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STADIUS
Center for Dynamical Systems, Signal Processing and Data Analytics

STADIUS Newsletter

June 2025

RESEARCH ▪ AWARDS ▪ NEWS ▪ EVENTS ▪ STAFF UPDATE ▪ DEFENDED PHD ▪ PUBLICATIONS

Welcome to the June edition of the STADIUS Newsletter!

This is the last newsletter of the academic year! Don't worry, we'll be back in September!

To all PhDs and researchers lucky enough to escape their desks (even for a while) this summer: enjoy the holidays, the travels, the naps, the reunions, the food... whatever brings you joy.
You've earned it!

Research of the month by Miguel Bhagubai

"Advancing Seizure Detection Based on Wearable Data – Una Europa Epilepsy Data Challenge "

Work under the supervision of Maarten De Vos

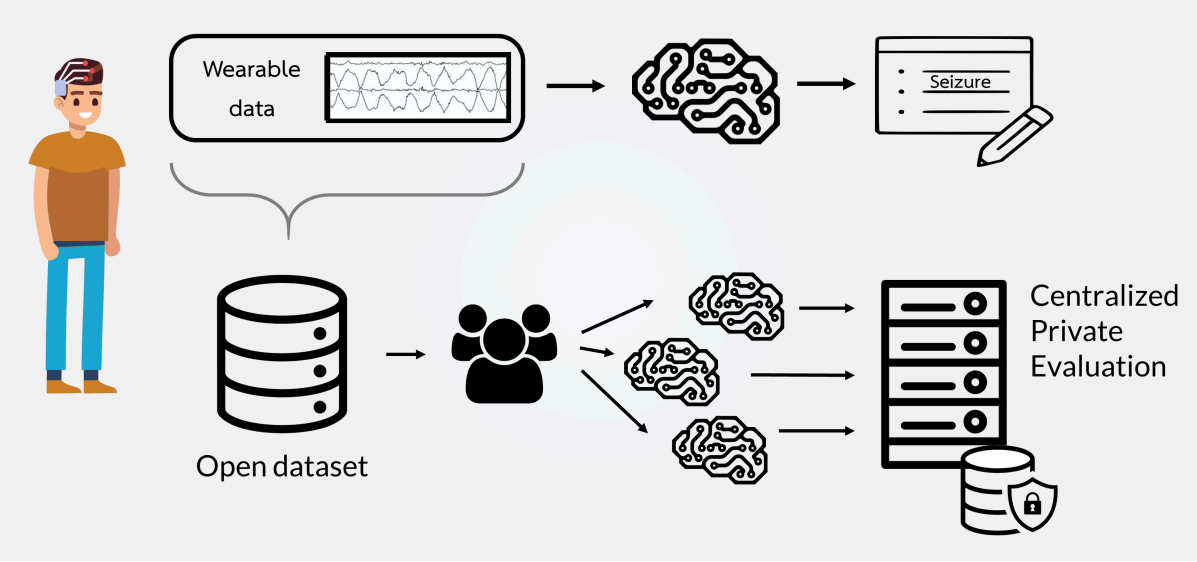
From February to May 2025, the **Una Europa Epilepsy Data Challenge** brought together 84 participants from 27 countries to tackle a critical healthcare challenge: developing machine learning (ML) frameworks for seizure detection using wearable physiological data.

Epilepsy, a neurological disorder marked by recurrent seizures, requires accurate and continuous monitoring for diagnosis and treatment optimization. Traditional in-hospital monitoring is typically limited to short periods, is costly, and burdensome for clinicians. This often leads to an underestimation of real-world seizure occurrences.
Recent advances in wearable technologies, capable of recording EEG, ECG, EMG, and

movement data, **offer a promising alternative to traditional in-hospital methods**, enabling long-term, non-invasive monitoring in daily life. However, these devices present challenges, including increased noise, motion artifacts, and lower spatial resolution. Additionaly, it is unfeasible to manually review and count seizure occurrences in the hundreds of hours of data recorded with the wearable. ML frameworks help manage these challenges by automatically identifying potential seizure events, making review by clinicians more efficient.



The **SeizeIT2 project**, a multicenter, prospective study, was carried out to validate the Sensor Dot wearable device (from Byteflies). The study started in 2020 and ended in 2022, and in 2025 the data became publicly available (https://openneuro.org/datasets/ds005873). This is the first multimodal wearable dataset (including EEG, ECG, EMG, and motion signals) openly accessible. The data enabled the creation of the **Epilepsy Data Challenge**, with the objective of motivating participants to develop automated seizure detection frameworks. The data was carefully split into training, validation, and a hidden test set to ensure fair evaluation and avoid overfitting, an issue seen frequently in ML publications. The test set was used in two evaluation phases to assess the generalizability and performance of the models. The challenge employed tools that enabled independent evaluation of standardized submissions, allowing frameworks to be assessed without manual intervention while keeping the test data private to support iterative model development. The best-performing teams improved their results by including additional data sources and leveraging multiple modalities beyond the behind-the-ear EEG. Their approaches highlight the importance of diverse data integration for robust seizure detection.



