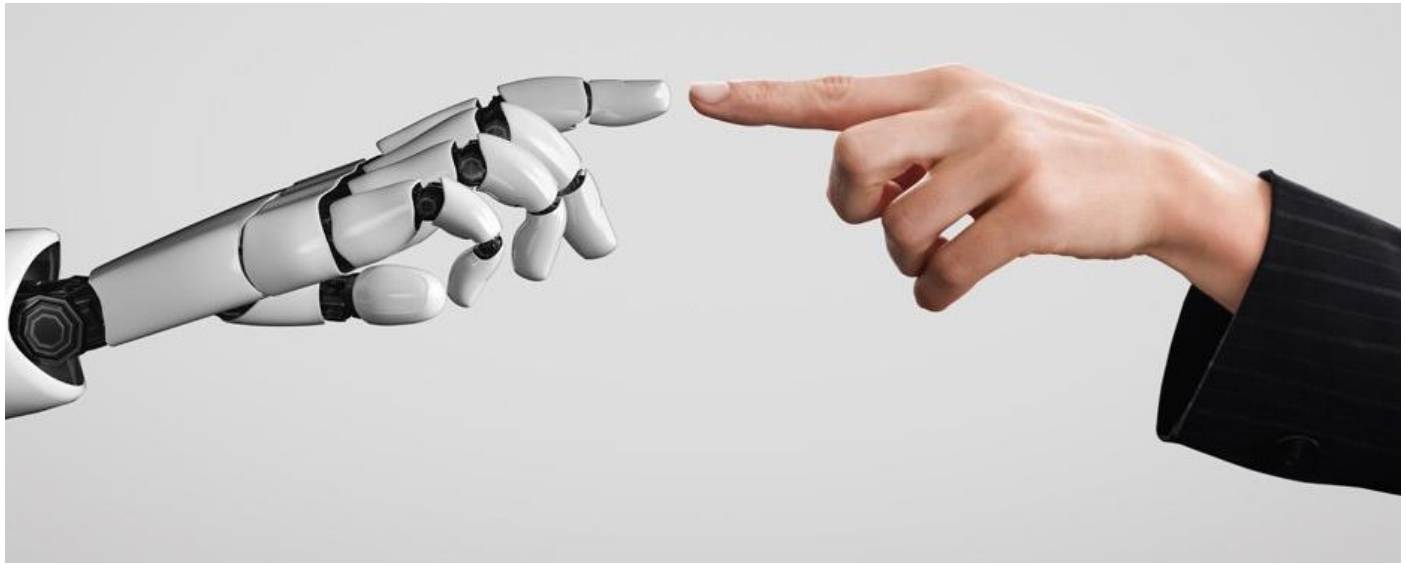
Smartphones and AI as Citizen Science tools

