Title: Ski jump launch trainer (ski jump)

Date: 9/12/2025 - 9/18/2025

Client: Prof. Walter Block and Dr. Azam Ahmed

Advisor: Prof. Randy Bartels

Team:

    - Team Leader: Kenneth Sun

    - BSAC: Caleb White

    - Team Communicator: Presley Stellflue

    - BPAG: Sarah Kong

    - BWIG: Matthew Niemuth

Problem statement: Develop and prototype a comprehensive training system that will allow young skiers learning to jump direct comparison of their technique to professionals utilizing force plates and motion capture.

Brief status update: The team met with the client, Dr. Ahmed, and established his general expectations and desires with the project. The team got in contact with Prof. Bartels and have set up a scheduled weekly meeting time following the conclusion of his travels. The group also spoke with Dr. Puccinelli for reassurance on group direction and to receive further clarity on the project scope. The rough draft of the Product Design Specification has been completed and uploaded to the group site.

Difficulties / advice requests: No notable difficulties thus far

Current design: N/A

Summary of Weekly Individual Accomplishments:
- Kenneth Sun: Met with Biomechanics Teacher to inquire about Motion capture and other biomechanics data collection modalities. Began looking into opensim markerless motion capture for outdoor use at the ski hill and IMUs for measurement of other metrics like force distribution and more.
- Caleb White: Continued research on studies and experiments that have utilized motion capture in similar settings. Looked into the possibility of force measuring insoles that would be placed within the ski boot of the jumper as an option to analyze force output and distribution for the ski jumper. Downloaded and began playing around with OpenSim in order to get familiar with the software.

- <u>Presley Stellflue:</u> Set up a time and date to meet with our client Dr. Ahmed. Began initial individual research concerning the physics and dynamics of the sport. Concluded that we will have to look into the biomechanics of the skier and their spine and skeletal system for proper function of our design.
- <u>Sarah Kong:</u> Researched the use of force insoles to track in-run pressure distribution and downloaded OpenSim, Met with Dr. Ahmed, his daughter, and her ski jumping coach to talk about their vision for the project. Also wrote the Function and Client Requirements sections of the PDS.
- <u>Matthew Niemuth:</u> Researched more competing designs that use motion capture systems. I also completed the miscellaneous section of design requirements, patient-related concerns, and the competing designs section of the PDS. I also posted the PDS and progress report to our project website.

Upcoming Team Goals: Next week the group will hopefully gain access to Prof. Willie's lab and begin to get comfortable and experiment with the force plates and motion capture system. The team would also like to look into OpenSim, a software used for the biomechanical analysis of movement, and understand its capabilities and potential applications within the project. The team will also be meeting with Prof. Bartels for the first time and will hopefully gain his insight into the project. Further research into relevant subject matter will be continued.

Upcoming Individual Goals:
- <u>Kenneth Sun: Begin testing and using opensim software, also meet with team to set up preliminary trip to ski hill. Finally work with dr. Willie to confirm time for crash course on lab motion cap and force plates</u>
- <u>Caleb White:</u> Learn how to use and operate the force plates and motion capture system located in the Engineering Centers Building. Look deeper into OpenSim and potentially discuss its capabilities with professors more familiar with the software. Continue research into force place insoles and brainstorm low cost solutions.
- <u>Presley Stellflue:</u> I will do more research on understanding the concept of the ski jump and how the physiology and biomechanics of the jumper affects the jump and the skier's flight time.
- <u>Sarah Kong:</u> Become more familiar with OpenSim before the next client meeting and continue to develop the PDS. Research more about how to design a comparative software using data gathered from OpenSim and force insoles/plates.
- <u>Matthew Niemuth:</u> get familiar with OpenSim software, force plates, and motion capture systems so I can effectively help our team use those in our prototype. Look into how to get an experts' data to compare to the data of young skiers captured by OpenSim.

Materials and expenses:

Item	Description	Manufacturer	Mft Pt#	Vendor	Vendor Cat#	Date	Cost Each	Total	Link
Category 1									
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
							TOTAL:	**$0.00**	

Timeline:

Task	Sep 12	Sep 19	Sep 26	Oct 3	Oct 8	Oct 17	Oct 24	Oct 31	Nov 7	Nov 14	Nov 21	Nov 28	Dec 5	Dec 10
Project R&D														
Research	X	X												
Design														
Prototyping														
Testings														
Deliverables														
Progress Reports	X	X												
PDS		X												
Design Matrix														
Prelim Presentation														
Prelim Report														
Final Poster														
Final Report														
Meetings														
Client		X												
Advisor	X	X												
Website														
Update	X	X												

Filled boxes = projected timeline

X = task was worked on or completed