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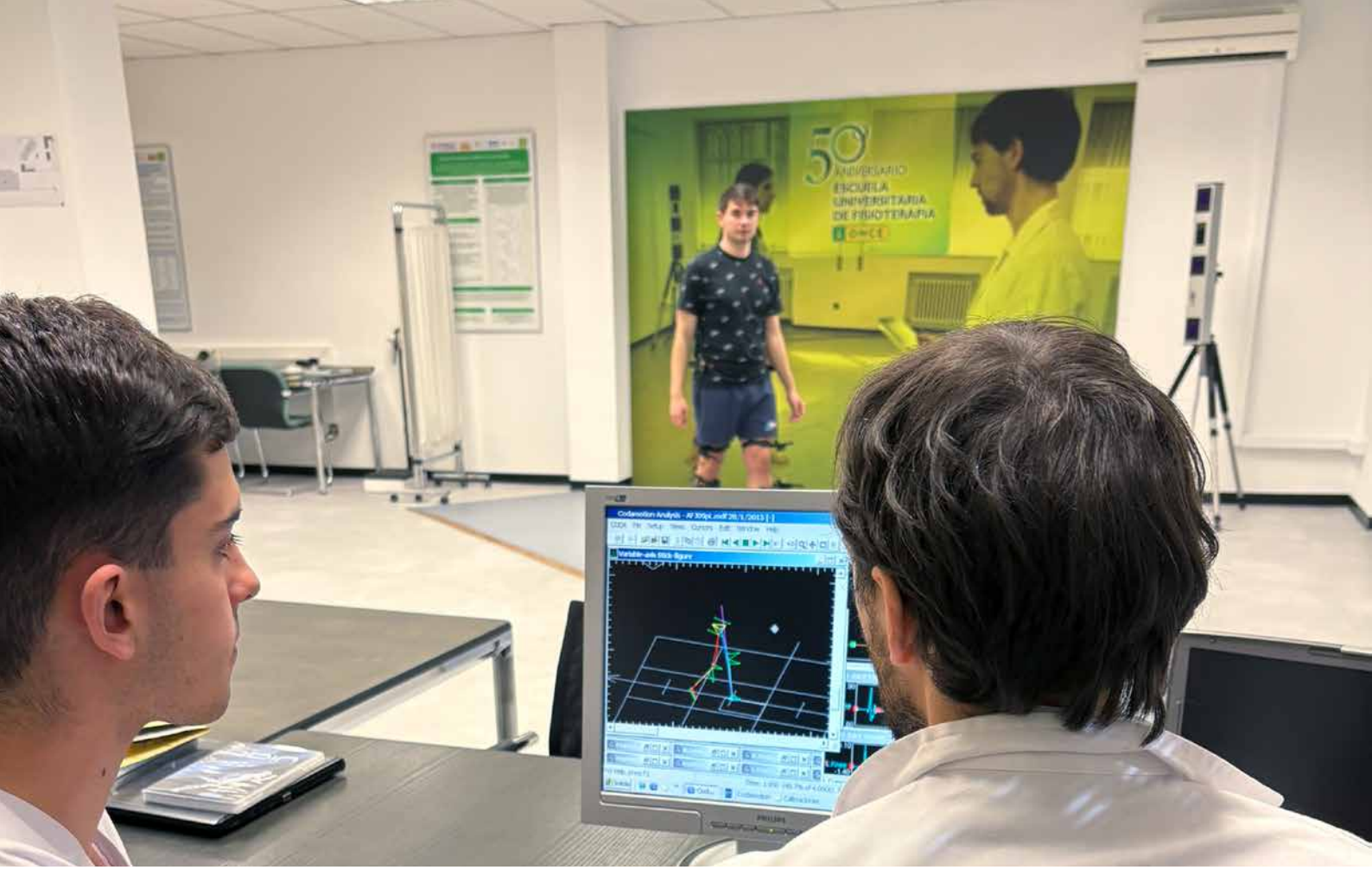
DECODING HUMAN GAIT

Gait analysis: a Kistler force plate supports a gait lab at ONCE University School of Physiotherapy

ONCE



In the gait laboratory at the ONCE University School of Physiotherapy at UAM, instruments such as cameras, body markers and a force plate from Kistler are combined to obtain comprehensive biomechanical data.

A Kistler force plate plays its part in the gait laboratory at ONCE School of Physiotherapy at the Autonomous University of Madrid: in combination with other instruments, it has been delivering anthropometric data for individual gait analysis for 15 years, which is not only useful for treating patients but also contributes to neurological research being pursued by a network of hospitals and universities throughout Spain.

