

Simulateurs haptiques d'apprentissage du geste médical

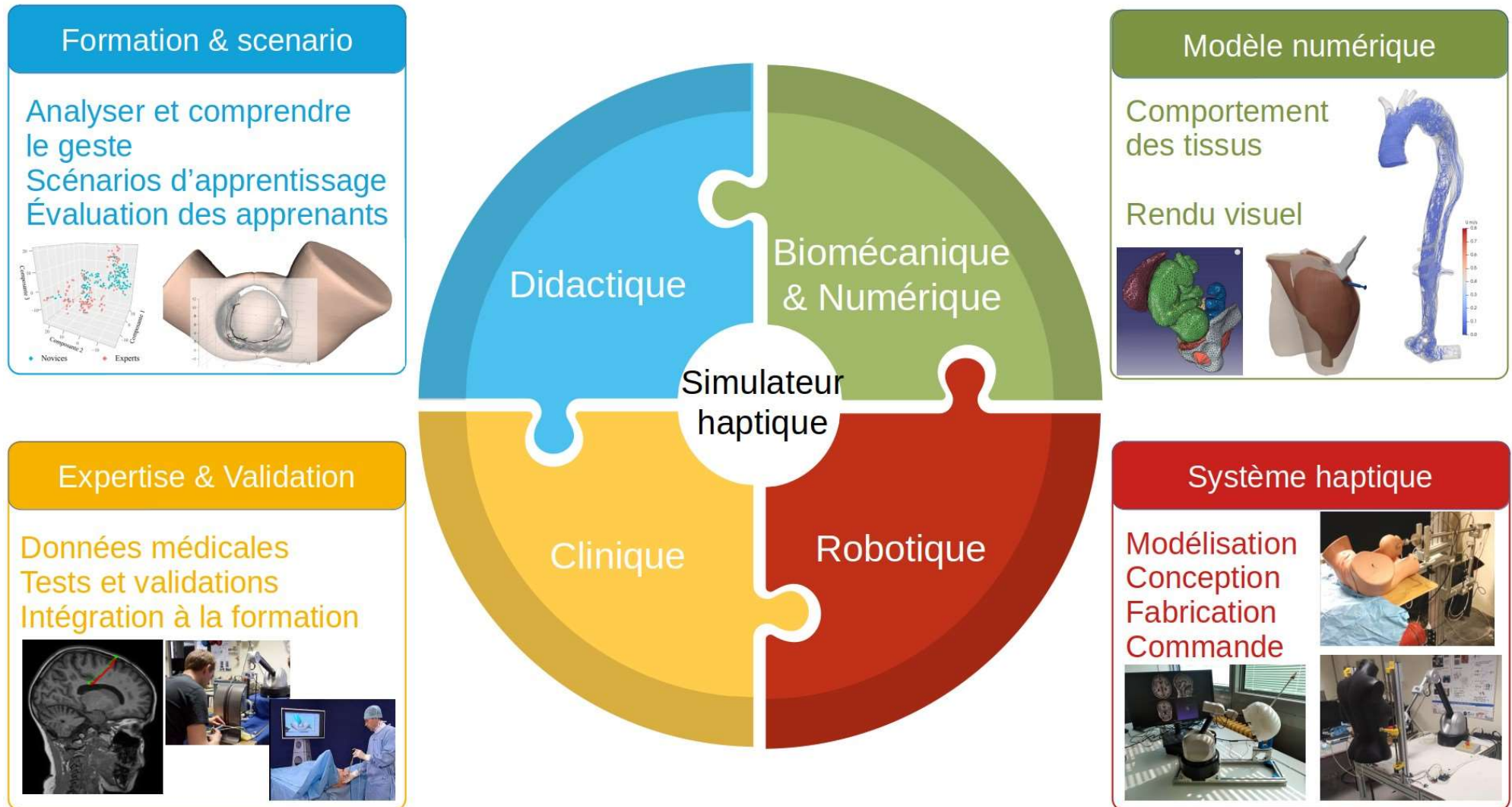
richard.moreau@insa-lyon.fr

maître de conférences

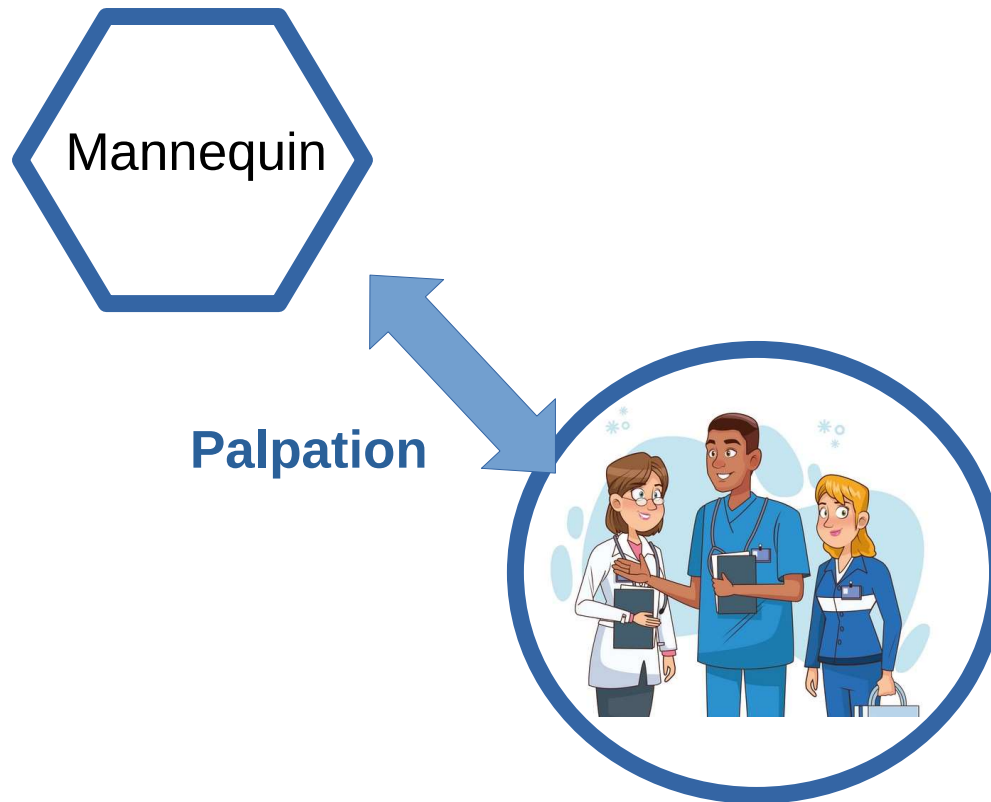
Laboratoire AMPERE – UMR CNRS 5005

INSA de LYON

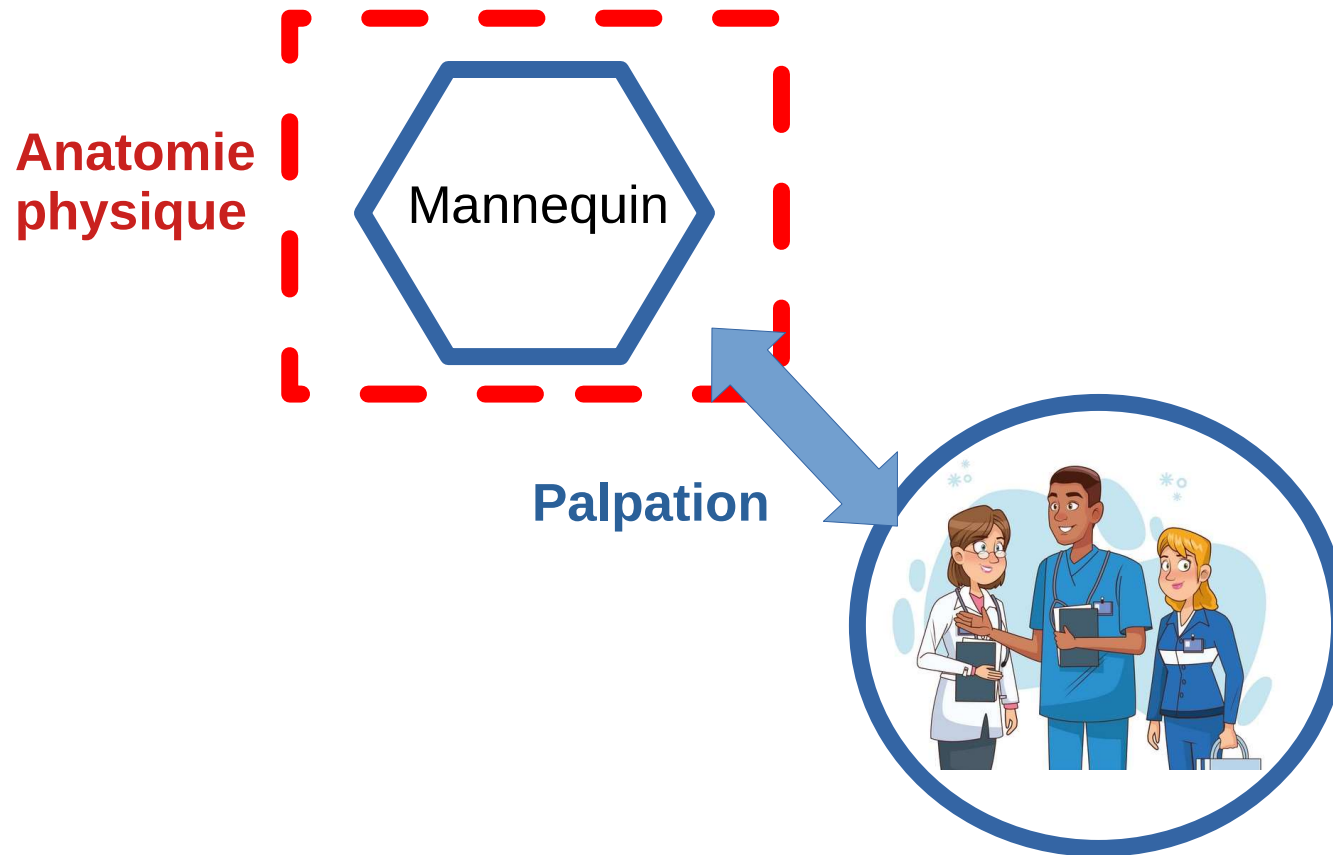
Principe de développement d'un simulateur haptique d'apprentissage



