



Offre n°2024-07626

## Post-Doctoral Research Visit F/M Design and evaluation of Large-Language Models (LLMs) based conversational agents for fostering curiosity-driven learning in children

*Le descriptif de l'offre ci-dessous est en Anglais*

Type de contrat : CDD

Niveau de diplôme exigé : Thèse ou équivalent

Fonction : Post-Doctorant

Niveau d'expérience souhaité : Jeune diplômé

### Contexte et atouts du poste

The full description of this job announce is available here: [https://docs.google.com/document/d/1kUNQ0wSHg\\_uB1bSS358dQq8WmyWdrUJs/edit?usp=sharing&ouid=100335754171717093796&rtpof=true&sd=true](https://docs.google.com/document/d/1kUNQ0wSHg_uB1bSS358dQq8WmyWdrUJs/edit?usp=sharing&ouid=100335754171717093796&rtpof=true&sd=true)

Co-supervision: [Pierre-Yves Oudeyer](#) and Hélène Sauzéon (Inria), [Edith Law](#) (Univ. Waterloo)

Host: Inria Bordeaux, Flowers project-team (<https://flowers.inria.fr>), in the context of the CuriousTech associate team between Inria and Univ. Waterloo (<https://flowers.inria.fr/curioustech-associate-team>)

Location: Inria Bordeaux (with visits to Univ. Waterloo)

Program/funding: DRI Inria

Duration: 12 to 24 months (starting nov. 2024)

**How to apply:** in addition to application on this web site, contact [pierre-yves.oudeyer@inria.fr](mailto:pierre-yves.oudeyer@inria.fr), [helene.sauzeon@inria.fr](mailto:helene.sauzeon@inria.fr) and [edithlaw@uwaterloo.ca](mailto:edithlaw@uwaterloo.ca) with CV, letter of motivation and 2 letters of recommendation (this can be sent later), and using the [application] tag in the email object field. In addition, the application has to be submitted on [jobs.inria.fr](https://jobs.inria.fr) before 30th may.

**Eligibility:** For the candidates who obtained their Ph.D. in the Northern hemisphere, the date of the Ph.D. defense shall be later than September, 1 2022; in the Southern hemisphere, later than April, 1 2022.

**Keywords:** Curiosity-driven learning, meta-cognition, generative AI, Large Language Models (LLMs), conversational agents, educational technologies, human-computer interaction, artificial intelligence, field experiments, children.

### About the Inria centre of the University of Bordeaux and the CuriousTech associate team between Inria and Univ. Waterloo

Inria is the French national research institute for digital science and technology. World-class research, technological innovation and entrepreneurial risk are its DNA. As a technological institute, Inria supports the diversity of innovation pathways: from open source software publishing to the creation of technological startups (Deeptech).

Inria has been present in the Nouvelle-Aquitaine region for more than 20 years thanks to the [Inria center at the University of Bordeaux](#). This center today employs more than 260 people who collaborate through 20 project-teams with 180 people from our academic and industrial partners (universities of Bordeaux, of Bordeaux-Montaigne, and of Pau-et-Pays-de-l'Adour, Bordeaux INP, ENSTA Paris, CNRS, Inserm, INRAE, TotalEnergies and Naval Group).

One of the three main thrusts of its scientific strategy is "Machine learning and AI", developed in a unique way in Bordeaux in conjunction with cognitive science, as exemplified by the [FLOWERS project team](#) led by Pierre-Yves Oudeyer. FLOWERS aims to develop the foundations for a new approach of AI and autonomous learning based on the modeling of learning and cognitive development in children, in particular the **mechanisms of curiosity**. This new approach to human-inspired AI naturally finds its ideal application in **educational technologies**.

Working closely with the University of Waterloo on this application area, the international associate team called **CuriousTECH**, was created in January 2023. The [curiousTECH team](#) aims to study how new educational technologies, using both curiosity-related models and artificial intelligence techniques

## Context

## Scientific project

Also, there will be opportunities in this project to interact with the [EvidenceB](#) company, developing educational technologies leveraging cognitive science and artificial intelligence, and with whom we have several ongoing collaborations. Its educational platform aims to personalize educational contents in

order to maximize both learning efficiency and intrinsic motivation in children.

