Title: Ski jump launch trainer (ski jump)

Date: 9/26/2025 - 10/02/2025

Client: Prof. Walter Block and Dr. Azam Ahmed

Advisor: Prof. Randy Bartels

Team:

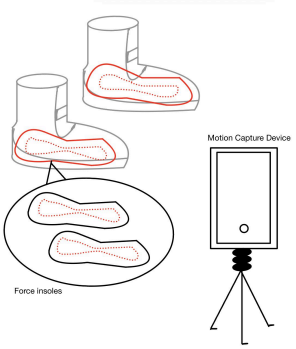
- Team Leader: Kenneth Sun
- BSAC: Caleb White
- Team Communicator: Presley Stellflue
- BPAG: Sarah Kong
- BWIG: Matthew Niemuth

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's main deliverable focus this week was the preliminary presentation. The team worked together to create a presentation that described the research and design process of the project that ultimately led to the selection of the specific design the team is going to go forward with. The team also met with Prof. Bartels and gained advice in regards to the importance of selecting specific metrics to measure and analyze based on their known individual impact on a dependent variable the skier is trying to achieve. This process involves creating some level of quantitative reasoning through either statistical or software analysis means. The team also met with Dr. Willie and gained insight into several appropriate motion capture software that could be used for the project.

Difficulties / advice requests: Approaching a process that in large has remained relatively qualitative, from a quantitative perspective.

Current design:



Summary of Weekly Individual Accomplishments:

- Kenneth Sun: Researched statistical analysis procedures like regression and parameterized machine learning to try to see how we could take data and pull out insights that could be used to guide better coaching methodology. Set up ski hill meeting with Coach Finn to check out the hill and test opencap on it. Also did testing with Caleb on preliminary open cap observations and testing.
- Caleb White: Kenneth and I tested OpenCap through a small qualitative testing procedure involving the tracking of basic dynamic movements, including squats and walking. I looked into both Kinovea and Dartfish as potential motion capture alternatives if OpenCap is unable to perform what is desired. I also contributed to the team's preliminary report.
- Presley Stellflue: 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 the proper function of our design. Sketched design ideas for our three design possibilities and did research on the benefits and limitations of each design.
- Sarah Kong: Researched more about force insoles, specifically looking at costs and how many sensors are necessary to record just ground reaction forces. I also looked into Kinovea as a motion capture system in which we can input videos and has its own slow-mo feature if we need it. I also contributed to the preliminary design presentation.
- Matthew Niemuth: Researched more on different types of force insoles to see which are relevant to our needs for the project. I also looked into the pricing to see which fits our budget the best. I also worked on my part of the preliminary design presentation, including practicing by myself and with my group.

Upcoming Team Goals: The group is traveling to Blackhawk Ski Club, the location of the ski hill, on Sunday, 10/5, and is planning to test the OpenCap on-site as well as get a general idea of the environment the system will be operating in. The team also has the Preliminary Report due

on Wednesday, 10/8, which will combine all preliminary contributions to the project into one cohesive document, which will give a strong idea of what the team has accomplished thus far.

Upcoming Individual Goals:

- Kenneth Sun: Set up project framework including deciding on our data collection metrics and what motion capture software we will use including 2d or 3d. Also finish off our design deliverables or our preliminary report.
- Caleb White: Decide whether or not OpenCap will be able to be used as the motion capture software following the visit to Blackhawk Ski Club. If not, get acquainted with either Kinovea or Dartfish. Determine the way in which the group will quantitatively justify the selection of certain measurement metrics that the design will focus on. Contribute to the team's Preliminary Report.
- Presley Stellflue: I will do more research on understanding the concept of the ski jump and how the physiology and biomechanics of the jumper affect the jump and the skier's flight time. Also will get more comfortable with the concepts of force plates and motion capture.
- Sarah Kong: Establish exactly what metrics we will be measuring in the future and what sensors we want to use for that. Find suitable force insoles that we can use, must be reasonably priced and measure GRF. Start ordering materials.
- Matthew Niemuth: go to the ski hill to get a feel for how we are going to measure our data. Upload our preliminary presentation to our project website as well as any photos we take at the ski jump. Continue working towards getting a better understanding of what metrics we will be measuring and how we can use our designs to help improve young skiers jumps.

Materials and expenses:

Item	Description	Manufac-turer	Mft Pt#	Vendo r	Vendo r 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			Oct					Nov				Dec	
	12	19	26	3	8	17	24	31	7	14	21	28	5	10
Project R&D														
Research	X	X	X	X										
Design			X	X										
Prototyping				X										
Testings														
Deliverables														
Progress Reports	X	X	X	X										
PDS		X												
Design Matrix			X											
Prelim Presentation				X										
Prelim Report														
Final Poster														
Final Report														
Meetings														
Client		X												
Advisor	X	X	X	X										
Website														
Update	X	X	X	X										

Filled boxes = projected timeline

X = task was worked on or completed