



SCIENCE & CREATIVITY TO INVENT A SUSTAINABLE WORLD

PhD Position in Computer science

Video Analysis and Artificial Intelligence for the Early Detection of Handwriting Disorders

Institution	IMT Mines Alès (Ecole Nationale Supérieure des Mines d'Alès)
Main job assignment	EuroMov Digital Health in Motion
Administrative residence	Alès (Département du Gard – Région Occitanie)
Starting date	September, 2025

1. Context

The Institut Mines-Télécom (IMT), a major institution within the meaning of the Education Code, is a public scientific, cultural and professional institution (EPSCP) placed under the principal supervision of the ministers responsible for industry and digital technology. It is the largest group of engineering schools in France, with 11 public engineering schools spread across the country, which train 13,500 engineers and PhDs each year. The ITM employs 4,500 people and has an annual budget of €400M, 40% of which comes from its own resources. IMT has 2 Carnot institutes, 35 industrial chairs, produces 2100 A rank publications annually, 60 patents and carries out 110M€ of contractual research.

Created in 1843, IMT Mines Alès currently has 1,400 students (including 250 foreigners) and 380 staff. The school has 3 research and teaching centers of high scientific and technological level, which work in the fields of materials and civil engineering (C2MA), environment and risks (CREER), artificial intelligence and industrial and digital engineering (CERIS). It has 12 technological platforms and has 1,600 partner companies.

2. Research project

Title: Video Analysis and Artificial Intelligence for Early Detection of Writing Disorders

Keywords: neural network, image processing / computer vision, Edge AI, federated AI, dysgraphia

Context and Challenges: Writing disorders, particularly dysgraphia, are frequently associated with Developmental Coordination Disorder (DCD), a neurodevelopmental condition affecting fine and gross motor skills. These difficulties can impact children's academic success and overall well-being. Currently, diagnosis relies on lengthy and complex clinical evaluations, often conducted late. It is therefore essential to develop innovative tools that enable early and accessible screening in educational settings.

Project Objectives: This project aims to design an innovative system for the early detection of writing disorders by combining video analysis and a hybrid, federated, and explainable Artificial Intelligence (AI). The goal is to identify signs of dysgraphia by analyzing children's handwriting movements, posture, and facial expressions using a simple camera.

The hybrid AI integrates knowledge of fine motor skills and machine learning algorithms to enhance disorder detection. Explainable AI will allow teachers and clinicians to understand the model's decisions, facilitating its adoption. By prioritizing edge AI, which processes data locally on school devices (tablets, computers), the system ensures data confidentiality, a crucial aspect in educational settings.

The project consists of several key phases:

- **Algorithm Development:** Designing and training an AI model based on video analysis of handwriting movements.
- **Laboratory Validation:** Comparing AI analysis results with measurements from biomechanical sensors and other clinical assessment tools.
- **Testing in Educational and Clinical Settings:** Evaluating the system's robustness, usability, and acceptance by teachers and healthcare professionals under real conditions.
- **Transparency and Explainability:** Developing interfaces that allow end-users to interpret and utilize AI-generated results effectively.

3. [Team supervision and PhD registration](#)

Research and Teaching Center : CERIS Center for Teaching and Research in Computing and Systems

Research Unit : EuroMov Digital Health in Motion

Doctoral School : I2S : Information, Structures et Systèmes - ED 166

The PhD will be conducted within a multidisciplinary team combining expertise in artificial intelligence, neuroscience, and ergonomics. The project will benefit from collaborations with schools, research laboratories, and clinical centers specializing in neurodevelopmental disorders. In collaboration with the Institut de Formation en Psychomotricité de Montpellier and UMR CLLE in Toulouse, the project benefits from expertise in motor disorders.

4. [Candidate profile](#)

We are looking for a motivated PhD candidate interested in interdisciplinary research at the intersection of artificial intelligence, video analysis, and cognitive sciences. Candidates should have strong skills in machine learning, image processing, and/or modeling of motor behaviors. Familiarity with challenges in educational and clinical settings, as well as the ability to collaborate with researchers in AI, neuroscience, and education, will be valuable assets.

Application: Interested candidates are invited to submit their CV, a cover letter, and, if possible, a sample of previous work related to the topic (thesis, article, AI project) to Gérard Dray (gerard.dray@mines-ales.fr) and Binbin Xu (binbin.xu@mines-ales.fr).

5. [Contacts](#)

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