

PhD proposal

Job Title: PhD Position on Multimodal Analysis of Cognitive and Emotional State during Motion (M/F)

Work Location: LAMIH UMR CNRS 8201 (Valenciennes, France), LIVIA (Montreal, Canada)

Scientific Supervisor: Mathias Blandeau

Contract Type: Fixed-term PhD Contract

CN Section: 03 (Computer Science: Signals, Images, Languages, Automation, Robotics, Interactions, Integrated Hardware-Software Systems), 28 (Brain, Cognition, Behavior), 30 (Pharmacology - Engineering and Technologies for Health - Biomedical Imaging)

Contract Duration: 36 months

Start Date: November 1st, 2026

Work Schedule: Full-time

Salary: €2,300 gross per month

Required Education Level: Master's degree or equivalent

Desired Experience: Not specified

Responsibilities or Thesis Topic Description:

Emotion recognition plays an increasingly important role in various health fields, including disease prevention, diagnosis, treatment monitoring, and digital health promotion, by facilitating adaptive and reactive interventions. Emotion recognition technologies can support interventions aimed at modifying behaviors by identifying affective states related to motivation, adherence, and engagement. Existing technologies include physiological signals (e.g., electroencephalogram), language analysis, and quantified motion analysis.

A review of the literature reveals a growing interest in the ability to estimate subjects' emotions through two distinct methodologies: 1. Facial video capture (Canedo & Neves, 2019; González-González et al., 2025) or 2. Body kinematics capture (Kang & Gross, 2015, 2016; Stout et al., 2026). This thesis aims to improve the analysis and detection of cognitive and emotional states during human movement by combining two methodological approaches: video capture and Deep Learning (DL) tools. Unlike traditional approaches, this project seeks to innovate on two scientific levels. First, by adopting an ecological approach through markerless movement analysis to minimize experimental bias and broaden the application of the developed tools outside the laboratory. Second, by using advanced DL tools such as multimodal transformers.

This project builds upon the past work of LIVIA and LAMIH. LIVIA has previously worked on emotion recognition through the creation of DL tools and the development of the Behavioural Ambivalence/Hesitancy ([BAH](#)) database. LAMIH possesses expertise in the quantitative analysis of cognitive-motor tasks and has recently created a database analyzing the movement of over 100 individuals whose gait was measured in single and dual cognitive tasks.

The opportunities presented by this project are numerous:

- Medical: aiding in the diagnosis of a person's emotional state (e.g., depression)

- Transportation: detecting the alertness of a person about to cross the road
- Workplace: preventing burnout and accidents.

Activities / Work carried out and resources implemented:

The work carried out will include:

- A systematic review of the analysis and detection of cognitive and emotional states, as well as the machine learning methods used.
- Creation of an annotated body/face database based on the data acquisition methods of LAMIH.
- The use of domain learning models on existing databases (e.g., kinematic head analysis in addition to facial annotations). The models will rely on domain adaptation, weakly supervised learning, and data generation methods.

Skills:

Candidates must hold a Master's degree or equivalent. Experience in one or more of the following areas is preferred: computer engineering, machine learning, deep learning, and biomechanical engineering. A strong command of data processing, programming, and numerical computing tools (MATLAB, Python) is essential. Knowledge of human motion analysis, experimental data acquisition, and deep learning tools will be an asset.

In addition to the required skills, strong writing skills and the ability to structure a scientific approach are expected, particularly for conducting systematic reviews, writing scientific articles, and presenting results at conferences. Fluency in English (spoken and written) is required for accessing scientific literature and disseminating research findings.

Work context / information on the relevant research contract:

The PhD will be conducted at LAMIH (Laboratory of Automation, Mechanics, and Industrial and Human Computing), a Joint Research Unit (8201) under the supervision of the CNRS and the University of Hauts-de-France (Nord, France). LAMIH is a renowned multidisciplinary research laboratory, particularly in the fields of biomechanics and human movement analysis.

The PhD candidate will join a team with complementary expertise (biomechanics, neurophysiology, automation, ergonomics). They will be primarily supervised by Laura Wallard and Mathias Blandeau at LAMIH, as well as Alessandro Lameiras Koerich and Eric Granger at LIVIA.

The LAMIH has a comprehensive technical platform for experimental data acquisition, including wireless EMG systems, optoelectronic cameras, inertial measurement units (IMUs), and force platforms. The doctoral student will conduct their experiments on healthy subjects within this laboratory.

The Laboratory for Imaging, Vision and Artificial Intelligence (LIVIA) is a research unit at ÉTS Montréal that focuses on the perception of 2D and 3D scenes and the modeling of static and dynamic environments using artificial intelligence (AI). LIVIA's activities are centered on machine learning, computer vision, pattern recognition, adaptive and intelligent systems, information fusion, and the optimization of complex systems. LIVIA excels in AI engineering, particularly in the development of complex deep learning models with massive amounts of data containing incomplete annotations, and also makes specialized databases available to the research community.

Constraints and risks: The work will take place in a ZRR laboratory; therefore, the candidate's application must be approved by the UPHF's senior security and defense official. The thesis will primarily be conducted in France; however, a few weeks/months of travel to Canada are expected.

Additional Information:

We are seeking a rigorous and curious young researcher capable of actively engaging in their project, demonstrating autonomy while also contributing to a collaborative environment. Strong organizational, communication, and adaptability skills, particularly regarding experimental constraints, are essential. The candidate must be comfortable in an international and multidisciplinary setting and open to exchanging ideas with experts from diverse fields.

Applications must include a detailed CV; a one-page cover letter; a one-page summary of the Master's thesis; and transcripts from the Master's program or engineering school. After reviewing the applications, shortlisted candidates will be invited for a videoconference interview.

The application deadline is August 28, 2026.

Contact

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Bibliography

- Canedo, D., & Neves, A. J. R. (2019). Facial Expression Recognition Using Computer Vision : A Systematic Review. *Applied Sciences*, 9(21), 4678. <https://doi.org/10.3390/app9214678>
- González-González, M., Belharbi, S., Zeeshan, M. O., Sharafi, M., Aslam, M. H., Pedersoli, M., Koerich, A. L., Bacon, S. L., & Granger, E. (2025). *BAH Dataset for Ambivalence/Hesitancy Recognition in Videos for Digital Behavioural Change (Version 7)*. arXiv. <https://doi.org/10.48550/ARXIV.2505.19328>
- Kang, G. E., & Gross, M. M. (2015). Emotional influences on sit-to-walk in healthy young adults. *Human Movement Science*, 40, 341-351. <https://doi.org/10.1016/j.humov.2015.01.009>
- Kang, G. E., & Gross, M. M. (2016). The effect of emotion on movement smoothness during gait in healthy young adults. *Journal of Biomechanics*, 49(16), 4022-4027. <https://doi.org/10.1016/j.jbiomech.2016.10.044>
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