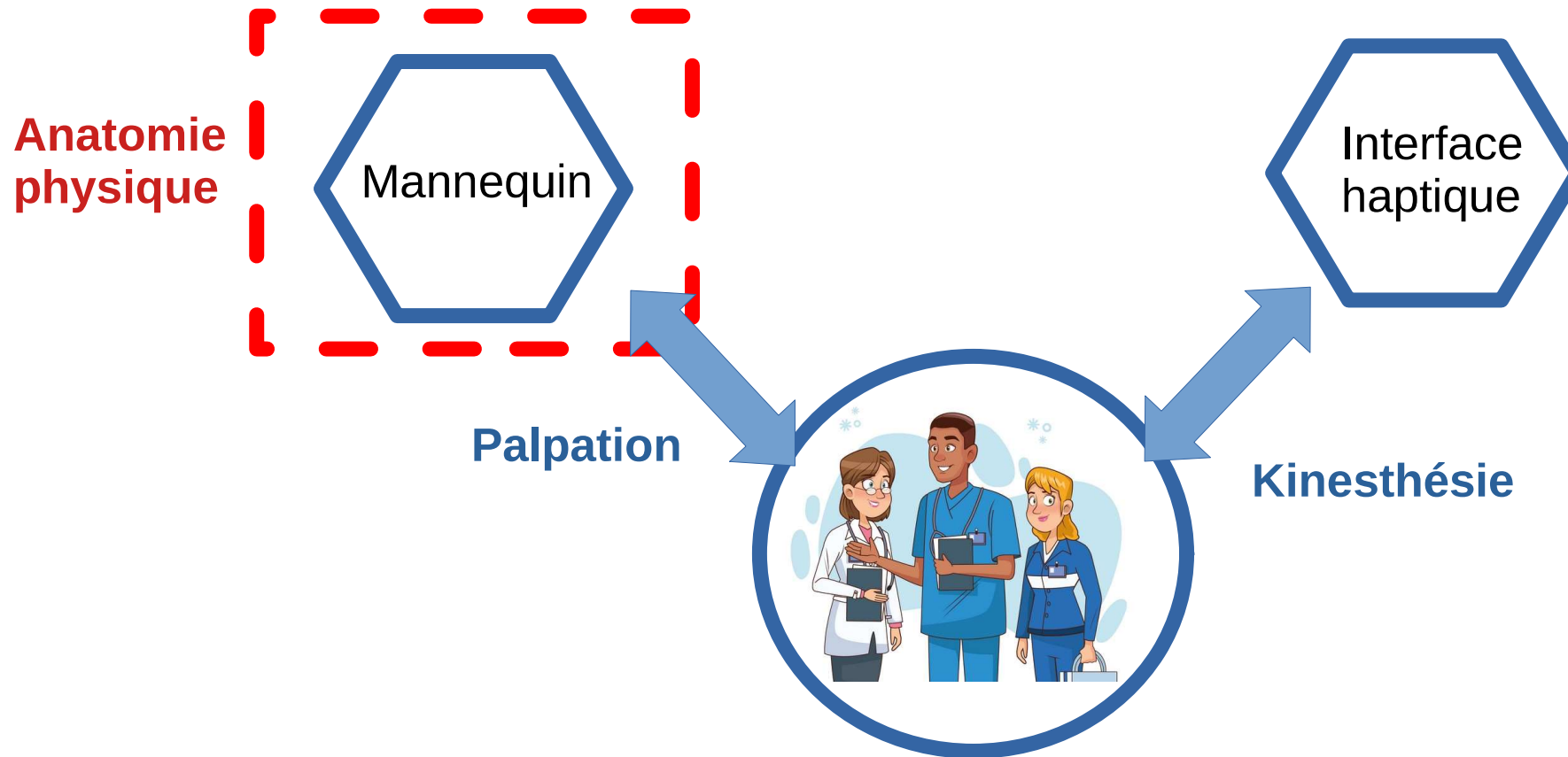
Méthodologie pour un simulateur hybride



Méthodologie pour un simulateur hybride



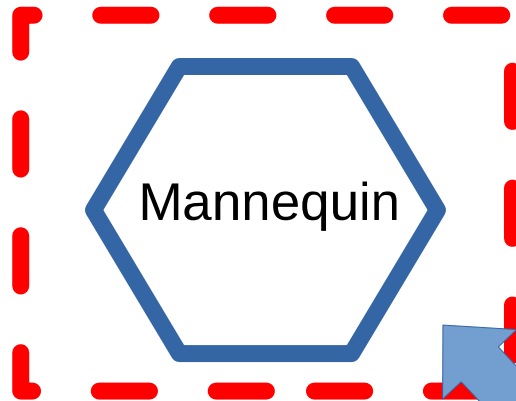
Méthodologie pour un simulateur hybride



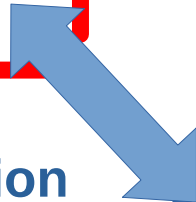
Méthodologie pour un simulateur hybride



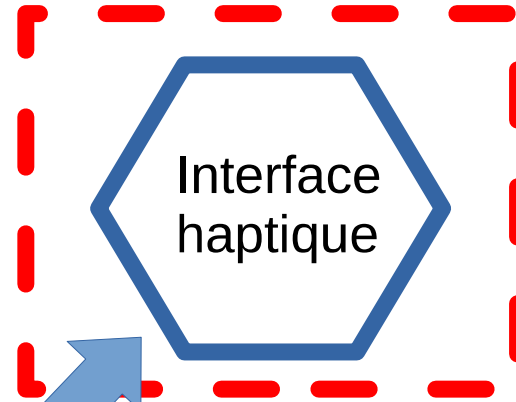
Anatomie
physique



Palpation



Kinesthésie



Anatomie
virtuelle

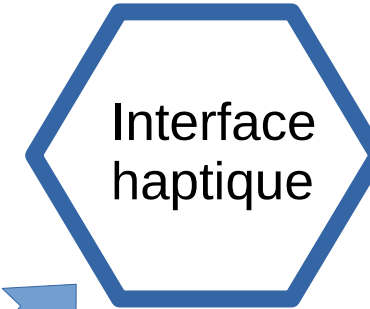
Méthodologie pour un simulateur hybride



Anatomie
physique



Palpation

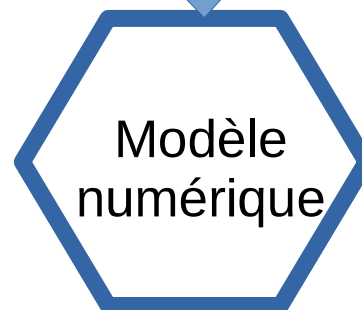


Anatomie
virtuelle

Kinesthésie



Visuel



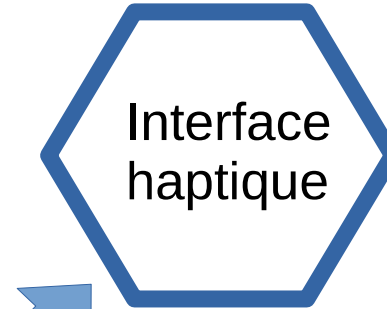