## Mission confiée

The postdoc will start at Inria Bordeaux by familiarization with the conversational agents, the experimental and software infrastructure used in the *KidsAsk* experiment, as well as the results of the *KidsMetaReflect* experiment. She/he will also familiarize with the recent results studying what are the required characteristics of metacognitive strategies needed to produce robust and generalizable curiosity-driven learning. This will enable to formalize precisely the context and the semantico-syntactic properties of prompts, to address a technical challenge consisting in fine tuning the prompting methods of LLMs for driving the 4 steps of curiosity cycle. In parallel, the candidate will explore various techniques that could be used to implement pedagogically aligned conversational agents using state-of-the-art LLMs, and through interaction with members of the Flowers team doing research on LLMs. Then, the postdoc will visit Edith Law's lab in university of Waterloo (for several weeks) in order to work on HCI dimensions of the design of conversational agents in an educational setting, and leveraging the expertise of E. Law's lab. After the candidate comes back to Inria Bordeaux, she/he will then design an experimental protocol, including appropriate conversational agents and their parameterization, and experimental psychology methods to assess the efficiency, tested with children from primary schools, run these experiments, analyze the results and write a scientific paper(s) describing the work. This work will benefit from various potential collaborations with PhD students and interns both at Inria Flowers and in Edith Law's lab.

## References

- Abdelghani, R., Law, E., Desvaux, C., Oudeyer, P. Y., & Sauzéon, H. (2023a).** Interactive environments for training children's curiosity through the practice of metacognitive skills: a pilot study. In *Proceedings of the 22nd Annual ACM Interaction Design and Children Conference*. 495-501.
- Abdelghani, R., Oudeyer, P. Y., Law, E., de Vulpillières, C., & Sauzéon, H. (2022).** Conversational agents for fostering curiosity-driven learning in children. *Int. J. Hum. Comput.* 167, 102887.
- Abdelghani, R., Wang, Y. H., Yuan, X., Wang, T., Lucas, P., Sauzéon, H., & Oudeyer, P. Y. (2023b).** GPT-3-driven pedagogical agents to train children's curious question-asking skills. *International Journal of Artificial Intelligence in Education*, 1-36.
- Abdelghani, R., Sauzéon, H., & Oudeyer, P. Y. (2023c).** Generative AI in the Classroom: Can Students Remain Active Learners? *Workshop on Generative AI in education, Neurips 2023*.
- Alaimi, Mehdi, et al. "Pedagogical agents for fostering question-asking skills in children." *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems*. 2020.**
- Eldan, R., & Li, Y. (2023).** TinyStories: How Small Can Language Models Be and Still Speak Coherent English?. *arXiv preprint arXiv:2305.07759*.
- Gunasekar, S., Zhang, Y., Aneja, J., Mendes, C. C. T., Del Giorno, A., Gopi, S., ... & Li, Y. (2023).** Textbooks Are All You Need. *arXiv preprint arXiv:2306.11644*.
- Gottlieb, J., & Oudeyer, P. Y. (2018).** Towards a neuroscience of active sampling and curiosity *Nature Reviews Neuroscience*, 19(12), 758-770.
- Ten, A., Kaushik, P., Oudeyer, P. Y., & Gottlieb, J. (2021).** Humans monitor learning progress in curiosity-driven exploration. *Nat. Commun.* 12(1), 5972.
- Ten, A., Oudeyer, P. Y., & Moulin-Frier, C. (2022).** Curiosity-driven exploration. *The Drive for Knowledge: The Science of Human Information Seeking*, 53.
- Xiao, Z., Yuan, X., Liao, Q. V., Abdelghani, R., & Oudeyer, P. Y. (2023).** Supporting Qualitative Analysis with Large Language Models: Combining Codebook with GPT-3 for Deductive Coding. In *Companion Proceedings of the 28th International Conference on Intelligent User Interfaces*, 75-78.