The challenge culminated in a successful workshop featuring researchers from institutions across Europe, including the University of Edinburgh, University Hospital Zurich, Austrian Institute of Technology, University of Cologne, and the French med-tech company Reliev (the winner of the challenge). The contributions of our clinical partners from UZ Leuven (Prof. Wim Van Paesschen and Dr. Jaiver Macea) were invaluable for the data collection and interpretation.

Organized by PhD researcher **Miguel Bhagubai**, **Dr. Christos Chatzichristos** and **Prof. Maarten De Vos**, the challenge brought strong international collaboration, pushed methodological boundaries, and advanced towards integrating ML tools into clinical practice. The public dataset and automated evaluation tools developed throughout the event will continue to support progress in this growing field.

Awards



Order of the Crown for Bart De Moor

King Filip of Belgium has bestowed on **Prof. Dr. Bart De** Moor, the **Order of the Crown**, which is one of Belgium's highest national orders. It is awarded for services rendered to the Belgian state, especially for meritorious service in public employment, and for **distinguished achievements in science, technology,** and **entrepreneurship**. Prof. De Moor will have the title of '**Grand Officer in the Order of the Crown'**.

News



Susan Ghaderi elected as representative in KU Leuven Academic Council

We are proud to announce that **Susan Ghaderi**, a STADIUS researcher from Yves' Moreau group, has been elected as the **representative for the Science, Engineering and Technology Group** to the **KU Leuven Academic Council.** Her election highlights the recognition and support she has earned within the university community.
Susan will officially take office on 1 August 2025. Please join us in **congratulating her on this accomplishment** and in thanking her for stepping forward to represent academic staff at the university level.

Susan would like to sincerely thank all those who supported her. She is committed to doing her best to represent the interests of all AAP members.



Leuven Gravity Institute Strengthens Partnerships Through Scotland Mission

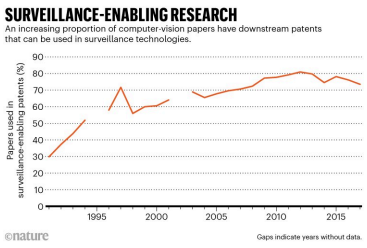
A high-level Flemish delegation including Flemish Minister-President Matthias Diependaele and **Prof. Tjonnie Li (STADIUS)** from the Leuven Gravity Institute recently completed a successful mission to Scotland (10-12 June 2025), deepening ties with Scottish institutions and exploring new opportunities for gravitational wave research collaboration on the Einstein Telescope project. The mission brought together senior academic representatives from both regions to advance scientific cooperation in this cutting-edge field.
Read more

Strong First Year for Athumi



Athumi, the Flemish government's trusted data utility company (of which Bart De Moor is a chairman of the Board) , has completed its first full financial year with a strong performance. The company achieved a net revenue of €15 million—50% above its target—and a total turnover of nearly €39 million in 2024.
As a neutral data intermediary, Athumi facilitates secure data exchange across sectors such as real estate, energy, mobility, and logistics. Key projects include the expansion of the Real Estate Information Platform (VIP), the rollout of a digital certificate for student workers, and the upcoming launch of Elys—a platform to streamline the communication of death notifications.
Bart De Moor invites to learn more about Athumi via a clear and engaging podcast episode with CEO Björn De Vidts:
🎧 Listen here (Graydon – Voorbij de data).
The entire "Voorbij de data" series by Graydon is highly recommended for anyone interested in the future of data and innovation.

Yves Moreau contributes to Nature News



"Wake-up call for AI: Computer-vision research increasingly used for surveillance

Human-surveillance technologies have advanced in the past few years with the rapid development of artificial intelligence (AI) and imaging capabilities. The technologies can recognize humans and their behaviour, for instance, through face or gait recognition and monitoring for certain actions.
Police forces and governments say that AI-powered surveillance allows them to better protect the public. But critics say that the systems are prone to error, disproportionately affect minority populations and can be used to suppress protest.

Yves Moreau, a computational biologist at STADIUS, who studies the ethics of human data, warns that computer scientists need to "wake up" and consider the moral implications of their work. His comments were featured both in a recent **Nature** article and in a **Nature editorial,** which called for deeper scrutiny of the ethical risks posed by the widespread use of computer vision for surveillance.

Read more:
https://www.nature.com/articles/d41586-025-01745-1
https://www.nature.com/articles/d41586-025-01965-5

Events @ STADIUS

Michael Fanuel on Sampling finite determinantal point processes on a quantum computer
When: 1/07/2025, 15:00 – 16:00
Location: ESAT B91.100

For more information about STADIUS events please visit the STADIUS Event webpages.