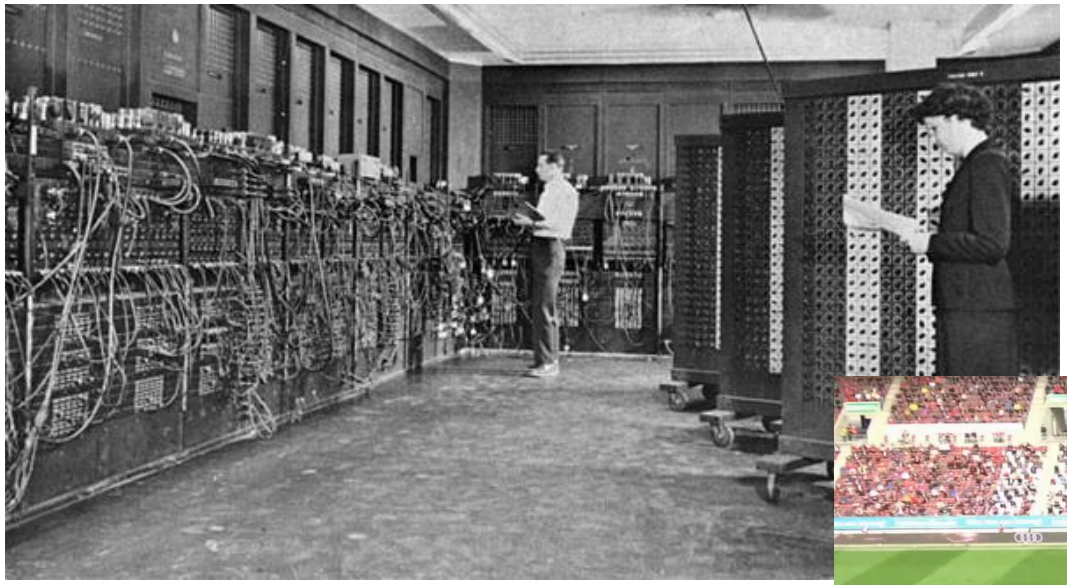


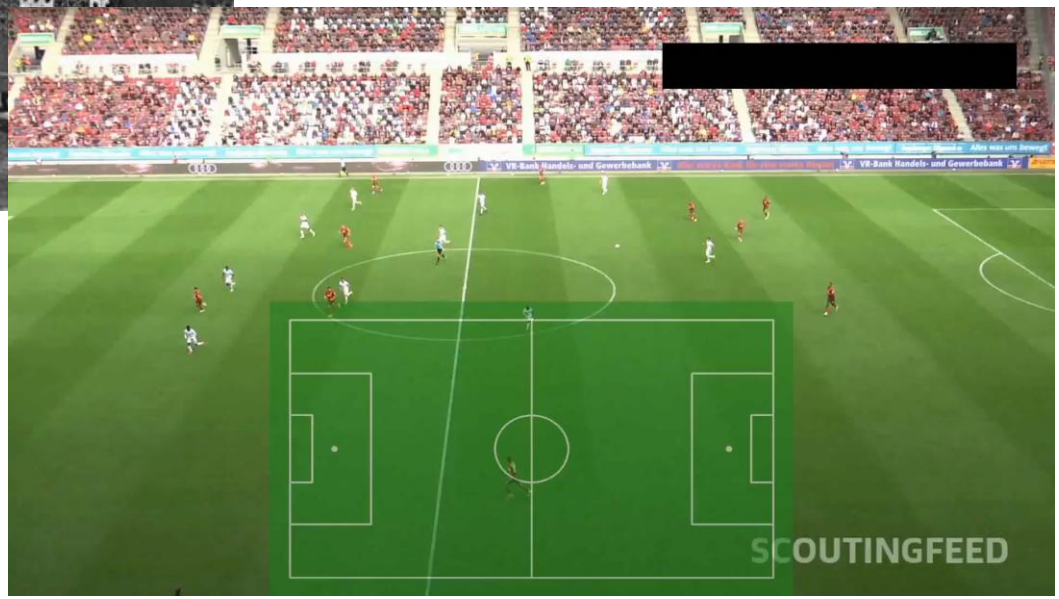
Neil Cronin

Professor of Exercise Biology

Why AI?

