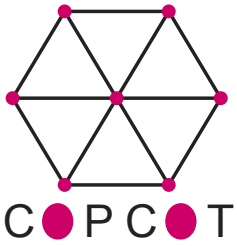
Research engineer position in Technology Enhanced Learning



1 Information about the position

- **Supervisors:**
  - Nour El Mawas (Université de Lorraine) (https://nour-elmawas.com/)
  - Germain Forestier (Université de Haute-Alsace) (https://germain-forestier.info)
  - Maxime Devanne (Université de Haute-Alsace) (https://maxime-devanne.com)
- **Funding:** the ANR COPCOT project
- **Net salary:** 2577 EUR
- **Duration:** 15 months (starting from September 2026)
- **Location:** Centre de Recherche sur les Médiations (Crem) - Université de Lorraine (Metz)
- **Keywords:** Machine Learning, Knowledge Tracing, content personalization, Technology Enhanced Learning

2 Goals

The goal of this position is to develop, evaluate, and integrate advanced Knowledge Tracing (KT) models based on the KTBench framework [1], in order to improve the prediction of learners' performance and support personalization in

online learning platforms [2]. This work will contribute both to the advancement of learning modeling methods and to their transfer into real-world educational applications.

In this context, the research engineer will work on the following tasks:

- **Development of KT models.**

  KT [3] aims to model the evolution of a learner's knowledge based on their interactions with an educational system. The research engineer will design and implement new KT models using the KTBench framework [1] to ensure comparability with state-of-the-art methods. Special attention will be given to model interpretability, generalization ability, and adaptation to different data regimes, including dense and sparse datasets.

- **Experimental evaluation and comparative analysis.**

  The research engineer will design and implement rigorous evaluation protocols using KTBench [1] to ensure fair and reproducible comparisons between developed models and existing approaches. Experiments will rely on multiple performance metrics, including AUC, accuracy, and F1-score, as well as computational efficiency indicators such as runtime, model size, and energy consumption (Green AI considerations). The analysis will focus on identifying trade-offs between predictive performance, computational cost, and deployability. Particular attention will also be paid to model robustness, sensitivity to data variations, and experimental reproducibility.

- **Reproducibility, documentation, and scientific dissemination.**

  Scientific rigor will be ensured through comprehensive documentation of all experimental procedures. The research engineer will document data processing pipelines, training configurations, hardware and software environments, and all experimental results. They will contribute to ensuring full reproducibility of experiments and participate in the continuous improvement of the KTBench framework. The results of the work will be reported in technical documents and may lead to scientific publications in collaboration with the research teams involved in the project.

- **Development of a learner performance prediction tool.**

  To facilitate the exploitation of the developed models, the research engineer will design and implement a software tool dedicated to learner performance prediction. This tool will enable the integration of multiple KT models, including both state-of-the-art baselines and newly developed approaches. A modular and extensible architecture will be favored to allow easy integration of new models and experimentation with model selection or ensemble strategies. The tool will support both real-time and offline prediction depending on the requirements of target platforms.

- **Design and development of an integration API.**

The research engineer will develop a standardized API to enable interaction between prediction models and learning platforms. This API will handle the collection of learner interaction traces, trigger prediction processes, and return actionable outputs such as success probabilities, or personalized recommendations [4]. Particular attention will be paid to performance, robustness, security, and proper documentation.

- **Integration and experimentation on learning platforms.**

  The developed tools and models will be integrated into one or more educational platforms in order to evaluate their effectiveness in real-world scenarios. The research engineer will contribute to the implementation and evaluation of use cases such as exercise recommendation, early detection of learning difficulties, and dynamic learning path personalization. These experiments will make it possible to assess the impact of KT models on learner support and guide future system improvements [5].

3 Profile of applicant

The candidate must fit the following requirements:

- Master 2 or Engineering degree (or equivalent) in **Computer Science**
- Good skills in **Python programming** (PyTorch / TensorFlow) are mandatory
- Good skills in **Machine Learning / Deep Learning** and **Sequential data processing** are required
- Experience in **reproducible experimentation** (ML pipelines) and **API development** (FastAPI, Flask, etc.)
- **Version control** and **reproducibility** practices (Git, Docker)
- Interest, knowledge and/or a first experience in **Technology Enhanced Learning** will be appreciated

4 Application

For further information or to apply, candidates should send the following documents to nour.el-mawas@univ-lorraine.fr, germain.forestier@uha.fr and maxime.devanne@uha.fr (until the 4th of July 2026):

- A CV
- Academic records
- A copy of the master's thesis
- Personal projects (e.g. Github repositories)
- A motivation letter

References

[1] A. El Ayady, M. Devanne, G. Forestier, and N. El Mawas, "Ktbench: A unified evaluation framework for deep knowledge tracing," in *Proceedings of the 18th International Conference on Computer Supported Education - Volume 1: CSEDU*, pp. 106–117, INSTICC, SciTePress, 2026.

[2] L. Giannandrea, M. Sansoni, *et al.*, "A literature review on intelligent tutoring systems and on student profiling," *Learning & Teaching with Media & Technology*, vol. 287, pp. 287–294, 2013.

[3] A. T. Corbett and J. R. Anderson, "Knowledge tracing: Modeling the acquisition of procedural knowledge," *User modeling and user-adapted interaction*, vol. 4, no. 4, pp. 253–278, 1994.

[4] H. Fan and M. S. Poole, "What is personalization? perspectives on the design and implementation of personalization in information systems," *Journal of Organizational Computing and Electronic Commerce*, vol. 16, no. 3-4, pp. 179–202, 2006.

[5] P. Brusilovsky and M. T. Maybury, "From adaptive hypermedia to the adaptive web," *Communications of the ACM*, vol. 45, no. 5, pp. 30–33, 2002.