PORTS

ENGINEERING LAB

We are dedicated to

Enhancing sports performance

Improving human motor function

Understanding human motor control

Quantifying human motor performance

*Prof. Ahn says "We have an instrumented treadmill, a large force platform, multiple motion capture cameras, EMG sensors, a wearable metabolic system, etc. However, the most valuable assets to our lab are the students. They are the **'Avengers'** in the field of sports engineering, who have strong passion and expertise in either kinesiology, engineering or both."*

Director

Prof. Jooeun Ahn

Ph.D. in Mechanical Engineering, **MIT**

M.S. in Mechanical Engineering, **MIT**

B.S. in Mechanical and Aerospace Engineering, **SNU**

Graduate students

Jeongin Moon

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Tae-gyun Park

Our recent research

Humans typically move in a way that is comfortable in the short term but harmful in the long term. Because the deleterious effects of such comfortable but unsafe motion develop slowly, people do not perceive the risk in time as in the case of disc degeneration. We can resolve this.
https://robotics.sciencemag.org/content/6/57/eabe1243
https://www.youtube.com/watch?v=j5ux5VdPIjE

Detecting the intention of human movement requires multiple sensors. We reduced the number of required sensors dramatically… to …ONE.
https://ieeexplore.ieee.org/document/9305235
https://www.youtube.com/watch?v=rultnG-gPSQ

Barely detectable vibration to the soles can enhance jump height!
https://doi.org/10.1371/journal.pone.0266597

Body compositions like muscle mass and fat mass are important indicators of health, but measuring them requires expensive devices like DXA or MRI. We propose a much easier way to estimate them.
https://doi.org/10.1016/j.clnu.2021.11.027

Large variability of toe clearance during walking increases the risk of tripping. Applying small but barely detectable vibration to soles can reduce this risk.
https://doi.org/10.1371/journal.pone.0261732

The fact that some devices are widely used does not guarantee that they are reliable or accurate. We need to quantify their reliability & accuracy, and suggest better ways.
https://doi.org/10.3390/s21165511

As we become older, both our strength and endurance decrease no matter how much we exercise. How and when will our motor ability begin to alter? We found the critical age when our athletic performance is likely to change.
https://www.aging-us.com/article/102126/text
https://www.aging-us.com/article/202461/text

When we walk or run on a treadmill, it feels so different from our over-ground exercise. Why so?
https://www.nature.com/articles/s41598-019-49272-0

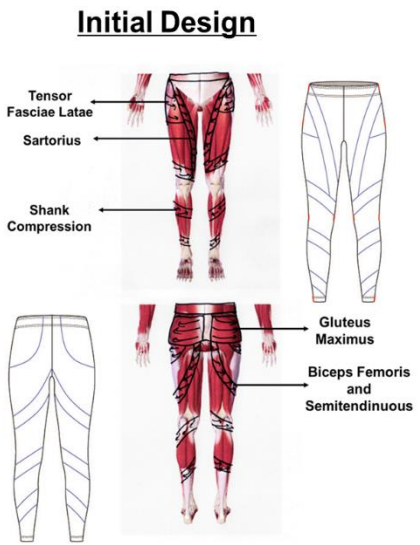
When we experience fatigue, we cannot balance well and may even fall. How can we mitigate this with undetectable vibration.
https://www.nature.com/articles/s41598-020-58815-9

BioRob 2022 Sports Engineering Lab Tour Program (Tentative)

Time: Aug 23 17:15~18:00
Location: Rm 301 Building 71 Seoul National University

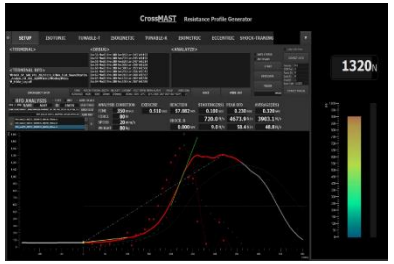
The following items will be briefly introduced during the lab tour.

Compression tights for gait correction



Shoes with vibrating insoles

Cable-driven variable resistance machine



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The process of inverse analysis identifying muscle and joint load depending on shoe properties will be presented.

Nike Air zoom α-fly next%	Asics SORTIEMAGIC RP5	Adidas UltraBoost 20
		
Weight : 210g Offset : 4mm (heel: 39 mm/ forefoot: 35 mm) Midsole : Zoom x foam (TPE), Carbon plate	Weight : 160g Offset : 5mm (heel: 10mm/ forefoot: 10 mm) Midsole : Solyte (custom material, half the weight of EVA)	Weight : 310g Offset : 10mm (heel: 22 mm/ forefoot: 12 mm) Boost midsole : Boost foam (ETPU, encapsulation)
⬇	⬇	⬇
Alphafly Shoes (AF)	Minimal shoes (MIN)	Conventional Running shoes (CON)