Don't forget to check the website of VAIA for a wide choice of courses on (aspects of) AI: www.vaia.be

Other Events

Physical Computation Workshop
When: 3-4 Sept 2025
Location: Irish College

NEonatal Sleep Talks - NEST
When: 3-4 Sept 2025
Location: Groot Begijnhof, Leuven

New colleagues

A warm welcome to new personnel at STADIUS!



Hi,

My name is Trui Osselaer. After completing my bachelor's degree at Ghent University, I recently graduated with a master's in Biomedical Engineering at ETH Zürich. I have now started my PhD at Biomed under the supervision of Prof. Maarten De Vos. My research will focus on applying machine learning techniques to sleep data, specifically to daytime napping. In my free time, I enjoy running and cycling.

Trui

Hello everyone!

I'm Diego Tielens and I graduated last year from a Master in Mathematical Engineering at the KUL. I'm a new PhD student at STADIUS under the supervision of Prof. Rodolphe Sepulchre and the goal is to study in the field of neuromorphic engineering with a curiosity towards subjective experience, the sense of touch and internal models. For the rest, I'm also a big fan of running, cycling



and basically of spending lots of time in nature. Excited to meet you all !

Diego

We wish the best of luck to the researchers who are leaving STADIUS

Best of luck!

- We wish **Sem Viroux**, researcher from the group of Bart De Moor, the best of luck in the next steps of their career as he leaves STADIUS at the end of this month.

Recently defended PhDs

Congratulations on the recently approved grants:

- **19/06/2025 Giulia Rinaldi "***A Framework for Designing Decision Support Systems to Generate Artificial Intelligence Pipelines*, PhD thesis, Faculty of Engineering"
  - Supervisor: Bart De Moor
  - Link to thesis: https://lirias.kuleuven.be/4234234&lang=en

Recently approved projects

Congratulations on the recently approved grants:

- **C1** "Towards fast, calibration-free naturalistic brain-computer interfaces"
  - **Promotor:** Alexander Bertrand
  - **Co-promotor:** Simon Geirnaert
  - **Start:** 01/10/2025 - 30/09/2029
  - **Budget:** 250.233

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Publication Digest

Here's the monthly STADIUS Publications Digest, including new reports that have been added to the publications database.
Please remember to have your own reports added in the publications database and make sure your entries are kept up to date (status submitted/accepted/published) at all times.

Contact Ida for new additions and updates, do not add/update database content yourself.

25-122
Didier P., ``Distributed Multichannel Wiener Filter for Wireless Acoustic Sensor Networks", Technical Report 25-122, ESAT-STADIUS, KU Leuven (Leuven, Belgium), 2025.

25-123
MacWilliam K., Dietzen T., van Waterschoot T., ``Tracking of Spatially Dynamic Room Impulse Responses Along Locally Linearized Trajectories", Technical Report 25-123, ESAT-STADIUS, KU Leuven (Leuven, Belgium), 2025. Accepted for publication in *Forum Acousticum Euronoise 2025*.
Lirias number: 4243558.

25-125
Bruneel R., Schuurmans M., Patrinos P., ``Optimal intraday power trading for single-price balancing markets : An adaptive risk-averse strategy using mixture models", *Applied Energy*, vol. 389, Mar. 2025, 125754 art nb p.
Lirias number: 4230643.

25-126
Evens B., Latafat P., Patrinos P., ``Convergence of the Chambolle-Pock Algorithm in the Absence of Monotonicity",*Journal of Optimization Theory and Applications*, vol. 206, no. 7, 2025, pp. 1-45.
Lirias number: 4235740.

25-127
Yan J., Markovsky I., Lygeros J., ``Secure data reconstruction : A direct data-driven approach", Technical Report 25-127, ESAT-STADIUS, KU Leuven (Leuven, Belgium), 2025. Accepted for publication in *IEEE Transactins on Automatic Control*.
Lirias number: 4242801.

25-129
Desmedt C.P., Budts W., De Vos M., Moons P., ``Artificial intelligence-generated podcasts open new doors to make science accessible : a mixed-method evaluation of quality and the potential for science communication", *European Journal of Cardiovascular Nursing*, 2025, pp. 1-11.
Lirias number: 4242244.

25-130
Ketcham R., Pollin S., Moonen M., et al., ``Joint precoding and transmit power allocation for multiuser multiantenna SWIPT employing OFDM with optimal time-switching and a-fairness", Technical Report 25-130, ESAT-STADIUS, KU Leuven (Leuven, Belgium), 2025. Accepted for publication in *IEEE Open Journal of the Communications Society*.
Lirias number: 4243561.

25-131

Rinaldi G., *A Framework for Designing Decision Support Systems to Generate Artificial Intelligence Pipelines*, PhD thesis, Faculty of Engineering, KU Leuven (Leuven, Belgium), Jun. 2025
Lirias number: 4234234.



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ida.tassens@kuleuven.be .

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