

Title: Ski jump launch trainer (ski jump)

Date: 10/17/2025 - 10/23/2025

Client: Prof. Walter Block and Dr. Azam Ahmed

Advisor: Prof. Randy Bartels

Team:

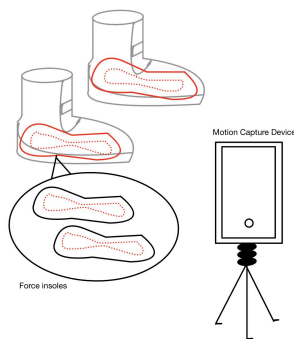
- Team Leader: Kenneth Sun
- BSAC: Caleb White
- Team Communicator: Presley Stellflue
- BPAG: Sarah Kong
- BWIG: Matthew Niemuth

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 has continued fabrication of the system. The Velostat is beginning to be understood and the Kinovea software is getting more comfortable. Further materials have been ordered which will be needed for the force plates including an Adafruit ESP32 Feather, more Velostat, a proto board, and electrical tape.

Difficulties / advice requests: Figuring out exactly what sensors to utilize to quantify the more qualitative aspects of ski jumping (IMU's or not). Make sure data collection is smooth and accurate.

Current design:



Summary of Weekly Individual Accomplishments:

- Kenneth Sun: This week I met with Dr. Willie to ask her about how to optimize video capture for 2D video analysis of ski jumping. She mentioned video quality and frames and the need to parallel orientation to subject. Caleb and I then went to the ski hill to get preliminary video data.
- Caleb White: Prototyped with the Velostat to understand its tendencies as a material. Used an Arduino R4 Minima and Arduino IDE software to determine the need to layer the material to increase sensitivity. Ordered several more parts from Adafruit that will be needed for the Force Insoles. Analyzed some of the videos from the ski hill on Kinovea.
- Presley Stellflue: 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. I researched the Arduino code. Went to the ECB lab to complete lathe training.
- Sarah Kong: 3D-Printed final force sole templates and tested fit in WOMens Size 8 shoes. Researched more about the purpose of force insoles within sports and how to best utilize them for the clients requirements.
- Matthew Niemuth: This week I completed both my Lathe and Mill training for Intro to machining at the ECB. Learned from juniors how to get the arduino code working and analyzing data while connected to the accelerometer.

Upcoming Team Goals: The main goal this upcoming week is to prepare for the Show & Tell on Friday, October 31st. The Team will bring some fabricated components of the design and demonstrate its capabilities. The team will receive feedback from other groups on the fabricated piece and overall design specifications. The team will also attempt to rent professional cameras from the UW library and bring those to a ski jump jamboree this upcoming weekend.

Upcoming Individual Goals:

- Kenneth Sun: Use the video data captured from the athletes to figure out Kinovea capabilities. Work out how to get data of the different angles and figure out if we can get some kinematics data from the motion capture video as well. If not, look into timing gates or IMU for that.
- Caleb White: Fabricate the first prototype of the force insoles for demonstration at Show&Tell. Get used to the new ordered parts and begin implementing them into fabrication and prototyping. Visit the ski hill during the jamboree and collect more footage using the professional UW cameras.
- Presley Stellflue: Use the Arduino kit and get used to the coding that we will need to program it specifically to the skier's usage. Will brainstorm ways that we can take our data from the next visit to the ski hill and make use of it in either the code or in motion capture for analytical results.

- Sarah Kong: Start fabricating the force insoles using the Velostat and Arduino code I previously researched. Visit the ski hill and ensure fit and practicality of the force insoles as well as try and figure out a solution for the WiFi/data processing issue.
- Matthew Niemuth: Go to ski hill and be present for athlete testing of our data collection system and based on how that goes come back and update our system or begin looking into ways to compare data.

Materials and expenses:

Item	Description	Manufacturer	Mft Pt#	Vendor	Vendor Cat#	Date	QTY	Cost Each	Total	Link
Motion Capture System										
Tripod with Bag	60 inch lightweight tripod with adjustable-height legs and rubber feet, compatible with smartphone adapters.	Amazon Basics	WT3540	Amazon	B005K P473Q	10/1/2025	2	\$25.99	\$51.98	Amazon Basics Tripod
Tripod Mount Adapter	Smartphone holder, vertical and horizontal mount adapters for smartphones. Pack of 2	Sharing Moment Co.	H-200112	Amazon	B07S8 TTH34	10/1/2025	1	\$6.99	\$6.99	Amazon Tripod Mount
Force Plate Insoles										
Force Insole Template	TPU 3D-printed template for force plate insole made of, 18.3 cm long	N/A	N/A	Wendt	N/A	10/10/2025	1	\$0.72	\$0.72	N/A
Force Insole Template	PLA 3D-printed template for force plate insole made of, 18.3 cm long	N/A	N/A	Wendt	N/A	10/13/2025	1	\$0.56	\$0.56	N/A
Force Insole Template	PLA 3D-printed template for force plate insole made of, 20.8 cm long	N/A	N/A	Wendt	N/A	10/15/2025	1	\$0.59	\$0.59	N/A
Velostat	Pressure-Sensitive Conductive Sheet 28cm x 28cm	Adafruit	1361	Adafruit	1361	10/16/2025	1	\$4.95	\$4.95	Velostat
Copper Tape	Copper foil tape with conductive adhesive 6mm x 15m	Adafruit	1128	Adafruit	1128	10/16/2025	1	\$5.95	\$5.95	Copper Tape

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Accelerometers	ISM330DHCX - 6 DOF IMU - Accelerometer and Gyroscope	Adafruit	4502	Adafruit	4502	10/16/2025	2	\$19.95	\$39.90	Accelerometers
Velostat	Pressure-Sensitive Conductive Sheet 28cm x 28cm	Adafruit	1361	Adafruit	1361	10/22/2025	1	\$4.95	\$4.95	Velostat
ESP32	Adafruit ESP32 Feather Wifi + BT microcontroller	Adafruit	5400	Adafruit	5400	10/22/2025	1	\$19.95	\$19.95	ESP32
LIPO Battery	Lithium Ion Polymer Battery - 3.7V 2500mAh	Adafruit	328	Adafruit	328	10/22/2025	1	\$14.95	\$14.95	LIPQ
Proto-Board	PCB Proto-Board 4cm x 6cm 3-pack	Adafruit	4785	Adafruit	4785	10/22/2025	1	\$2.50	\$2.50	proto
Electrical Tape	SWRT 6 Pack Black Electrical Tape 0.75in x 66ft 600V	SWRT		Amazon	B0DLNGHJZH	10/22/2025	1	\$7.99	\$7.99	Electrical Tape

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	X	X	X							
Design			X	X	X	X	X							
Prototyping				X	X	X	X							
Testings														
Deliverables														
Progress Reports	X	X	X	X	X	X	X							
PDS		X												
Design Matrix			X											
Prelim Presentation				X										
Prelim Report					X									
Final Poster														
Final Report														
Meetings														
Client		X												
Advisor	X	X	X	X	X	X	X							
Website														
Update	X	X	X	X	X	X	X							

Filled boxes = projected timeline

X = task was worked on or completed