



**Soutenance d'une thèse de doctorat  
de l'INSA LYON, membre de l'Université de Lyon**  
La soutenance a lieu publiquement

<b>Candidat</b>	MME VEDEL Charlotte
<b>Fonction</b>	Doctorant
<b>Laboratoire INSA</b>	LAMCOS
<b>Ecole Doctorale</b>	ED 162 : MEGA
<b>Titre de la thèse</b>	« ACCROITRE SES PERFORMANCES EN HALTÉROPHILIE : LA BIOMÉCANIQUE POUR UN ENTRAÎNEMENT OPTIMISÉ »
<b>Date et heure de soutenance</b>	11/09/2023 à 10h
<b>Lieu de soutenance</b>	Amphithéâtre GM, INSA-Lyon (Villeurbanne)

### Composition du Jury

Civilité	Nom	Prénom	Grade / Qualité	Rôle
M.	BOU-SAÏD	Benyebka	Professeur des Universités	Directeur de thèse
M.	MASSI	Francesco	Professeur des Universités	Rapporteur
M.	ROUCH	Philippe	Professeur des Universités	Rapporteur
MME	MEZIANE	Anissa	Professeur des Universités	Examineur
M.	DUREISSEIX	David	Professeur des Universités	Examineur
M.	BELLI	Alain	Professeur des Universités	Examineur

### Résumé

More than sports, weightlifting and powerlifting are widely used in fitness/resistance training for sport performance. As they both consist of lifting additional weights they must be well executed to avoid injuries and enhance fitness and performance. To date, pieces of advice from experienced or graduated or self - proclaimed coaches, swarm in gyms and on the web, but very little are based on scientific knowledge. The same technical instructions are often given to men and women with different anthropometry and training history. As they are not individualized, these instructions could be at best suboptimal for most athletes, not enabling them to express their full potential and, at worst, dangerous and causing injuries.

The central objective of our project is the development and validation of an optimised personalized virtual human model.

On the one hand, a virtual mechanical model of an athlete squatting was numerically designed and set into motion by the development of a genetic algorithm minimizing a cost function.

On the other hand, an experiment was designed to measure the squat kinematics of experienced athletes.

The results of the simulation and experimentation were then confronted, the differences explained and areas of improvement listed.