Lorenzo HERMEZ

E-mail: lorenzo.hermez[at]imt-nord-europe.fr
764 Bd Lahure, 59500 Douai, France
LinkedIn
Google Scholar
Website

EDUCATION

PhD in Signal, Image, Automation, and Robotics **2022 – 2025**
Institut Polytechnique de Paris, prepared at Télécom SudParis.
Thesis: *Spatiotemporal characterization of gait kinematics in motor disorders using machine learning: from signal to image analysis*
Funding: Institut Mines-Télécom (Futur, Ruptur & Impacts program)
Supervisors: **Nesma HOUMANI** and **Sonia GARCIA-SALICETTI** (SAMOVAR, ARMEDIA team)
Jury: Chair: **Jérôme BOUDY** (Prof., Télécom SudParis), Reviewers: **Francois ROUSSEAU** (Prof., IMT Atlantique) and **Gérard Dray** (Prof., IMT Mines Alès), Examiners: **Anthony FLEURY** (Prof., IMT Nord Europe) and **Mathieu LEMPEREUR** (Eng., CHU Brest).

Engineering Degree in Data Science and Computer Science **2019 – 2022**
Télécom SudParis, Evry
Final year specialization: Applied Modeling and Statistics
Highest honors.

Preparatory Classes in Mathematics and Physics **2017 – 2019**
Lycée Faidherbe, Lille

Scientific Baccalaureate, European section **2017**
Lycée Condorcet, Lens
Mathematics option
Highest honors.

PROFESSIONAL EXPERIENCE

Post-doctoral contract within the SCOOL team **11/2025 – 10/2027**
INRIA Center, University of Lille

Supervisors: Philippe PREUX and Emilie KAUFMANN

Topic: *Personalized monitoring of post-bariatric surgery patients*

- Collaboration with Lille University Hospital.

PhD Thesis, SAMOVAR Laboratory, ARMEDIA team **10/2022 – 10/2025**
Télécom SudParis, Évry

Topic: *Spatiotemporal characterization of gait kinematics in motor disorders using machine learning: from signal to image analysis*

- Collaboration with the Movement Analysis Laboratory of UGECAM Île-de-France (Coubert);
- Use of AI and machine learning techniques to characterize and assess gait patterns;
- Development of quantitative indices to evaluate gait deviation **[3,5,8,9]** and asymmetry **[2]** in neurological diseases (e.g., Parkinson's disease, stroke);

- Proposal of a new asymmetry index based on a dissimilarity map from gait signals **[2]**;
- Prediction of treatment effects on the gait of patients with motor disorders;
- Development of software for managing angular kinematic data for clinical use.

Master's Research Internship, DS/AI team **02/2022 – 08/2022**
RTE, Paris - La Défense

Topic: *Interpretable latent variable methods for time series characterization*

- Visualization and characterization of electricity consumption data in an interpretable latent space (Keras);
- Reconstruction and generation of time series via variational autoencoders;
- Measurement of similarities and dissimilarities of consumption profiles in reduced dimension.

Engineering Research Project **10/2021 – 02/2022**
Télécom SudParis, Évry

Topic: *Stochastic neural architectures for data generation.*

Supervision: Yohan Petetin (CITI department, SAMOVAR)

- Comparative evaluation of generative algorithms;
- Study of unsupervised and interpretable methods;
- Application of variational autoencoders to electrical data.

Engineering Research Project (M1) **02/2021 – 06/2021**
Allianz, Télécom SudParis, Évry

Topic: *Smoothing and filtering of geographical areas in risk insurance*

Supervision: Emmanuel Monfrini (CITI department, SAMOVAR)

- Visualization and analysis of geographical data in Python (GeoJSON);
- Modeling and forecasting temperatures in France via time series;
- Spatial interpolation of thermal behavior at the national scale.

TEACHING ACTIVITIES

TEACHING All my teaching activities were carried out at Télécom SudParis, for diverse audiences. Details of the courses below:

- **Artificial Intelligence for Data Science** [Lecture: 3h] 2024
  (*25 M1 and engineering students (Bac+4)*)
- **Data Science Case Study n°2** [Tutorial: 18h] 2025
  (*27 M2 students* [M2 TRIED])
- **Machine Learning, Classification, Data Mining** [Lecture: 18h, Integrated Course: 6h, Practical Work: 30h] 2025
  (*100 engineering students (Bac+4)*)

PEDAGOGICAL CONTENT

- Design of courses in Machine Learning and Deep Learning: theory and use cases;

- Design of practical work focused on clinical and medical data (blood biochemical analyses, ECG, X-rays, etc.);
- Design of exam subjects.

SUPERVISION

All my supervision activities took place at Télécom SudParis. They mainly concern the co-direction of scientific research projects for students at different levels:

- **Research Projects** 2025
  Project 1: Characterization of post-stroke gait with Dynamic Time Warping [**9**]
  Project 2: Characterization of post-stroke gait signals via EGAI [**2**]
  Project 3: Frequency analysis of normal gait
  (*10 M1 and engineering students (Bac+4)*)
- **Research Project** 2025
  Topic: Impact of age on the angular kinematics of the lower limbs: signal and image approaches
  (*2 engineering students*)
- **Research Project** 2024
  Topic: Characterization of normal gait via time-frequency maps and wavelet theory
  (*1 M1 student*)
- **Research Internship** 2023
  Topic: Statistical and deep learning analysis of normal and pathological gait
  (*1 M2 student*)

PUBLICATIONS

[**1**] **L. Hermez**. Spatiotemporal modeling of gait to characterize motor disorders using machine learning: From signal to image analysis. PhD thesis, Institut Polytechnique de Paris, 2025, https://theses.hal.science/tel-05312265.