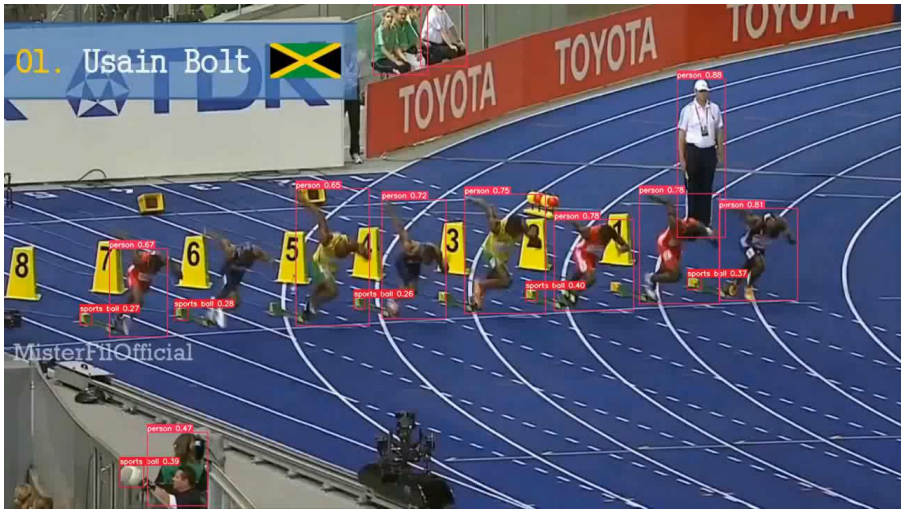
Computing power + data



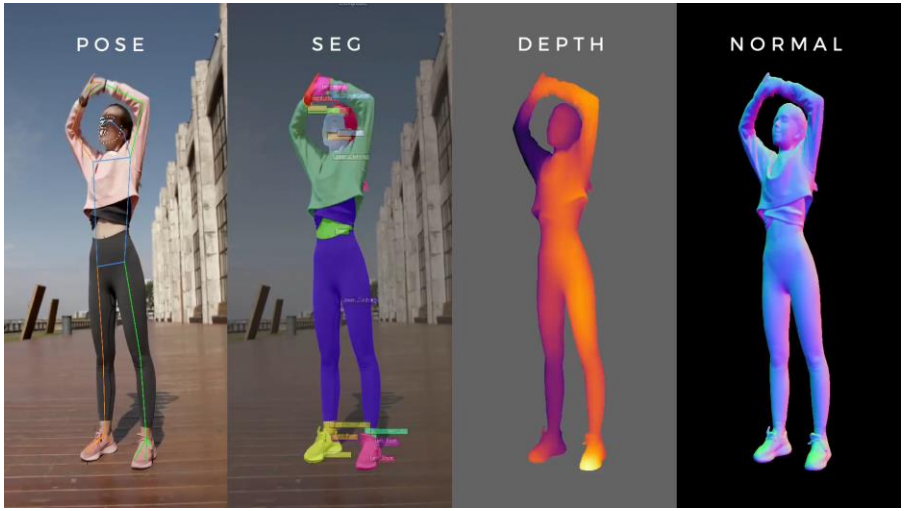


SkalskiP/X; Roboflow

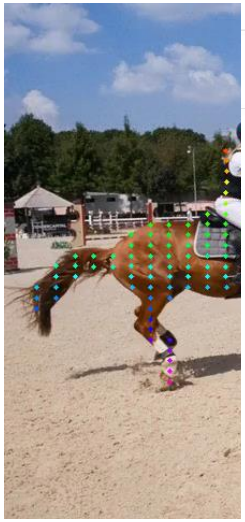
Detecting things in images



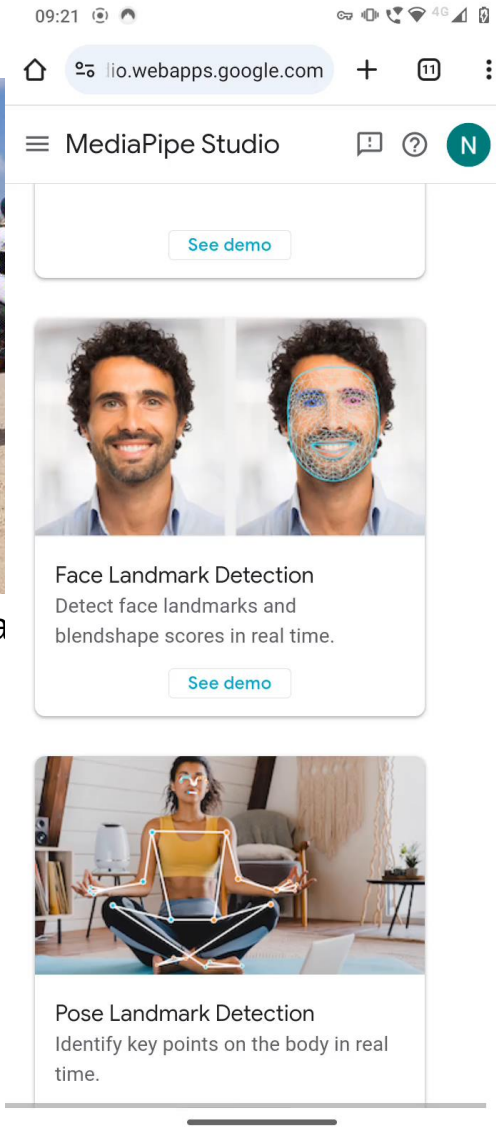
Yolo; Wang et al., 2022



