



Offre n°2025-09089

PhD Position F/M Personalized Modeling and Control of the Eye-Head-Neck System in Myopic Children

Type de contrat : Fixed-term contract

Niveau de diplôme exigé : Graduate degree or equivalent

Fonction : PhD Position

Contexte et atouts du poste

Context

The MIMESIS team at INRIA is a leading research group at the crossroads of scientific computing, machine learning, medical imaging, and control. Our mission is to develop cutting-edge digital tools for personalized medicine, particularly through the creation of **digital twins** and advanced **numerical methods** to assist medical interventions. With a strong foundation in **biomechanical modeling of soft tissues** and real-time computational methods, we work closely with clinicians to translate scientific innovations into practical healthcare solutions — from surgical planning to augmented reality and robotic control.

As part of this commitment, the MIMESIS team is now involved in **PREMYOM**, a large-scale, five-year biomedical innovation project focused on **personalized myopia treatment for children**. Coordinated by **EssilorLuxottica** and funded by the **France 2030** national plan, the PREMYOM consortium brings together six prestigious French partners from research, industry, and healthcare: **INRIA, Hôpital Fondation Adolphe de Rothschild, Institut de la Vision, Institut Mines-Télécom, and InSimo**.

PREMYOM aims to establish a new standard in pediatric eye care by developing predictive models and digital tools that account for the anatomical, optical, and behavioral factors influencing myopia progression. The project's ambitious goal is to transform how we understand, monitor, and treat myopia—turning personalized vision care into a reality.

Mission confiée

Your mission will be to contribute to the development of advanced anatomical and biomechanical models of the human eye and its interaction with the head and neck, as part of the broader goal of improving personalized care for children affected by

myopia. These models will form the foundation of a digital twin framework designed to support diagnosis, treatment planning, and the development of custom therapeutic lenses.

You will focus on the study and development of biomechanical models for the eye-head-neck system. First, these models will serve to simulate ocular and postural behavior of children engaged in various visual tasks, offering insights into how head and eye movements may influence optical performance and the progression of myopia. Achieving this will necessitate the implementation of biomechanical control laws capable of handling the highly redundant and geometrically intricate eye-head-neck system in a physically plausible manner, while simultaneously accounting for myopia-induced anatomical and behavioral changes. Second, these models will also serve to evaluate the optical and ergonomic effects of different lens designs during real-life activities, providing essential data to optimize the fit, comfort, and efficacy of therapeutic eyewear. Indeed, maximal lens wear-time will likely enhance the potential for therapeutic success, and thus, minimal visual fatigue during daily visual tasks will have to be optimized for. Your work, towards such optimization objective, will require the study and development of muscle fatigue models adapted to myopic eye-head-neck systems.

This work support the generation of individualized eye models that could guide the design of personalized myopia control lenses, based on a combination of anatomical, biomechanical, and behavioral inputs. These models will be integrated into an e-health decision-support tool, facilitating real-world application of research outcomes in clinical and commercial settings.

Compétences

We are looking for a motivated and skilled candidate with the following qualifications:

Required:

- MSc or PhD in **biomedical engineering, applied mathematics, computer science**, or a related field.
- Strong background in the **finite element method** and **biomechanical simulation**.
- Strong background with **numerical analysis** and **optimization techniques**.
- Proficiency in **scientific programming** (e.g., Python, C++).
- Communication skills for **team working**.

Desirable:

- Knowledge of the **eye-head-neck system** and its biomechanics.
- Knowledge of **machine learning techniques**.
- Experience in **collaborative research** or **interdisciplinary healthcare projects**.

Avantages

- Subsidized meals

- Partial reimbursement of public transport costs
- Leave: 7 weeks of annual leave + 10 extra days off due to RTT (statutory reduction in working hours) + possibility of exceptional leave (sick children, moving home, etc.)
- Possibility of teleworking (after 6 months of employment) 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

2200 € gross/month

Informations générales

- **Thème/Domaine** : Computational Neuroscience and Medicine
Biologie et santé, Sciences de la vie et de la terre (BAP A)
- **Ville** : Strasbourg (near the hospital campus)
- **Centre Inria** : [Centre Inria de l'Université de Lorraine](#)
- **Date de prise de fonction souhaitée** : 2025-10-01
- **Durée de contrat** : 3 years
- **Date limite pour postuler** : 2025-08-01

Contacts

- **Équipe Inria** : [MIMESIS](#)
- **Directeur de thèse** :
Cotin Stephane / Stephane.Cotin@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

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.