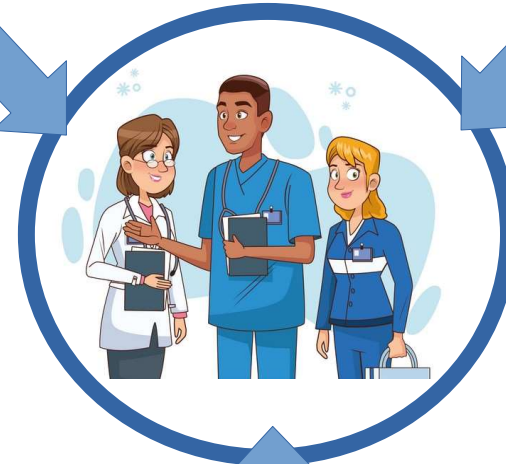
Méthodologie pour un simulateur hybride



Anatomie
physique



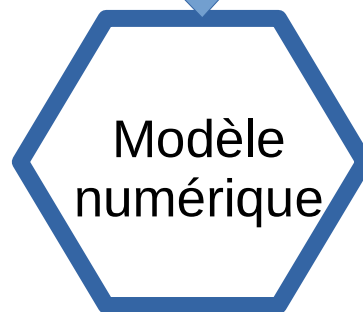
Palpation



Kinesthésie

Anatomie
virtuelle

Visuel



Anatomie
imagerie

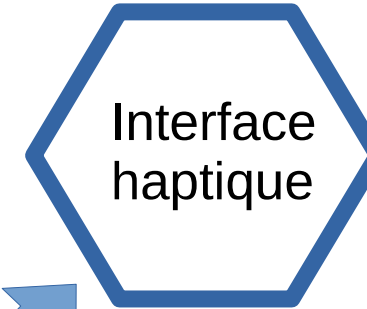
Méthodologie pour un simulateur hybride



Anatomie
physique



Transformation
géométrique



Anatomie
virtuelle

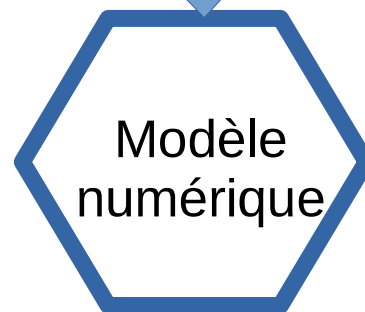
Palpation



Kinesthésie

Recalage
géométrique

Visuel

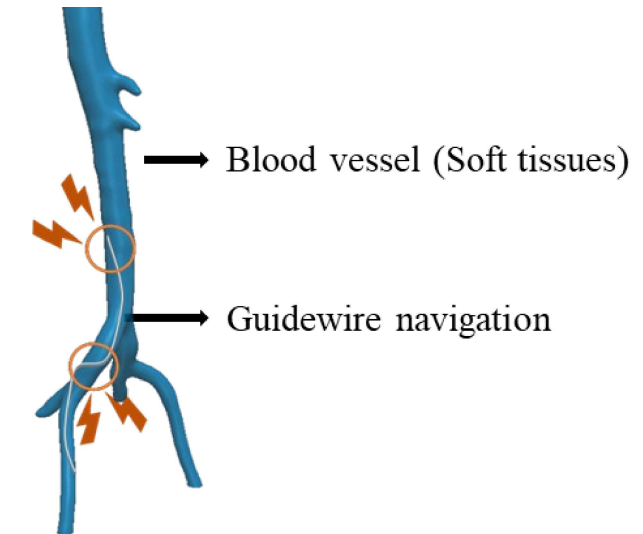
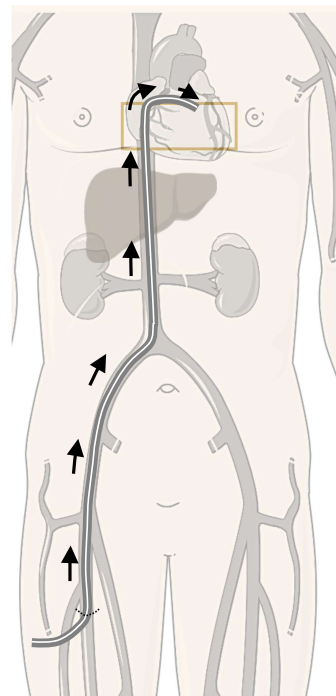
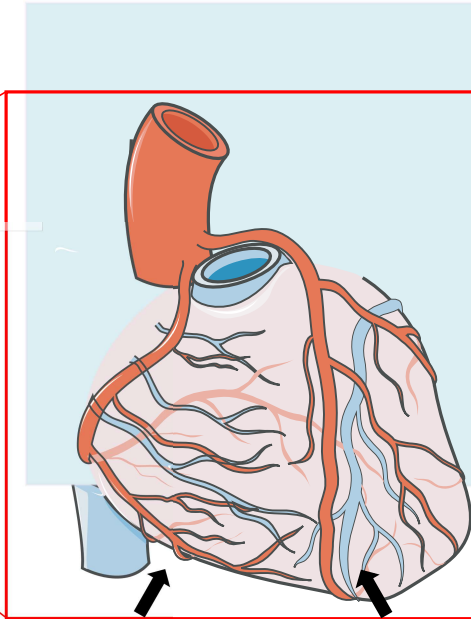
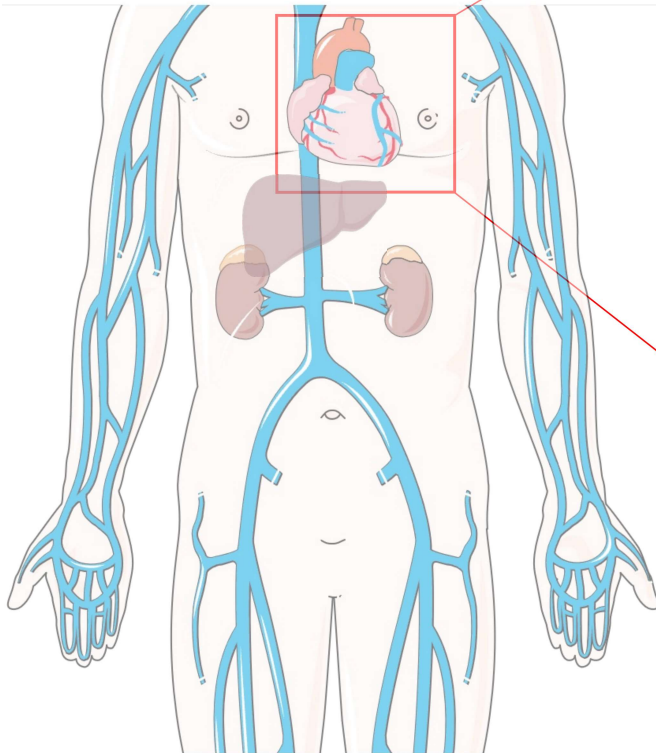