Meta Sapiens; Khirodkar et al., 2024

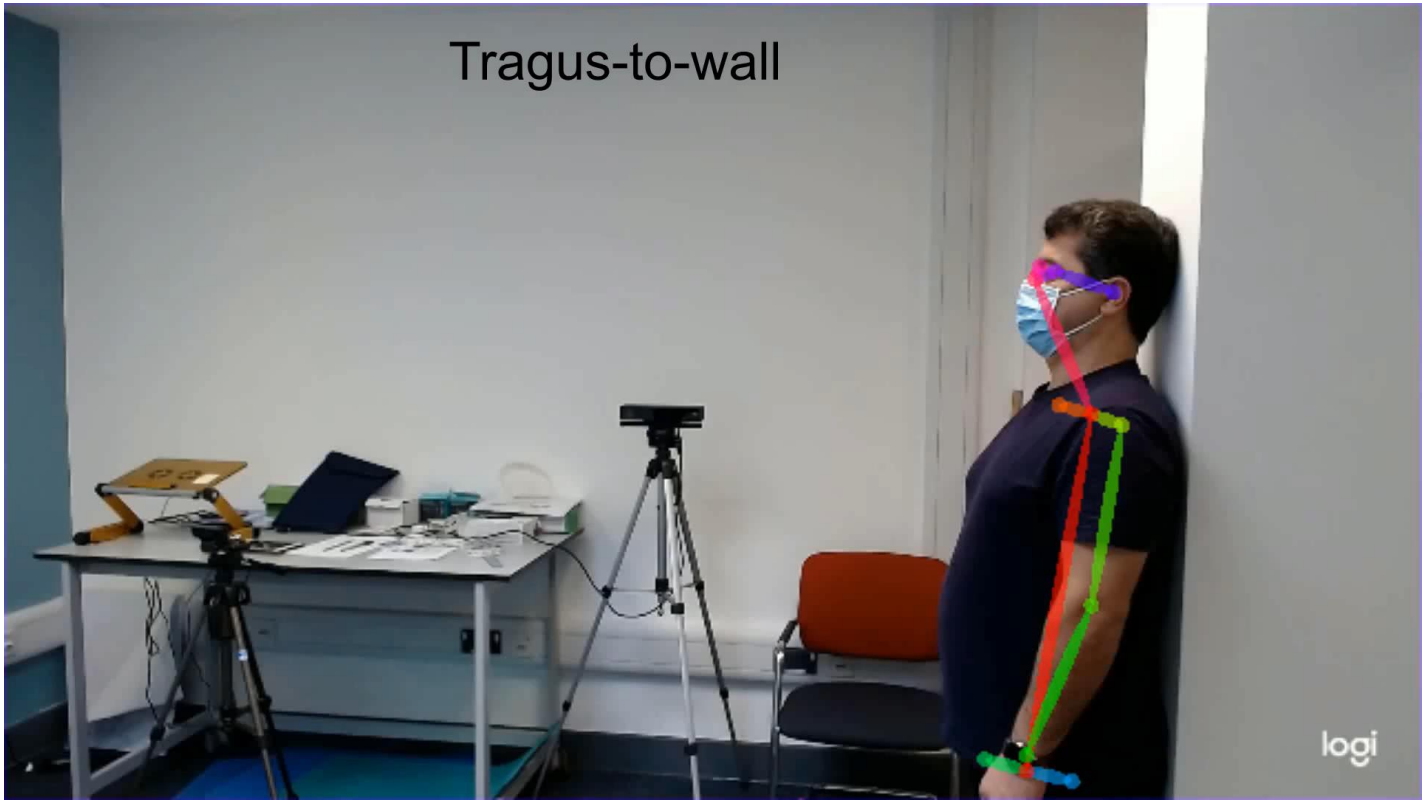


CoTracker; Ka

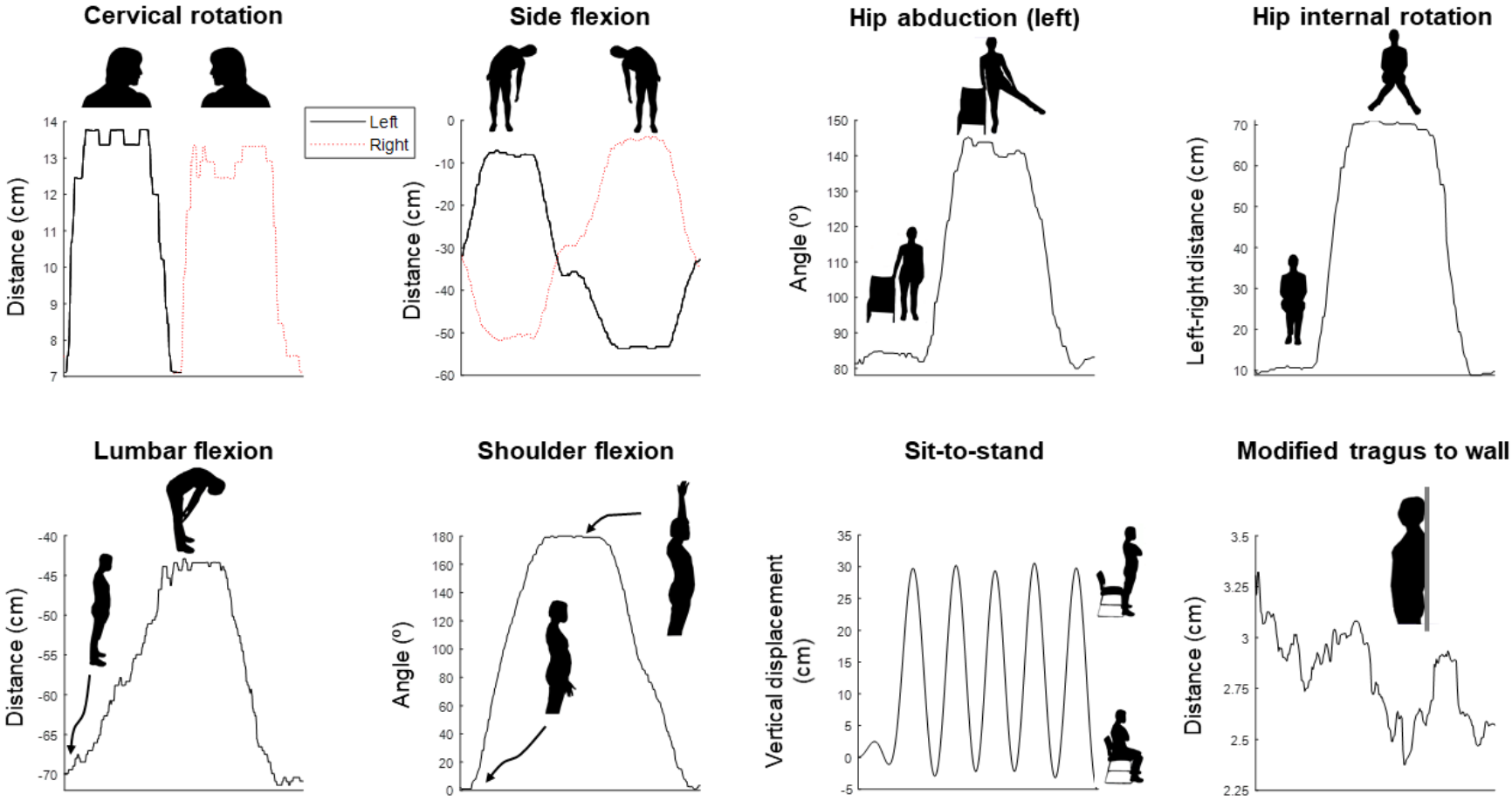


Pose estimation as a clinical tool

90% of participants reported a need for physiotherapy but only 35% received it…Satisfaction with the availability and quality of physiotherapy services were 21% and 27% (Manikandan et al., 2022 [UK])



Remote testing, off-the-shelf model



Remote testing, off-the-shelf model

- 31 axial spondylarthritis (axSpA) patients, age 54±13
- 31 young, healthy people, age 36±9

