Postgraduate Seminar Series

Venue: Graduate Seminar Room
Date & Time: July 25, 2026 at 3:00 PM

Speaker Information

Danial Chakma (Std No. 1018052001) is a part-time M.Sc. student in the Department of Computer Science and Engineering (CSE) at Bangladesh University of Engineering and Technology (BUET). He completed his undergraduate studies at BUET in 2014. His research interests lie in the field(s) of Network Security, Machine Learning, and Deep Learning. He is currently pursuing his postgraduate thesis under the supervision of Dr. Shohrab Hossain. He will be speaking about his ongoing research in this talk.

HALCN: A Lightweight CNN–Attention Framework for Real-Time Network Intrusion Detection

The growing volume and sophistication of cyber threats necessitate Network Intrusion Detection Systems (NIDS) that are both accurate and suitable for real-time operation. Existing deep learning models often rely on computationally expensive architectures while overlooking temporal dependencies within network traffic flows. To address this challenge, we propose HALCN, a unified framework for lightweight temporal modeling that integrates multi-scale separable convolutions with low-rank self-attention to jointly capture local and long-range dependencies in network traffic. Unlike existing approaches that prioritize detection performance at the expense of computational efficiency, HALCN is designed to optimize the trade-off between detection accuracy and inference efficiency, enabling real-time deployment in resource-constrained environments. The proposed model incorporates channel attention (ECANet) and Linformer-based temporal self-attention to enhance feature representation while maintaining low latency. To improve robustness under class imbalance, we employ hybrid data augmentation using SMOTE and CGAN, along with an outlier-aware instance selection strategy to reduce redundancy. Evaluated on the CICIDS2017 and CSE-CIC-IDS2018 datasets, HALCN achieves up to 99.83% accuracy with low variance and a low false alarm rate while maintaining low model complexity compared with LSTM-based approaches. These results demonstrate the effectiveness of HALCN as a practical and efficient solution for real-time NIDS deployment.