Anatomie
imagerie

Force
Déplacement

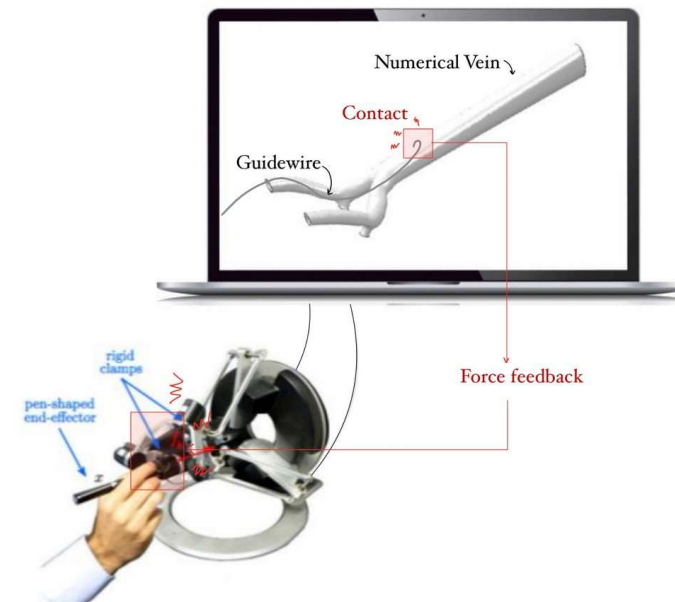
PROJET ANR RHU ICELAND

Remplacement de la valve mitrale par la technique transfémorale transeptale



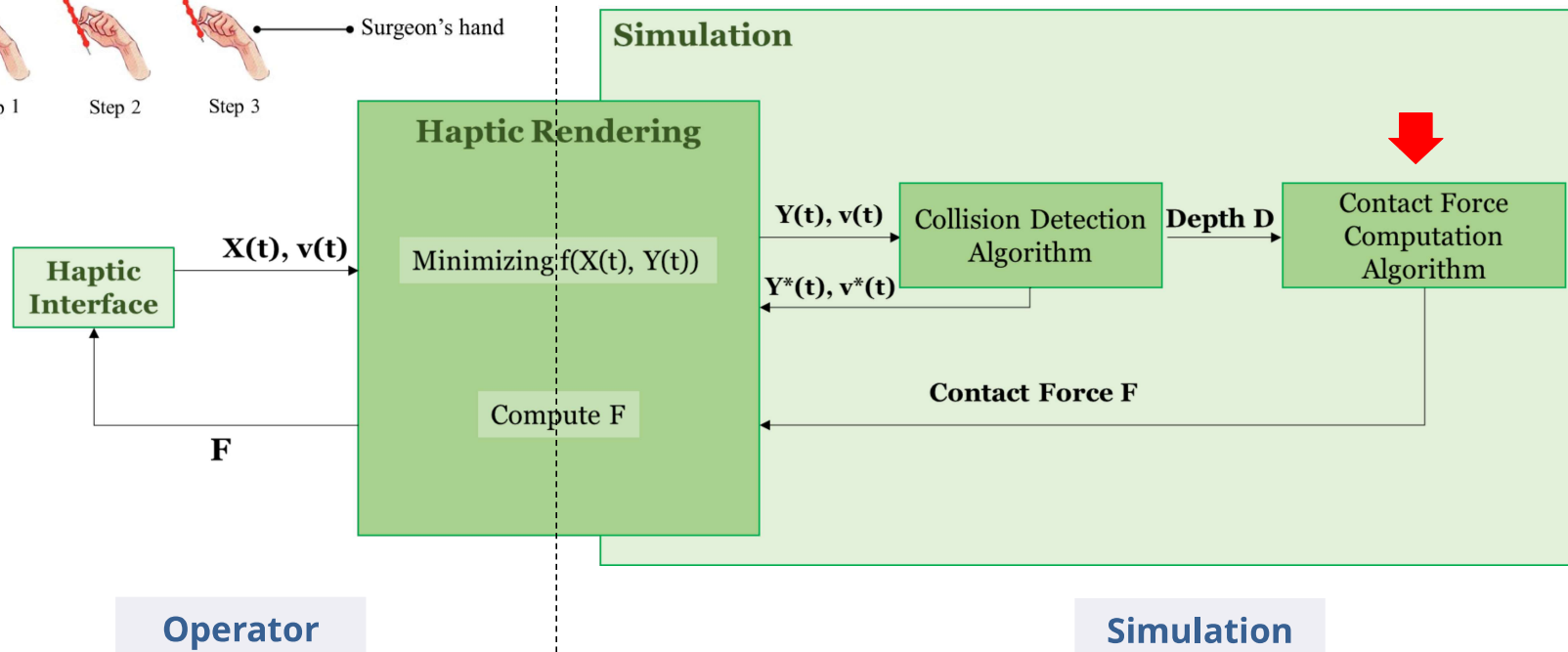
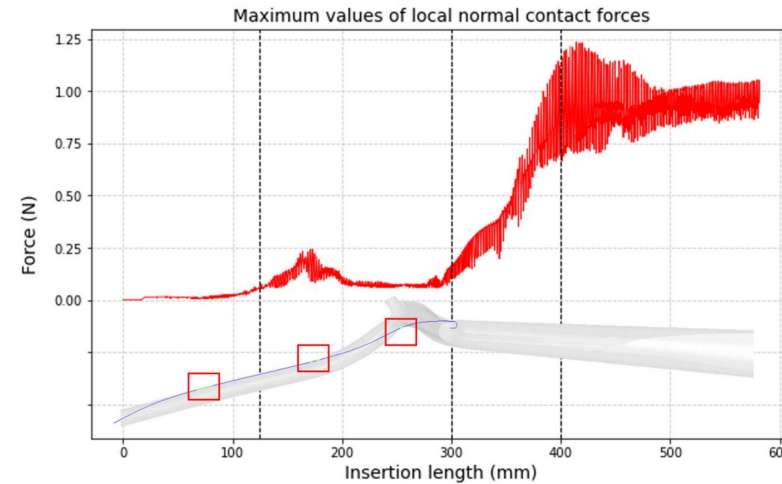
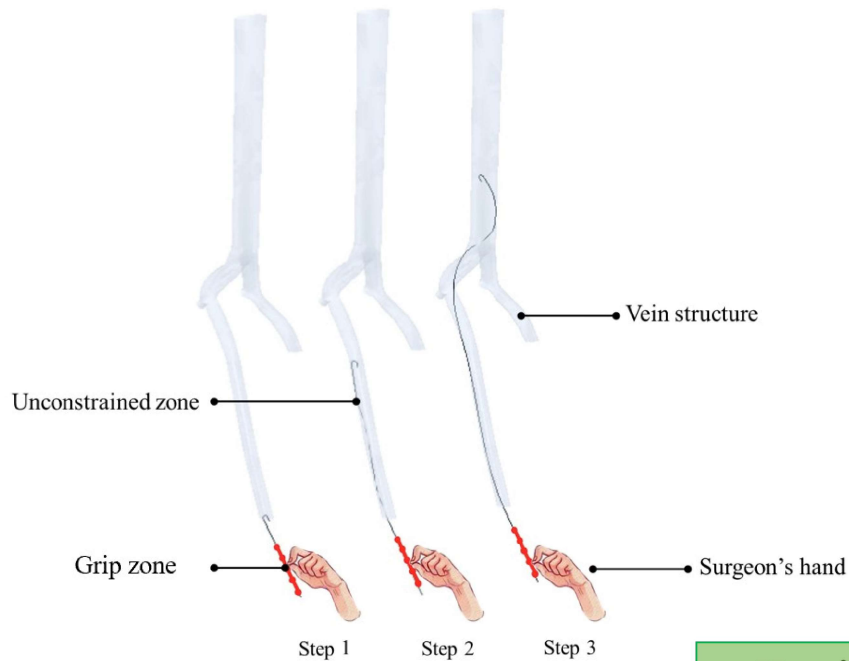
Transcatheter (TC) navigation

