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## TwinBrain Newsletter

March 2023

### LATEST NEWS FROM THE TwinBrain PROJECT TEAM

- Intro from the Principal Investigator
- TwinBrain Workshop 3.0: Trieste, Italy
- TwinBrain Summer School 3.0: Piran, Slovenia
- TwinBrain Clinical trial – an update, Trieste, Italy
- TwinBrain scientific publications from 2022
- About the TwinBrain project



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### **A word from the Principal Investigator**

We are pleased to announce some new developments and to draw your attention to upcoming TwinBrain events.

First, we would like to invite you to the TwinBrain Workshop 3.0, taking place this week and hosted by our partners, the University of Trieste. The workshop can also be attended online, and we will post video recordings on the TwinBrain YouTube channel.

Second, we will hold online information sessions for potential participants to receive direct information. Third, we will provide an update on the TwinBrain clinical trial currently underway in Trieste, Italy.

And finally, we have an updated list of publications that have been generated with the help of TwinBrain funding.

We hope you enjoy reading these updates.

Best regards

Uroš Marušič



## **ANNOUNCEMENT: The TwinBrain Workshop 3.0: Trieste, Italy**

### **Advances in movement disorders diagnosis and rehabilitation: from new technologies to clinical practice**

**March 30<sup>th</sup> – April 1<sup>st</sup>**

The third edition of the TwinBrain Workshop is bridging the gap between clinical practice and new technological advancements which could be used to advance diagnostic and rehabilitation practices. Held in Trieste, Italy, the workshop will bring together experts in neurophysiology, biomedical engineering, exercise and rehabilitation, neuroimaging, and more. The last day of the workshop will offer opportunities to “learn by doing” – the practical sessions will demonstrate how to assess and study movement disorders.

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Click on the link below to access the full program:

[http://www.twinbrain.si/?page\\_id=19022](http://www.twinbrain.si/?page_id=19022)

Register for the Workshop and listen to the talks:

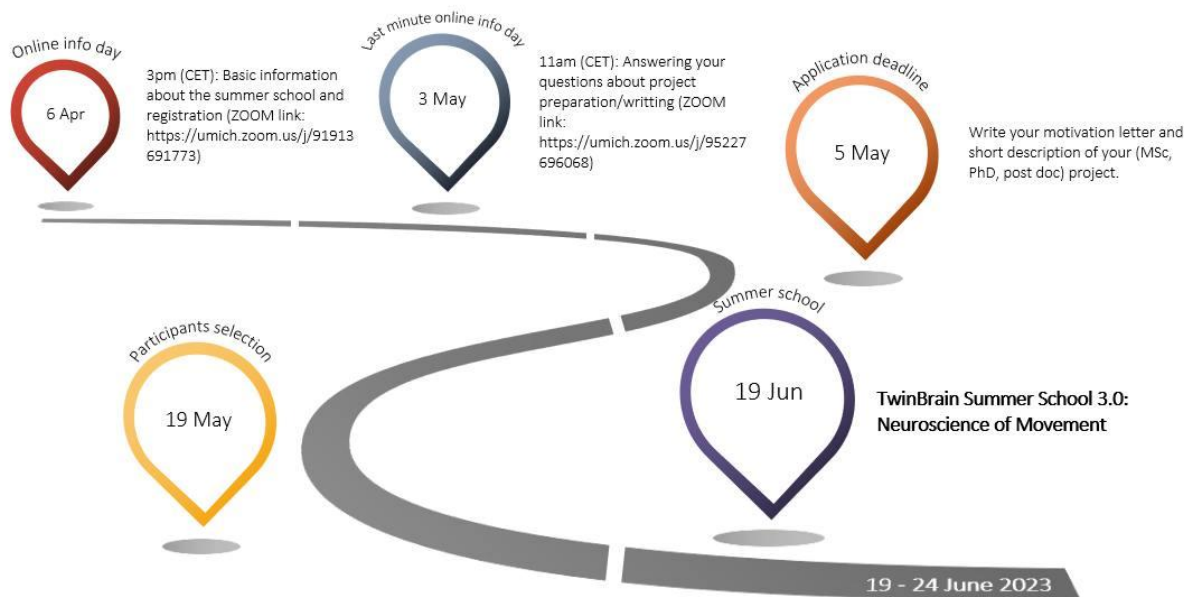
<https://forms.gle/cP82cVijBsGKCUZC8>



## ANNOUNCEMENT: TwinBrain Summer School 3.0: Piran, Slovenia

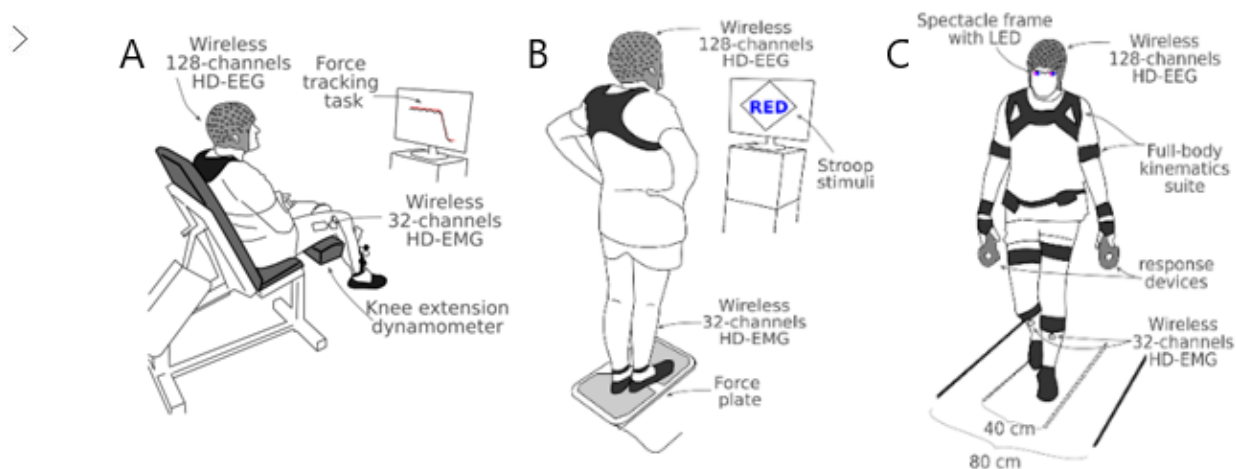
The last edition of the TwinBrain Summer School will take place between 19 – 24 June 2023. The Summer School will bring together top-ranked lecturers from around the globe, such as Germany, Belgium, the USA, Brazil, and many more. We invite Master and Ph.D. students but also motivated undergrad students and interested postdocs to participate and gain a valuable opportunity to develop or improve their research idea in the field of Mobile Brain/Body Imaging (MoBI) under the supervision of world-renowned experts.

The important dates are presented below:



## UPDATE: TwinBrain Clinical trial, Trieste, Italy

Upon extensive testing in 2022, we have launched a TwinBrain clinical trial on Parkinson's disease patients. We are investigating brain dynamics using hdEEG, muscle activations with hdEMG, and body movements using whole-body kinematics. This investigation comprises three experiments across which we increase the need for motor control – from developing the muscle force over time in a seated position to maintaining balance in a semi-tandem stance, and lastly to natural overground walking. See the schematic below. The data collection phase will be finished in the summer of 2023.



## TwinBrain scientific publications from December 2022 – March 2023

Below we invite you to read the latest TwinBrain publications (SCI, peer-reviewed articles only; listed alphabetically):

Šlosar L, Voelcker-Rehage C, Paravlič AH, Abazovic E, de Bruin ED, Marusic U. Combining physical and virtual worlds for motor-cognitive training interventions: Position paper with guidelines on technology classification in movement-related research. *Front Psychol.* 2022 Dec 14;13:1009052. doi: 10.3389/fpsyg.2022.1009052.

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Šömen MM, Peskar M, Wollesen B, Gramann K, Marusic U. Does Standing Up Enhance Performance on the Stroop Task in Healthy Young Adults? A Systematic Review and Meta-Analysis. *Int J Environ Res Public Health.* 2023 Jan 28;20(3):2319. doi: 10.3390/ijerph20032319.

Omejc N, Peskar M, Miladinović A, Kavcic V, Džeroski S, Marusic U. On the Influence of Aging on Classification Performance in the Visual EEG Oddball Paradigm Using Statistical and Temporal Features. *Life (Basel).* 2023 Jan 31;13(2):391. doi: 10.3390/life13020391.

Peskar M, Omejc N, Šömen MM, Miladinović A, Gramann K, Marusic U. Stroop in motion: Neurodynamic modulation underlying interference control while sitting, standing, and walking. *Biol Psychol.* 2023 Mar 15:108543. doi: 10.1016/j.biopsycho.2023.108543.





## About the TwinBrain project

The investigation of brain dynamics in most routine movements such as walking, balancing, or learning new motor-cognitive tasks remains a major challenge for neuroscience. An integrative approach to investigating brain and movement dynamics was recently developed under the term MoBI: Mobile Brain/Body Imaging. This technique is based on mobile electroencephalography (EEG) synchronized to motion capture to better understand the relationship between brain dynamics, movement, and cognition in more realistic (everyday) environments. Development and optimization of this technique will provide new analytical methods for high-dimensional MoBI data in ecologically valid contexts, work with data that is not yet standard in the field of human neuroscience, and lead EEG research out of the laboratory environment into everyday situations, which become more challenging for the symptomatic population.

The overall objective of TwinBrain project is to improve the scientific and technological capacity of the country with low R&I performance (Slovenia) by twinning it with three leading international research institutions (from Germany, Switzerland, and Italy). Leading researchers in the field of neuro-muscular control, MoBI and the neuroscientific investigation of embodied cognitive processes as well as machine learning will form a network of excellence that will facilitate training and early-stage research growth through the exchange of best practices, workshops and summer schools. TwinBrain will also provide short term on-site trainings, expert visits and exchanges, as well as start working on future joint research proposals and PhD projects among partners and beyond to be continued after the completion of the project. These will lead to strengthening of long-term infrastructure capacities and facilitate the development of the proposed research area and related careers.



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