Narasaraopeta Engineering College (Autonomous)
Department Of Computer Science and Engineering
2025 -2026

Batch Number	CG - 6
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Guide	Mothe Sathyam Reddy (Assistant Professor)
Title	**Deep Learning Innovations for Greenhouse Climate Prediction: Insights from a Spanish Case Study**
Domain / Technology	Deep Learning
Base Paper Link	https://ieeexplore.ieee.org/document/10960464
Dataset Link	https://zenodo.org/records/6697044(Spain Menaka Greenhouse Dataset)
Software Requirements	**Browser:** Google Chrome / Mozilla Firefox (latest version) **Operating System:** Windows 10/11 **Python Environment:** Python 3.8 – 3.10 (Anaconda or Google Colab recommended) **Libraries/Packages:** NumPy, Pandas, Scikit-learn, PyTorch, PyTorch-TabNet,Imbalanced-learn, SHAP
Hardware Requirements	**System Type:** 64-bit System **RAM:** 8 GB **Number Of Cores:** 4 **Number Of Threads:** 8 **Storage**: At least 20 GB free disk space **Internet:** Stable High-Speed Connection
Abstract	Accurate prediction of a greenhouse temperature is essential for effective climate control and optimal crop production. In this study, we focus on the performance of deep learning (DL) models and the proposed Power Long Short-Term Memory (PLSTM) model introduced in our early research for predicting internal temperatures using a database from Spain. By analyzing DL architectures such as Gated Recurrent Units (GRU), Artificial Neural Networks (ANN), Long Short-Term Memory with Artificial Neural Network (LSTM-ANN), and Long Short-Term Memory with Recurrent Neural Network (LSTM-RNN), we aim to benchmark their performance against the proposed PLSTM model. Additionally, this study explores the correlation between internal temperature and other key environmental factors and evaluates how well the models generalize these relationships. The results show that the PLSTM model consistently outperforms the evaluated DL models, achieving an R2 of 0.9999 with a significantly lower Root Mean Squared Error (RMSE) and Mean Absolute Error (MAE) demonstrating its robustness in handling time-series forecasting for greenhouse conditions. This research underscores the potential of PLSTM as a key tool for improving precision climate control in agriculture and offers valuable insights for the development of intelligent greenhouse systems.

Signature of the student(s) **Signature of the Guide** **Signature of the project coordinator**