Virtual surgery

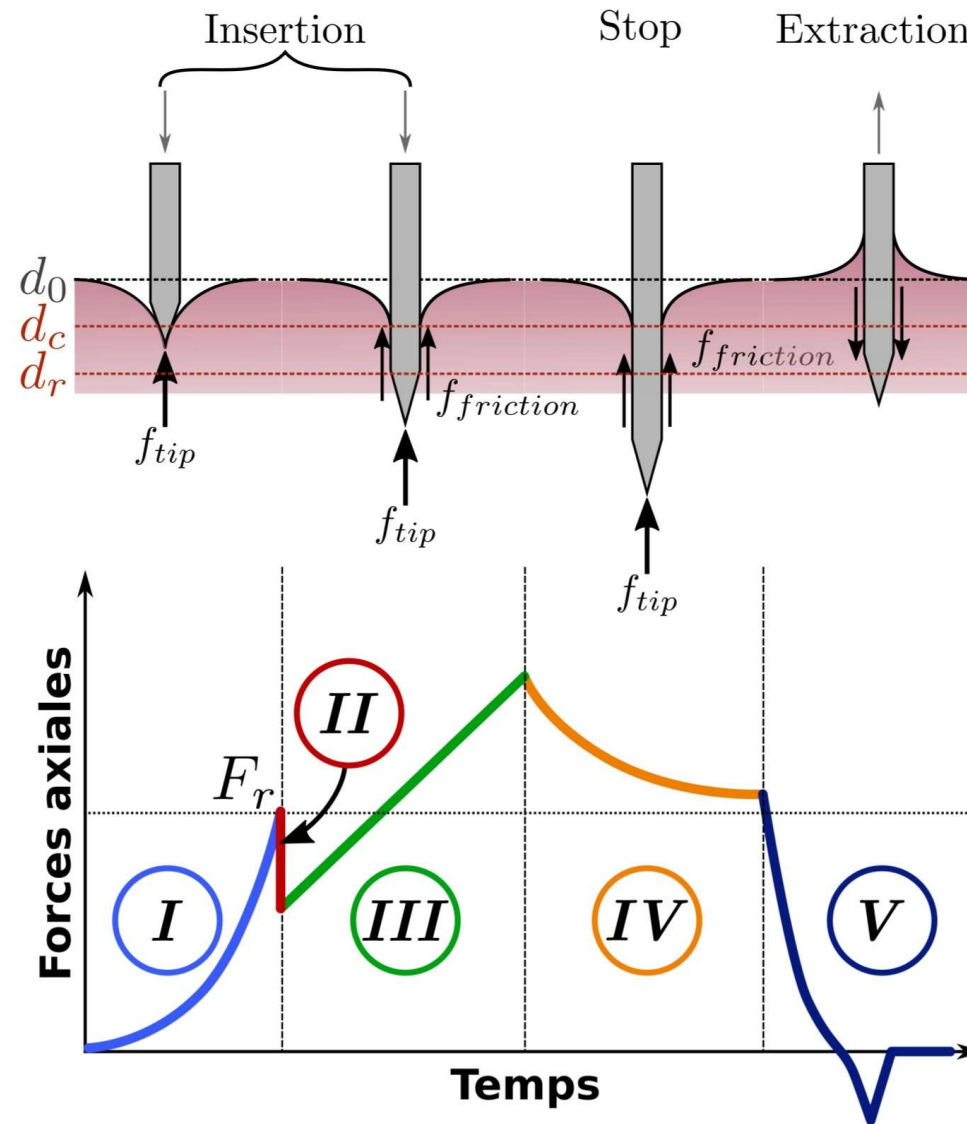


Physical haptic device

Modélisation numérique des veines et des outils

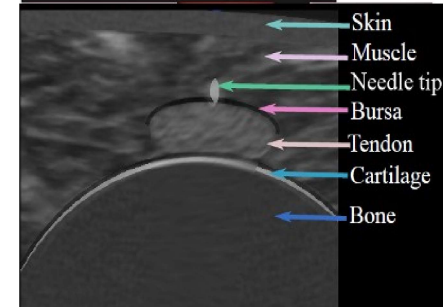
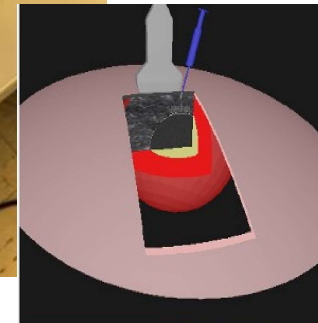
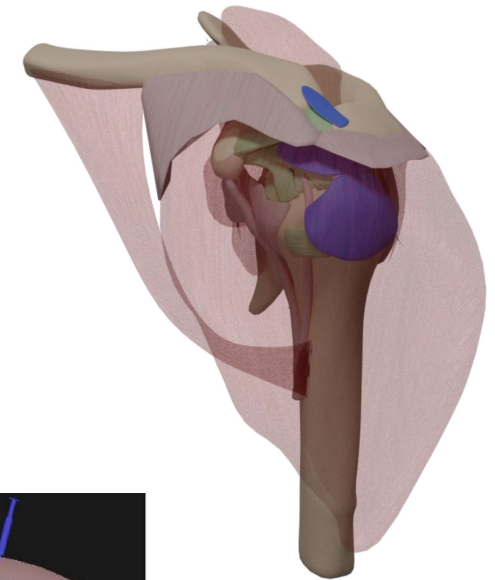