**Deadline for application : May 30th, 2024**

## Principales activités

Candidates for postdoctoral positions are recruited **after the end of their Ph.D. or after a first post-doctoral period**: for the candidates who obtained their PhD in the **Northern hemisphere, the date of the Ph.D. defense shall be later than September 1, 2022; in the Southern hemisphere, later than April 1, 2022**. To encourage mobility, the postdoctoral position must take place in a scientific environment that is truly different from the one of the Ph.D. (and, if applicable, from the position held since the Ph.D.); particular attention is thus paid to French or international candidates who obtained their doctorate abroad.

## Compétences

### Required knowledge and background:

Candidates should have an outstanding expertise in at least one of these areas, and ideally have experience in several of them:

- Experience with LLMs (e.g. through huggingface's transformers library), prompting and/or finetuning will be a plus.
- Digital learning technologies : Educational technologies, Intelligent tutoring systems, e-learning
- Methodologies for assessing educational technologies with users

### Other requirements:

- Good skills in programming languages such as python and javascript
- Motivation to work on a project that combines LLM, HCI, cognitive sciences and user studies

## Avantages

- Subsidized meals
- Partial reimbursement of public transport costs
- Possibility of teleworking and flexible organization of working hours
- Professional equipment available (videoconferencing, loan of computer equipment, etc.)
- Social, cultural and sports events and activities
- Access to vocational training
- Social security coverage

## Rémunération

2788€ / month (before taxes)

## Informations générales

- **Thème/Domaine** : Robotique et environnements intelligents  
Statistiques (Big data) (BAP E)
- **Ville** : Talence
- **Centre Inria** : [Centre Inria de l'université de Bordeaux](#)
- **Date de prise de fonction souhaitée** : 2024-11-01
- **Durée de contrat** : 2 ans
- **Date limite pour postuler** : 2024-05-25

## Contacts

- **Équipe Inria** : [FLOWERS](#)
- **Recruteur** :  
Oudeyer Pierre-yves / [Pierre-Yves.Oudeyer@inria.fr](mailto:Pierre-Yves.Oudeyer@inria.fr)

## A propos d'Inria

Inria est l'institut national de recherche dédié aux sciences et technologies du numérique. Il emploie 2600 personnes. Ses 215 équipes-projets agiles, en général communes avec des partenaires académiques, impliquent plus de 3900 scientifiques pour relever les défis du numérique, souvent à l'interface d'autres disciplines. L'institut fait appel à de nombreux talents dans plus d'une quarantaine de métiers différents. 900 personnels d'appui à la recherche et à l'innovation contribuent à faire émerger et grandir des projets scientifiques ou entrepreneuriaux qui impactent le monde. Inria travaille avec de nombreuses entreprises et a accompagné la création de plus de 200 start-up. L'institut s'efforce ainsi de répondre aux enjeux de la transformation numérique de la science, de la société et de l'économie.

**Attention:** Les candidatures doivent être déposées en ligne sur le site Inria. Le traitement des candidatures adressées par d'autres canaux n'est pas garanti.

## Consignes pour postuler

Thank you to send:

- CV
- Cover letter
- Support letters (mandatory)
- List of publication

### Sécurité défense :

Ce poste est susceptible d'être affecté dans une zone à régime restrictif (ZRR), telle que définie dans le décret n°2011-1425 relatif à la protection du potentiel scientifique et technique de la nation (PPST). L'autorisation d'accès à une zone est délivrée par le chef d'établissement, après avis ministériel favorable,

tel que défini dans l'arrêté du 03 juillet 2012, relatif à la PPST. Un avis ministériel défavorable pour un poste affecté dans une ZRR aurait pour conséquence l'annulation du recrutement.

**Politique de recrutement :**

Dans le cadre de sa politique diversité, tous les postes Inria sont accessibles aux personnes en situation de handicap.