ONCE (Organización Nacional de Ciegos Españoles) is a Spanish non-profit foundation dedicated to the inclusion of the blind and visually impaired. Since its founding in 1938, it has evolved into a complex and multidivisional organization. ONCE is part of the ONCE Social Group, which includes Ilunion and Fundación ONCE. The Group employs 75,000 individuals, 60% of whom have disabilities, making it the largest employer of persons with disabilities in the world and an international benchmark in terms of inclusion and equal opportunities. A key enabler for ONCE is its social, safe, and responsible charity lotteries, such as the Cupón, which is sold by blind or visually impaired people across Spain, often at special ONCE kiosks, for 2 euros each. Drawings happen every weekday with special weekend jackpots on Saturdays.

Driven by this funding, ONCE has owned and operated many important Spanish companies and institutions, such as a media company, a famous cycling team that competed in the Tour de France (1989–2003), and, closer to its original purpose, various educational projects and associations. One of these is the ONCE University School of Physiotherapy, which is part of the Autonomous University of Madrid (UAM), one of the most prestigious universities both in Spain and in all of Europe. The ONCE University School of Physiotherapy was founded in 1964 and is located in a green suburban area in the North of Madrid. Its goal is to train visually impaired people to become full-time professional physiotherapists. Juan Andrés Martín Gonzalo, who graduated from the school in 2006 and now teaches human anatomy and biomechanics, reports: "With our physiotherapist training program, we want to enable blind and visually impaired people to work as full-scope professional physiotherapists on the same level as people without any impairments."

Kistler force plate delivers key data on patient biomechanics

Together with his staff, Juan also leads research at the ONCE University School of Physiotherapy and is one of the main researchers at the UAM gait laboratory, a scientific lab with a total area of about 80 square meters that houses a great deal of specialized equipment, including a Kistler force plate (9286BA) that is integrated into a walkway. This piezoelectric, multicomponent platform measures basic biomechanical parameters such as ground reaction forces, moments and the center of pressure. Foskien Bouman, Product Manager for Biomechanics at Kistler, adds: "Our integrated piezoelectric measurement technology captures forces and moments with the utmost precision: even the smallest changes in gait pattern or shifts in the center of gravity are detected. Plus, thanks to accurate force measurements, the center of pressure can be calculated exactly for precise inverse dynamics." The installed 9286BA force plate has an integrated charge amplifier

Juan Andrés Martín Gonzalo teaches human anatomy and biomechanics at the ONCE University School of Physiotherapy in Madrid and is one of the lead researchers at the affiliated gait laboratory.

that facilitates its usage and combination with other products, such as 3D motion capture cameras, an electromyography system, and data acquisition and software systems.

How to decipher the secrets of a gait profile?
"The ONCE UAM movement analysis laboratory is dedicated to clinical analyses of persons with different kinds of disabilities, including visual impairment. Our lab also welcomes guest researchers who regularly visit the ONCE University School for Physiotherapy from all over Spain," Juan reports. Gait analysis is a complex discipline that requires a lot of precisely captured parameters. In clinical applications, such as the treatment of neurological disorders, understanding gait biomechanics allows for a functional diagnosis, which in turn leads to a concrete treatment plan. "Initially, our focus is on description: creating gait profiles, comparing different groups of patients. Afterwards, the obtained results are helpful for external experts as well when they want to translate research into practice," Juan adds.

"We are very happy with the force plate from Kistler. It is very robust and reliable and has been serving our purposes well for more than 15 years now. We're in close contact with Kistler in Spain and we test the force plate regularly – so far it has not needed any recalibration." The gait laboratory team uses special third-party software to automatically synchronize the force signals from the Kistler force plate with body marker signals and, if necessary, with video imaging data (frontal and side view). This software also delivers analyses and statistics to classify gait patterns, differentiate them from others, and ultimately answer the question "What is the biological or clinical meaning of the gait profile?" Valid gait analysis results ultimately lead to tailored treatments of movement pathologies or neurological issues.

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Juan Andrés Martín Gonzalo, lecturer and researcher at the ONCE School of Physiotherapy

Delivering valuable data for a large research network
Lastly, Juan Andrés Martín Gonzalo looks to the future: "The ONCE University School of Physiotherapy is involved in many different projects in partnership with hospitals and universities. We are constantly looking for new ways to process complex data, for example by applying artificial intelligence to nonlinear systems to maximize the benefits of the analyses carried out at our gait laboratory. Kistler has been a valuable partner over the years, and we're very satisfied with the system and its features."

Kistler force plates work with piezoelectric sensor technology to deliver precise measurements of ground reaction forces, moments and the center of pressure for research and healthcare purposes.

The gold standard in biomechanics and clinical research

Kistler force plates deliver precise, reliable data in research, clinical gait analysis and rehabilitation. The most important features for these applications are:

- High resolution and reliability
- Long-term stability across an extremely wide measuring range
- Recording of very small forces (e.g. in children)
- Specific applications for humans and animals

Stationary and portable digital force plates from Kistler offer the highest measurement resolution in the biomechanics sector as well as outstanding signal quality and low noise.

Would you like to learn more about our applications? Explore now:

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