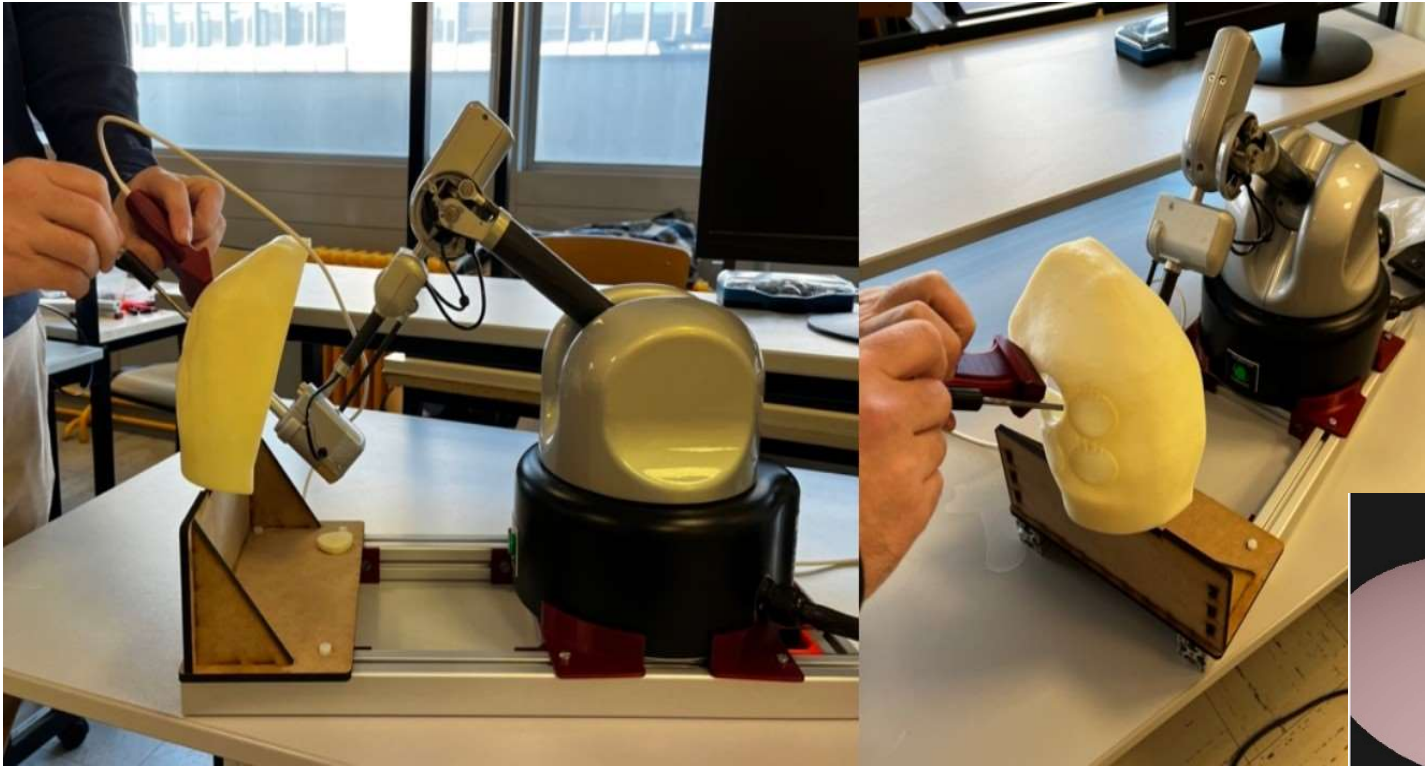


Exemples du problème de l'insertion aiguille



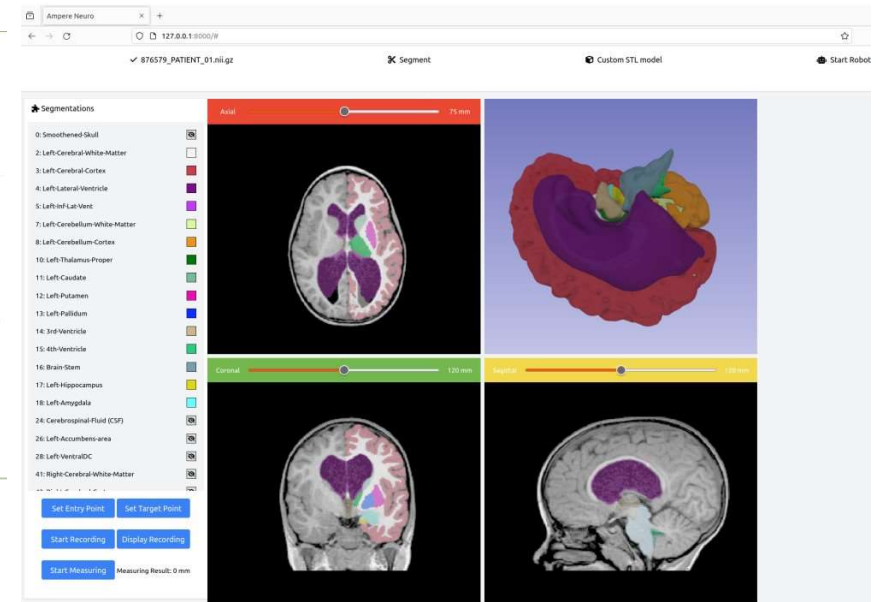
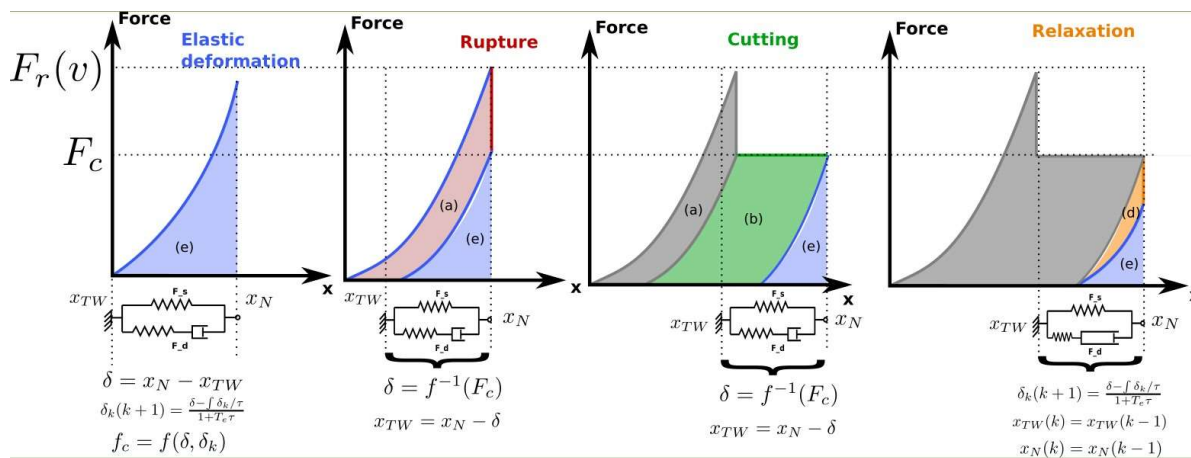
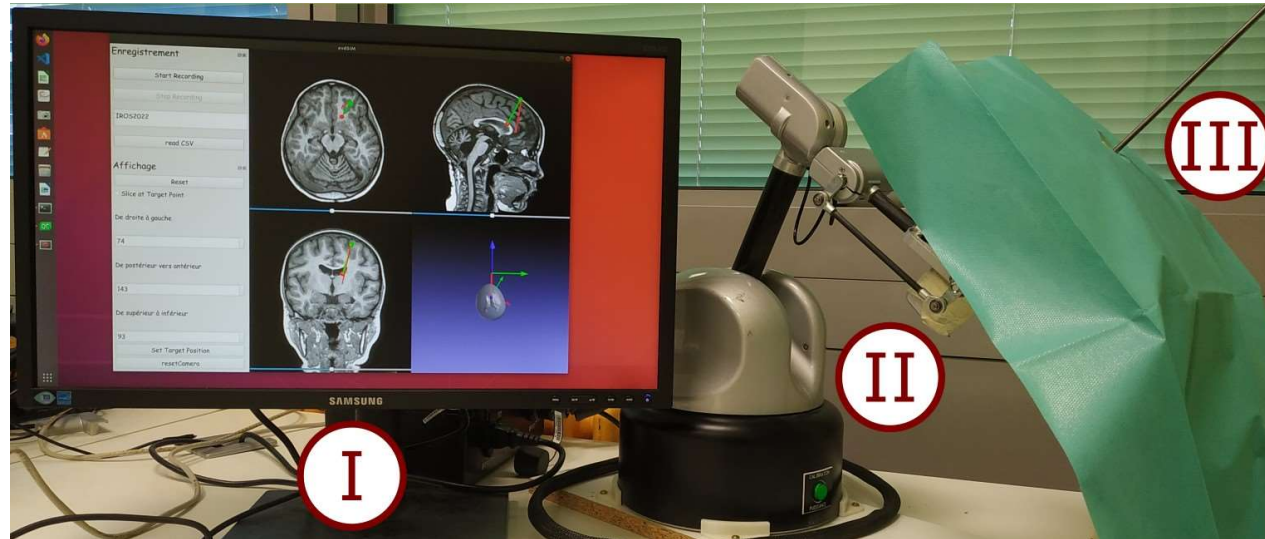
Exemples du problème de l'insertion aiguille

