The PhD will work with longitudinal studies of actual patients from Grenoble University Hospital. The Data corpus Grenoble University Hospital.

The mid-term goal is to come up with a breakthrough clinical software for the analysis and treatment over time. Shapes and motions correlate with the current clinical bio-markers as well as the scoliosis evolution real and synthetic data will be used towards this end. In a second part, the PhD will study how these properties of a simplified anatomical human model capable to reproduce the observed motions. Both register the static multi-modal data of the patient (x-ray, scans) and the estimation of the physical as well as the motion of the spine. This includes the development of methods to automatically individual anatomic models of the patients, that faithfully reproduce the acquired shape of the body.

To reach the objectives a Data-Driven strategy will be used. The first objective will be to create short to longer term:

- Investigate novel shape and motion bio-markers allowing to go beyond current clinical practice and for the scoliosis, i.e. Cobb angles and spine 3D angle rotations.
- Investigate novel shape and motion bio-markers allowing to infer the current medical bio-markers using for that purpose individual multi-modal data (such as X-ray and surface scans). The PhD will be advised by Sergi Pujades, Edmond Boyer (Morpheo INRIA), François Faure (Anatoscope) and Aurélien Curvoisier (Grenoble Hospitals).

Idiopathic scoliosis is a progressive disease, with multiple forms, mostly affecting young women and evolving throughout the period of growth. Accurately classifying the scoliosis pattern of each patient at early stage would allow a major breakthrough in the prediction of disease evolution and the design of efficient treatments. Unfortunately, this is not possible using the static 3D skeleton models provided by the most advanced currently available methods.

In the recent years, motion capture data of scoliosis patients has been collected in Grenoble University Hospital. It exhibits dynamic patterns in space and over time which are of primary interests. For instance, 3D spine deformations seem better revealed through patient motions than static poses. Therefore, the scoliosis medical community is showing a great interest for computational tools that would help analyze and diagnose using novel 3D dynamic imaging techniques.

Mission confiée

Objectives
The objectives of the PhD are to investigate and create novel computational models in order to, from short to longer term:

- Build a personalized anatomic avatar that encodes both external and internal body parameters, using for that purpose individual multi-modal data (such as X-ray and surface scans).
- Investigate novel shape and motion bio-markers allowing to infer the current medical bio-markers for the scoliosis, i.e. Cobb angles and spine 3D angle rotations.
- Investigate novel shape and motion bio-markers allowing to go beyond current clinical practice and predict the scoliosis evolution during growth.

2019-01832 - PhD Position F/M Learning Scoliosis Patterns using Anatomical Models and Motion Capture

Informations générales

- Thème/Domaine : Vision, perception et interprétation multimedia
- Ville : Montbonnot
- Centre Inria : CRI Grenoble - Rhône-Alpes
- Date de prise de fonction souhaitée : 2019-10-01
- Durée de contrat : 3 ans
- Date limite pour postuler : 2019-08-25

Contacts

- Equipe Inria : MORPHEO
- Directeur de thèse : Pujades Sergi / sergi.pujades-rocamora@inria.fr
- Team : TEAM INRIA

A propos d'Inria

Inria, l'institut national de recherche dédié aux sciences du numérique, promeut l'excellence scientifique et le transfert pour avoir le plus grand impact. Il emploie 2400 personnes. Ses 2000 équipements projets agiles, en général communes avec des partenaires académiques, impliquent plus de 3000 scientifiques pour relever les défis des sciences informatiques et mathématiques, souvent à l'interface d'autres disciplines. Inria travaille avec de nombreuses entreprises et a accompagné la création de plus de 160 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.

L'essentiel pour réussir

How to apply

Please send your application including

- Mandatory: Complete CV
- Mandatory: Letter of motivation (at most one page) – briefly describing the personal experience in the relevant areas (see Candidate Profile).
- Mandatory: Degrees and lists of grades (translated to English or French)
- Mandatory: Name and e-mail address of two references (this typically includes your Master thesis supervisor)
- Topic of Master thesis and report if available through this Jobin website.

NOTE: only complete applications submitted through Jobin will be considered.

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.

Attention : Les candidatures doivent être déposées en ligne sur le site Inria.
Le traitement des candidatures
sparse dynamic motion capture scans. The PhD will be able to participate in the data acquisition process and suggest improvements.

**Compétences**

**Candidate Profile:**

- A master in Computer Science or Applied Mathematics (mandatory).
- Strong mathematical background – geometry – linear algebra – optimization techniques
- Language requirements: fluent spoken English or French, and fluent written English
- The candidate should have preliminary experience in at least two of the following areas: image processing – geometry processing – machine learning – temporal series – physics simulation. A specific section in the application letter must briefly describe the personal experience in these areas.
- Strong coding skills (c++ / python)

**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**

Gross monthly salary for the 1st and 2nd year: 1982€

Gross monthly salary for the 3rd year: 2085€