

الجمهورية الجزائرية الديمقراطية الشعبية  
République Algérienne Démocratique et Populaire  
وزارة التعليم العالي و البحث العلمي  
Ministère de l'Enseignement Supérieur et de la Recherche Scientifique  
المدرسة العليا للاعلام الآلي 8 ماي 1945  
École Supérieure en Informatique  
8 Mai 1945 Sidi Bel Abbès



## MÉMOIRE

En vue de l'obtention du diplôme d' **Ingenieur d'état**  
Filière: **Informatique**  
Spécialité: **Intelligence Artificielle et science de données (IASD)**

### Thème

---

DEEP LEARNING ARCHITECTURES FOR GENERATING  
REHABILITATION HUMAN MOTION

---

Présenté par:  
Hadjar Aroua FERRAR

Soutenu le :                      devant le jury composé de :

Pr.	Président
Dr.	Examineur
Dr. Maxime DEVANNE	Encadreur
Dr. Belkacem KHALDI	Encadreur
Dr. Ali Ismail FAWAZ	Co-Encadreur

Exercise-based rehabilitation programs play a vital role in helping patients recover from injuries or surgeries, significantly enhancing their quality of life while reducing mortality rates and the likelihood of re-hospitalization. However, traditional rehabilitation methods are often resource-intensive, requiring continuous supervision by therapists. This creates a substantial barrier for patients who need to attend rehabilitation sessions multiple times a week. One way to resolve this is by providing technological support for home-based rehabilitation.

Recent advancements in deep learning offer promising new avenues for automating and improving these rehabilitation practices by generating human motion patterns. Previous works in the domain of motion generation have rarely explored the generation of rehabilitation movements.

In this project, we propose a deep learning-based framework for generating rehabilitation human motion. Given a prescribed action type and a quality score, we aim to generate plausible 3D rehabilitation human motion sequences. We propose a conditional Variational Auto-Encoder (VAE) that encourages a diverse sampling of the motion space according to a specified performance score.

**Keywords:** Rehabilitation Human Motion, Variational Auto-Encoder, Deep learning.