Application en rhumatologie



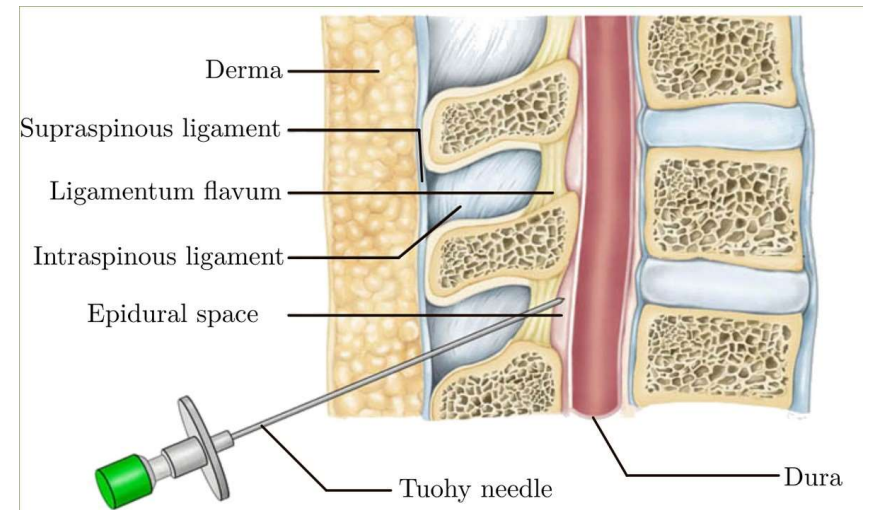
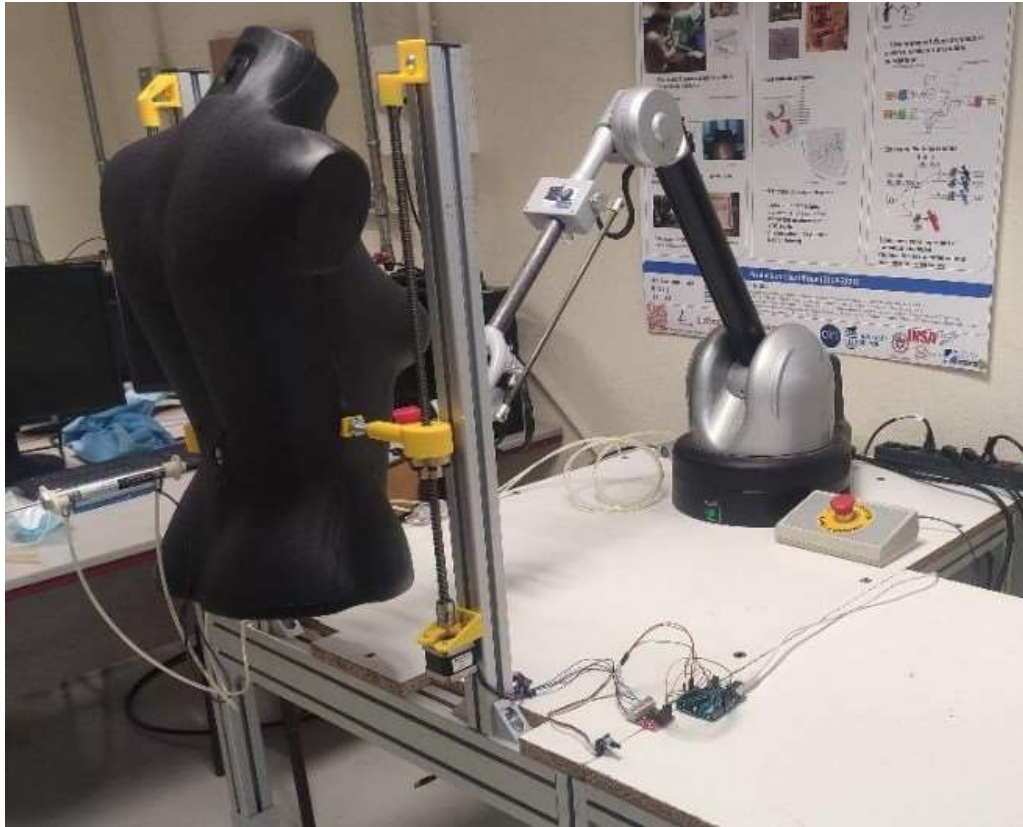
Exemples du problème de l'insertion aiguille

