Dr.med. Andreas Krüger is a Swiss board orthopaedic and trauma surgeon in Zurich, who specialises in knee and shoulder surgery. Andi is a second generation of tournament doctors for equine sports, known as Polodoc since 2013

Photography courtesy of Gian Luca Reich

The interactive training session

Robot Revolution

Game-based robotic personal training

With the new century and its accompanying digital revolution, medical care has gone through an evolution. Machines improve the recent techniques in the individual rehabilitation process after a critical illness or injury, with customised rehabilitation having been raised to the next level. Jacqueline Sander was a robust low goal polo player until a health issue forced her to stop playing. Now she is fighting her way back to the saddle and training with the latest equipment in the training and rehabilitation.

Dynamic devices

The Robotic Personal Trainers from Dynamic Devices, called DD Systems, have a proven track record of highly effective, fun and functional training sessions and testing. Thanks to neuromuscular and neurocognitive training units, people of all ages and conditions can build up their leg muscles. The DD Systems improve physical function, increase performance and support recovery at any level.

All training data is recorded and monitored transparently and is then used for analysis and training automation. Due to the fact that the main qualities required for perfect mobility are a flawless combination of balance, coordination, strength, good reflexes and a strong visuo-motor connection. Regardless of whether you run or play polo, it is the subtle and elegant interplay between our environment, perception, and musculoskeletal system which makes a difference, as mobility and quality of life are tightly interwoven. Dopamine, a neurotransmitter produced by our brains, plays a major role in the control of pleasure and reward-motivated behaviour.

With game-based robotic personal training, dopamine kicks can be produced so our brains are tricked and a hard workout turns into a ‘fun’ activity.

These robots combine real-time visual feedback, unprecedented dynamic control and diagnostics facilities into motivating and effective neuromuscular and neurocognitive training units. The user can select intrinsically rewarding training and test protocols and generate thousands of unique training plans to optimise the interplay of four basic neuromotor abilities, such as coordination, strength, power and endurance.

Neuromuscular training in seating position on the DD System Elite

The DD System Elite with personalised set up

Speed training with SpeedCourt®

These plans are then personalised to the specific training goals and needs of each user in a matter of seconds. The post-workout boost of dopamine exploits the user's intrinsic pleasure and reward mechanisms to a deep positive impact on the mental and physical health. This impact is key for athletic training, injury prevention, back-to-sports scenarios and treatment of central/peripheral nervous system impairments.

Speed court

After Jacqueline experienced the effect of the seated position training on the robot, she stepped to the next level on the field court. Here the aim is to increase processing speed and neural speed. It's about perfecting the elegance of movements in all dimensions and being efficient and unloading previously untapped forces and abilities. The SpeedCourt® Return, Swiss Speedtech, was specially developed for efficient rehabilitation. The focus is mainly on the implementation of return-to-sport, return-to-competition/return-to-work and return-to-play tests. Furthermore, the entire range of applications of the mobile SpeedCourt® edition ranges from the analysis and improvement of postoperative imbalances to the treatment of stroke patients and other neurological indications. With the addition of a GlobalSpeed Syncbox, a Noraxon analysis system can measure precisely mobile 3D motion through inertial sensors, EMG analysis, pressure distribution and highspeed video. The SpeedCourt® will automatically analyse the motion on the basis of the ground contacts.

In professional sports, speed is the key to success. In the modern world of 21st century sport, coaching staff, physicians, psychologists and scientists are constantly looking for methods and techniques to bring their performers to an optimum. SwissSpeedTech GmbH stands for ideal methodical training for the children's and youth sector as well as for the amateur and professional sector. The system can be used for analytical purposes, short-term performance optimisation, long-term performance building, with rehabilitation measures.

The aim of the SwissSpeedTech GmbH is to supply exploitable data and provable training results, whilst providing a challenging and motivating test and training environment for children, adolescents and athletes. As different and individual as the training and test requirements of the athletes are, so specific and individual are the GlobalSpeed® systems. Thanks to its unique combination of modern technology and software, the innovative concept can guarantee a holistic test and training.

Provable and measurable at any time, all crucial aspects of speed are trained and improved. This applies to cognitive performances (e.g. perception, deciding and spatial orientation) as well as to motoric performances (e.g. coordination and reaction). It's a fact that SpeedCourt® makes good athletes better, it helps injured persons to get fit faster and it makes both strengths and weaknesses transparent.

The SpeedCourt® is a two dimensional, multifunctional diagnosis and training system for all forms of acyclic speed. As a tactile measuring system with at least ten sensors, expandable to a maximum of 32 sensors (incl. 3D with sensors in the vertical), it equally takes cognitive and athletic processes into account in a special way (among others multidirectional changes of direction, explosiveness, speed endurance, perception, cognition, reaction, speed of action). The SpeedCourt® is reliable, honest and objective and thus complies the three recognised main quality criteria. The different sizes and types enable an optimal user-specific integration into both existing premises and new buildings. The flooring complies to the sports flooring norm (DIN 18032) and therefore meets the standards of professional athletes. The multi-variant software SpeedPro® enables nearly endless customisable programming of various exercises with numbers, symbols, colours, pictures, videos and acoustic signals, so even a polo set-up is possible.

The last step before re-entering the real polo setting is then the use of the racewood horse – an equestrian simulator where complex swing situations can be trained in any speed.

Expert Opinion
Dr. Max Lungarella
Dynamic Devices AG, Schweiz
#ddrobotec

Dr. Max Lungarella,
CEO and Co-Founder Dynamic Devices AG
Experienced entrepreneur, engineer and scientist with an interdisciplinary and open mindset. Co-inventor of the world's first game- based robotic personal training and data analytics technology. He envisions a future where individual health, functional independence, and well-being can be sustained throughout life.

"Thanks to neuro-muscular and neuro-cognitive training units people of all ages and conditions can build up their leg muscles. The mentioned machines can improve physical function, increase performance and support recovery at any level. All training data can be recorded and monitored transparently and is then used for analysis and training automation.

"Training hard on the DD Systems is easy because the training experience is so good that it feels real. The game-based interaction greatly speeds up the transfer of the cognitive and physical benefits of DD Training to activities of daily living and in return-to-play scenarios.

The combination of scientific acumen in robotics, artificial intelligence, software engineering, bionics and mechanical fabrication techniques with movement and neurosciences will be key for the next level training and rehabilitation."

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