in all directions. During full sprint, the laryngoscope must not move more than 5mm from its original position relative to the helmet and must not apply a moment greater than 30N*m on the occipital condyle in both flexion, extension, and bending. Lastly the helmet must not slip and thus rotate relative to the patient's head more than 10 degrees from its initial wear position.

Brief Status Update

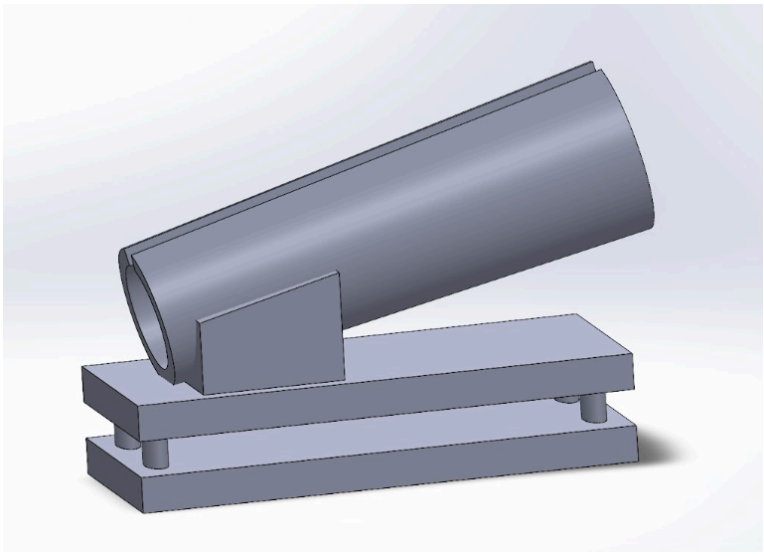
The team has decided to move forward with fabricating the laryngoscope mount on the climbing helmet. Based on feedback from the show and tell, the climbing helmet was considered a better fit and more comfortable option. As a result, the team removed the mounting components from the tactical helmet and plans to transfer them to the climbing helmet.

The team will meet this Friday to attach both mounting components from the tactical helmet to the climbing helmet and install the laryngoscope mount onto the new mounting area.

Difficulties / Advice / Requests

Current Designs : The angle cone mount will be mounted onto the mount area on the climbing helmet.





Materials and expenses - N/A

Item	Description	Manufacturer	Mft Pt#	Vendor	Vendor Cat#	Date	#	Cost Each	Total
Category 1 Helmet									
Tactical Helmet	Airsoft Helmet with Side Rails and NVG Mounts for Outdoor Activities Such As Airsoft, Paintball, CS Games, Etc.	GVAKVTGK						$23.96	$23.96
Climbing Helmet	Half Dome Rock Climbing Helmet, Adjustable Fit, Ventilated	BLACK DIAMOND						$69.95	$69.95
Wrestling Helmet	Wrestling Headgear	Amazon Generic						$69.95	$69.95
Category 2 Mount									
PETG printed	Laryngoscope mount printed with PETG	Wendt Commons							$0.00

mounted	for mounting purposes								
									$0.00
								TOTAL:	**$0.00**

Major team goals for the next week

1. Finish attaching the mount onto the helmet
2. Be able to collect data with phyphox with the phone mount on helmet

Next week's individual goals

- Evan Zheng
  - Assist in mounting the laryngoscope mount to the helmet
- Hangjay Liu:
  - Get testing procedure and data data plan complete
  - Have phyphox and everything ready
- Joseph Hegeman
  - Complete the helmet fabrication
- Kavin Yedlapalli
  - Print out the mount to attach the angled cone mount on to the helmet
  - Print out mount to attach to previous phone mount for testing
  - Complete the helmet fabrication
- Katherine Fletcher
  - Complete the helmet fabrication
- Reghan Ziegler
  - Continue learning Solidworks
  - Continue physical designs for phone mount
  - Start testing and recording the data (also get additional participants if needed)

Timeline

Task	Sept			Oct					Nov				Dec	
	11	18	25	2	9	16	23	30	6	13	20	27	4	11
Project R&D														
Empathize	X													
Background…		X	X	X										
Prototyping					X	X	X	X						

Testings														
Deliverables														
Progress Reports	X	X	X	X	X	X	X	X						
Prelim presentation				X										
Final Poster														
Meetings														
Client		X	X											
Advisor	X	X	X	X	X	X	X	X						
Website														
Update	x	X	X	X	X	X	X	X						

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

Previous week's goals and accomplishments

- Evan Zheng
    - Show and tell
    - Printed and picked up parts
    - Redesigned second iteration of the mount to fit the laryngoscope better and to smoothen the edges to reduce stress concentrations
- Hangjay Liu:
    - Show and tell
    - Drafting up testing plan and data collection
    - Look up equations to be used to make sure data will meet expectation
- Joseph Hegeman
    - Show and tell
    - Met with team and discussed design plan going forward
    - Did casual preliminary testing of helmets
- Kavin Yedlapalli
    - Show and tell
    - Measured dimensions on helmet and began developing model for mounting cone mount on to helmet
- Katherine Fletcher
    - Show and tell
    - Parts design/pickup
- Reghan Ziegler
    - Continued learning Solidworks
    - Finished all required training
    - Did Show and tell

Activities

Name	Date	Activity	Time (h)	Week Total (h)	Sem. Total (h)
Evan Zheng	10/22/2026	Show and tell, Solidworks polishing, 3D printing iteration 2, fit testing	52	4	56
Hangjay Liu	10/22/2026	Show and tell, drafted up testing plan and data collection table for helmet testing.	49	3	52
Joseph Hegeman	10/29/2026	Show and tell, team meeting, discussed designs, casual qualitative testing, SolidWorks learning	36	4	40
Kavin Yedlapalli	10/29/2026	Show and tell, took measurements of climbing helmet, began developing CAD design for mounting cone mount	45	3	48
Katherine Fletcher	10/29/2026	Complete one of the engineering trainings, and begin the other. Signed up for ECB training. Lead the fabrication of first prototype	34	5	39
Reghan Ziegler	10/29/2026	Continued training in Solidworks, kept on designing a new mount without CAD, finished all training, did show-and-tell	36	5	41