Application en neurochirurgie



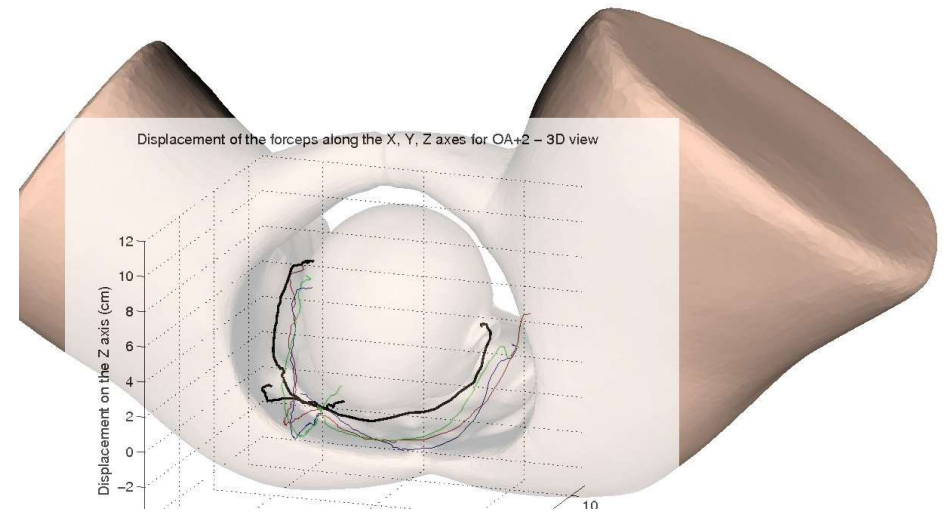
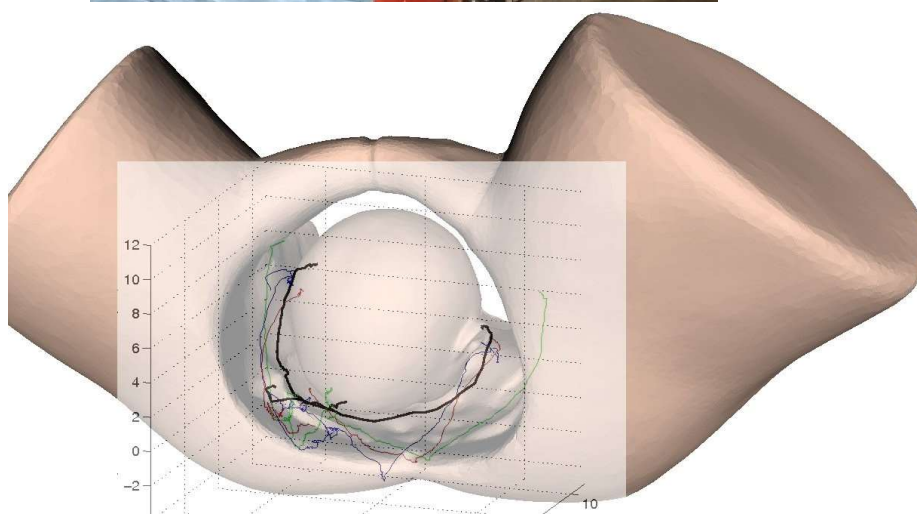
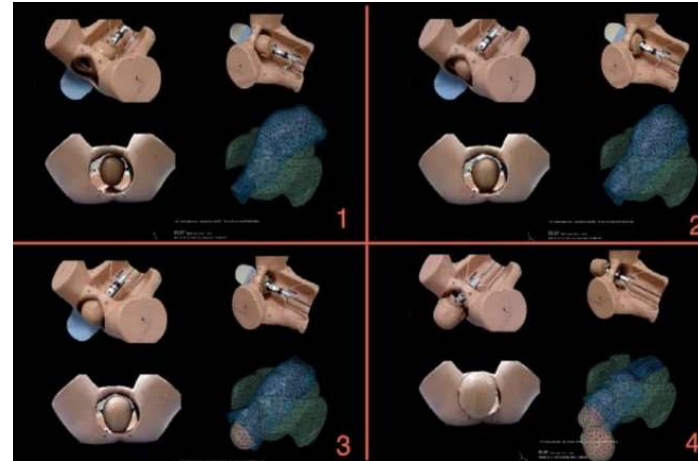
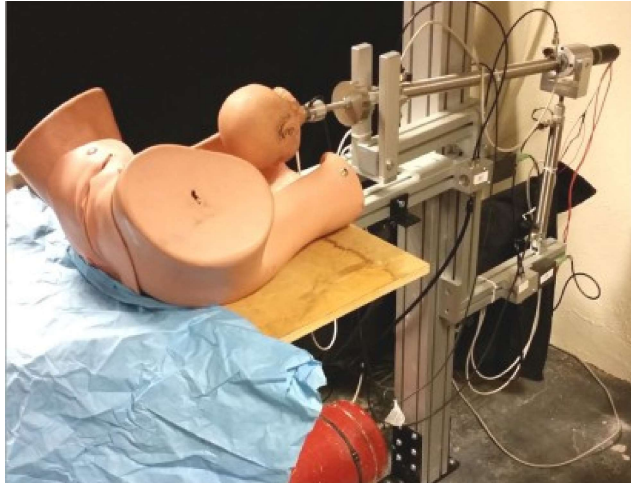
Exemples du problème de l'insertion aiguille

Application en anesthésie

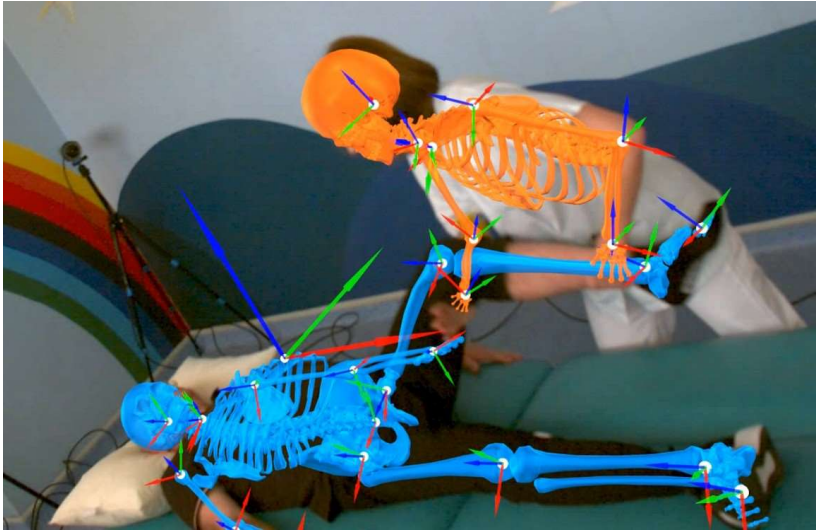


Autres gestes médicaux

En obstétrique



Autres gestes médicaux



Un simulateur pour :

- Se former aux gestes élémentaires
- Se former aux gestes avancés
- Rencontrer différentes pathologies
- Rencontrer différents patients
- Évaluer et s'auto-évaluer

Un simulateur doit

- Être immersif (visuel et haptique)
- Assurer une reproductibilité
- Mesurer la performance
- S'adapter aux apprenants et aux instructeurs

Problématiques

- Analyse de la pratique
- Définition du cahier des charges
- Modélisation du vivant
- Haptique
- Multi énergie
- Couplage modèle numérique et interface haptique
- Intégration de scénarios pédagogiques
- Réalisation de démonstrateurs pour preuve de concept

Richard MOREAU
Laboratoire Ampère – UMR CNRS 5005
richard.moreau@insa-lyon.fr