Computer vision **VS.**

Test (unit)	Mean difference	SD of difference	95% CI	*t* statistic	*p* value
Tragus to wall (cm)	1.4	2.5	0.6–2.3	4.52	< 0.001
Cervical rotation (cm)	2.5	1.2	2.1–3.0	16.81	< 0.001
Shoulder flexion, left (°)	2	14	−3–7	0.99	0.33
Shoulder flexion, right (°)	3	15	−2–9	1.57	0.12
Side flexion, left (cm)	−0.5	3.1	−1.6–0.6	−1.34	0.19
Side flexion, right (cm)	0.5	3.4	−0.7–1.7	1.05	0.30
Lumbar flexion (cm)	−1.1	8.2	−4.0–1.8	−1.05	0.30
Hip abduction, left (°)	−10	10	−13–6	−7.51	< 0.001
Hip abduction, right (°)	−10	10	−13–6	−7.26	< 0.001
Hip internal rotation (cm)	−2.1	6.0	−4.2–0.0	−2.78	0.007

Remote testing, off-the-shelf model

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What next?
How can society benefit?

What is Citizen Science?

"any activity that involves the public in scientific research…has the potential to bring together science, policy makers, and society…in an impactful way".

(https://eu-citizen.science/)

Tunnista lintu laulun perusteella ja auta samalla tiedettä

Muuttolintujen kevät -sovelluksen voi ladata itselleen älypuhelimen sovelluskaupasta. Sovellus tuntee tällä hetkellä 150 suomalaista lintulajia, mutta sen tunnistusalgoritmia kehitetään jatkuvasti. Sovelluksen voi ladata App Store ja Google Play -kaupoista.

CSC

J&AE JANE JA AATOS ERKON SÄÄTIÖ

Citizen Science @ JYU

Natural Science

Otso Ovaskainen
Aleksi Lehikoinen (HY)

”Resource-wise” infra

Health Science

Neil Cronin

Humanities

Jari Ojala
Eerika Koskinen-Koivisto

Education/Dev

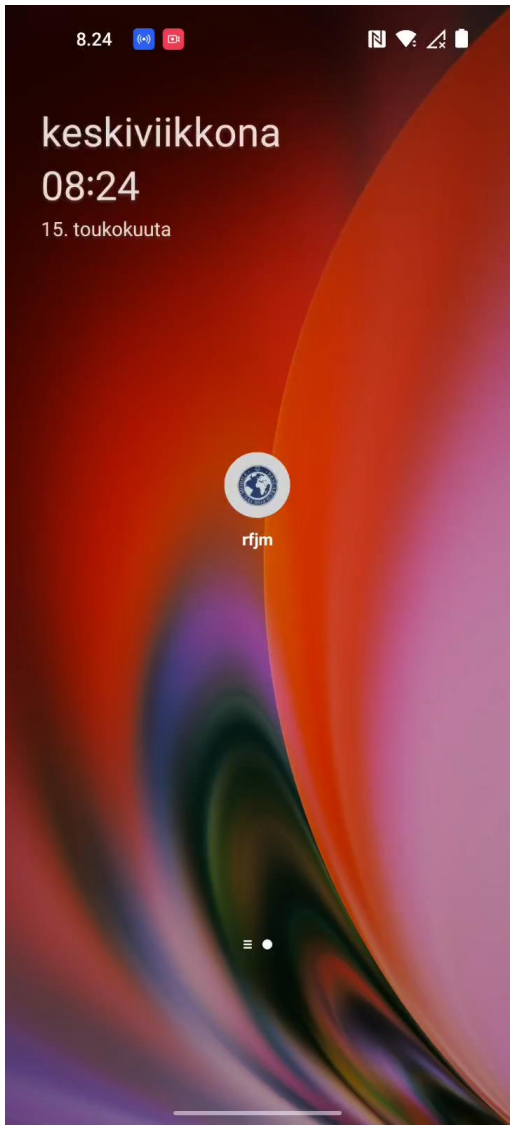
Paavo Leppänen

Digipalvelut: Ari Hirvonen, Ari Lehtiö
Avoimen tiedon keskus: Irene Ylönen

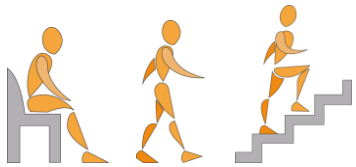
CSC

J&AE JANE JA AATOS ERKON SÄÄTIÖ

Citizen Science @ JYU



Customisable modules



Functional tests

MyJYU AI Transcription

To-do / underway:

e-questionnaires

Signed agreements

Cognitive tests

Stair climbing test

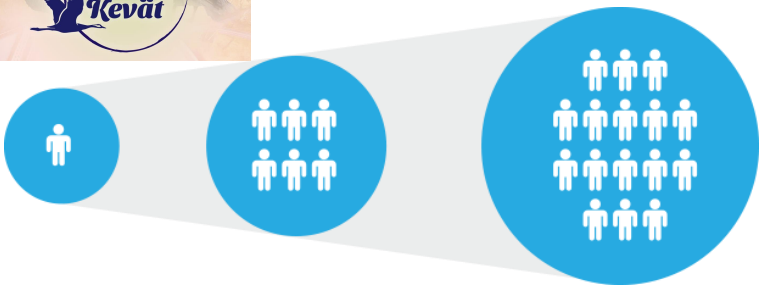
(in-app reminders)

J&AE JANE JA AATOS ERKON SÄÄTIÖ

Citizen Science @ JYU

We built it, we own it

Modular, customisable



Scalable

The future?

Research

PRE Test 1, 2, 3 → MID Test 1, 2, 3 → POST Test 1, 2, 3

Monitoring, promoting PA...

duolingo

Pokémon GO

Making predictions

European Society of Biomechanics

ESB 2025

30th Congress of the European Society of Biomechanics

esbiomech2025.org

AI IN BIOMECHANICS: OPPORTUNITIES AND CHALLENGES

6 – 9 July 2025
Zürich, Switzerland

ESB2025 TIMELINE

- **October 2024** Call for perspective talks
- **November 1, 2024** Abstract submission opens
- **November 30, 2024** Perspective talks submission deadline
- **December 20, 2024** Perspective talk acceptance notifications
- **January 31, 2025** Abstracts submission deadline
- **January 2025** Registration opening
- **March 31, 2025** Abstracts review notifications
- **May 16, 2025** Early registration deadline
- **July 6 - 9, 2025** ESB 2025 Congress

KEYNOTES & KEY DATES

Molly Stevens
Professor of Biomedical Materials and Regenerative Medicine, University of Oxford

Mackenzie Mathis
Bertarelli Foundation Chair of Integrative Neuroscience Assistant Professor, Swiss Federal Institute of Technology

Scott Delp
James H. Clark Professor School of Engineering and Medicine Stanford University

MAIN TOPICS

+ 3D bioprinting, additive manufacturing, and scaffolds
+ Ageing biomechanics
+ AI and machine learning in biomechanics
+ Animal biomechanics
+ Ankle and foot biomechanics
+ Biomaterials
+ Biomedical imaging
+ Bone biomechanics
+ Cardiovascular biomechanics
+ Cardiovascular implants and devices
+ Cellular and molecular biomechanics
+ Clinical and translational biomechanics
+ Computational biology
+ Computational methods for cardiovascular applications
+ Dental biomechanics
+ Fracture healing
+ Hip biomechanics
+ Impact/injury biomechanics
+ Implants and devices
+ Joint kinematics and kinetics
+ Knee biomechanics
+ Mechanobiology
+ Movement and posture
+ Musculoskeletal/orthopaedic interfaces
+ Musculoskeletal biomechanics
+ Musculoskeletal modelling
+ Neuromuscular and control biomechanics
+ Ocular biomechanics
+ Orthoregeneration
+ Osteoarthritis
+ Rehabilitation engineering, exoskeletons, and assistive devices
+ Reproductive, foetal, and neonatal biomechanics
+ Respiratory and fluid biomechanics
+ Shoulder biomechanics
+ Skeletal adaptation
+ Soft tissue biomechanics
+ Spine biomechanics
+ Sports biomechanics
+ Tissue engineering