[**2**] **L. Hermez**, N. Houmani, S. Garcia-Salicetti, O. Galarraga, and V. Vigneron. Gait asymmetry assessment through Eigen-Gait components on dissimilarity maps. Computers in Biology and Medicine, 184, p.109390, 2025.

[**3**] A. Halimi, **L. Hermez**, N. Houmani, S. Garcia-Salicetti, and O. Galarraga. A novel gait quality measure for characterizing pathological gait based on Hidden Markov Models. Computers in Biology and Medicine, 184, p.109368, 2025.

[**4**] **L. Hermez**, N. Houmani, S. Garcia-Salicetti, O. Galarraga, and V. Vigneron. Quantification of therapeutic effects on gait in patients with hemiparesis using a multidimensional elastic distance measure. XXII Congress of the Francophone Society for Movement Analysis in Children and Adults (SOFAMEA), Jan 2025, Paris (France). *Oral presentation.*

[**5**] **L. Hermez**, N. Houmani, S. Garcia-Salicetti, O. Galarraga, and V. Vigneron. Gait Deviation Assessment: from Signal to Image Analysis. In *13th International Conference on Image Processing Theory, Tools and Applications (IPTA 2024)*, Rabat, Morocco, October 2024. *Oral presentation.*

[**6**] **L. Hermez**, N. Houmani, S. Garcia-Salicetti, O. Galarraga, and V. Vigneron. An enhanced characterization of gait deviations in hemiparesis by combining knee and ankle kinematics. Annual Meeting of the European Society for Movement Analysis in Adults and Children (ESMAC), Sep 2024, Oslo, Norway. pp.91-92. *Oral presentation.*

[**7**] **L. Hermez**, N. Houmani, S. Garcia-Salicetti, O. Galarraga, and V. Vigneron. Characterization of normal gait and pathological deviations due to neurological diseases: a comparative study of gait deviation measures.

XXII Congress of the Francophone Society for Movement Analysis in Children and Adults (SOFAMEA), Jan 2024, Nantes (France). *Oral presentation.*

[8] L. Hermez, N. Houmani, S. Garcia-Salicetti, O. Galarraga, and V. Vigneron. Gait deviation and neurological diseases: a comparative study of quantitative measures. In *11th IEEE International Conference on E-Health and Bioengineering (EHB 2023)*, Budapest, Romania, November 2023. *Oral presentation.*
→ ***Honorable Mention – IEEE EHB Young Researcher Contest***

[9] L. Hermez, A. Halimi, N. Houmani, S. Garcia-Salicetti, O. Galarraga, and V. Vigneron. Clinical gait analysis: Characterizing normal gait and pathological deviations due to neurological diseases. *Sensors*, 23(14), 2023. ISSN 1424-8220.

PRESENTATIONS & COMMUNICATIONS

This section highlights my scientific communication activities: oral presentations, posters, and outreach actions. These interventions were carried out for diverse audiences: teacher-researchers, researchers, clinicians, and students.

ORAL PRESENTATIONS

- **IEEE Image Processing Theory, Tools and Applications** 16/10/2024
  - Presentation of a colleagues' paper at an international conference on image processing;
  - Participation in discussions with domain experts.

  Conference paper: N. Schmitt, Y. Loesch, N. Houmani, and S. Garcia-Salicetti. Transfer learning for artwork attribution: assessing the importance of the artist's signature. In *13th International Conference on Image Processing Theory, Tools and Applications (IPTA 2024)*, Rabat, Morocco, October 2024.

POSTER PRESENTATIONS

- **ESSI Colloquium: *Health and AI*** 10/06/2025
  Télécom SudParis, Évry
  Poster: *Spatiotemporal Characterization of Gait Kinematics in Motor Impairments with Machine Learning: from Signal to Image Analysis*
- **IMT Colloquium: *Engineering for health and well-being*** 21-22/05/2025
  Télécom SudParis, Évry
  Poster: *Spatiotemporal Characterization of Gait Kinematics in Motor Impairments with Machine Learning: from Signal to Image Analysis*
- **Futur, Ruptur & Impacts Day** 14/05/2025
  Télécom SudParis, Palaiseau
  - Short presentation ("lightning talk") to an audience of researchers, members of the IMT scientific council, and sponsors.

  Poster: *Characterization of healthy symmetrical gait to measure asymmetry due to neurological diseases*
- **2nd Engineering for Health (E4H) Annual Forum** 05/07/2023
  École Polytechnique, Palaiseau
  Poster: *Quantified gait analysis: Characterization of the deviation associated with neurological diseases*
- **SAMOVAR PhD Day** 25/05/2023
  Télécom SudParis, Évry
  Poster: *Quantified gait analysis: Characterization of the deviation associated with neurological diseases*
- **ESSI Colloquium: *Medicine of the Future*** 13/06/2023
  Télécom SudParis, Évry
  Poster: *Quantified Gait Analysis: Characterization of the deviation associated with neurological diseases*

OUTREACH ACTIVITIES

- **IP Paris - Fête de la Science** 04-05/10/2024
  École Polytechnique, Palaiseau
  - Presentation of thesis work to a school and general audience during the IP Paris Fête de la Science 2024;
  - Interactions with nearly 1900 visitors, including 560 middle and high school students;
  - Oral presentations and posters with accessible language to explain complex scientific concepts.

LANGUAGES

- **French** Native language
- **English** Fluent
- **German** Good level