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وزارة التعليم العالي والبحث العلمي
جامعة قسنطينة 1 – الإخوة منتوري
كليـــــــــة العلوم الد قيـقة

PEOPLE'S DEMOCRATIC REPUBLIC OF ALGERIA
MINISTRY OF HIGHER EDUCATION AND SCIENTIFIC RESEARCH
Constantine 1 University – Frères Mentouri
Faculty of Exact Sciences

ANNONCE DE SOUTENANCE

Conformément à la décision n° **06/D3C/2026 datée** du **22 Janvier 2026** autorisant la soutenance d'une thèse de doctorat, le Vice-doyennat chargé de la post-graduation, de la recherche scientifique et des relations extérieures, a n n o n c e la soutenance publique d'une thèse de doctorat le :

Dimanche 08 Février 2026 à 16H00

Lieu : A la salle de conférences sise au Campus AHMED HAMANI (ZERZARA)
Constantine 1 – Frères Mentouri -
F i l i è r e : Mathématiques
Spécialité : Statistiques Appliquées

Doctorant : **ROUIBAH Brahim**

Sur le thème : « Réseaux de neurones dans l'identification et le contrôle des systèmes dynamiques »

Devant le jury d'examen :

	Nom et prénoms	Grade	Etablissement d'appartenance
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Abstract

This thesis explores the application of artificial neural networks, specifically Extreme Learning Machine (ELM) and Long Short-Term Memory (LSTM), in the identification and control of nonlinear dynamic systems. The primary objective is to enhance the accuracy and robustness of models used in complex environments, often characterized by uncertainties and variable dynamics.
In the first part, we examined the comparative performance of ELM and ANN models in the context of energy forecasting for combined cycle power plants. The results demonstrated that ELM significantly outperformed ANN, with a RMSE of 0.51 MW and a coefficient of determination (R^2) of 0.98, highlighting its effectiveness for real-time applications.

The second part of the research focused on the identification of parameters for a Brushless Direct Current (BLDC) motor using LSTM architectures. The results revealed that LSTMs were capable of managing complex dynamics and resisting disturbances, with an increase in MSE of only 15% under noisy conditions, compared to 35% for the Gradient Boosting Regressor (GBR).

The methodologies developed in this thesis incorporate statistical tests into the learningprocess, which has improved the generalization and reliability of predictions. The integration of statistical tests has also contributed to the interpretability of the results, linking the model predictions to the underlying quantitative analyses.

In conclusion, this thesis highlights the growing importance of neural networks in the identification and control of dynamic systems. The results obtained and the methodologies developed open new perspectives for future research, particularly in the integration of statistical tests and the enhancement of model interpretability. This research aims to strengthen the confidence of engineers and researchers in the use of neural approaches, thereby promoting their adoption in critical and complex systems.