Haitham Kanj

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Education

- **The Ohio State University** — Columbus, OH, USA
  Ph.D. Candidate in Electrical and Computer Engineering, Minor in Statistics — *Dec 2026*
  Advisors: Kiryung Lee and Vincent Vu, GPA: 3.93
- **Lebanese American University** — Beirut, Lebanon
  B.E in Electrical Engineering, Magna Cum Laude — *May 2022*
  Research Advisor: Samer Saab, GPA: 3.93

Graduate Work

- **Theoretical ML for Piecewise Linear Regression**:
  Proposed an adaptive projected gradient descent algorithm as a solution to *piecewise linear regression*. Showed that this *computationally and data-efficient* algorithm converges linearly to the ground-truth solution given a sample size that scales linearly in the ambient dimension.
- **Reinforcement Learning for Traumatic Brain Injury Detection in Rats**:
  Modeled rat *reward perception behavior* as a recursive learning strategy. The developed model accurately categorizes rats (brain-injured vs. control) with limited observations. The study successfully achieves the goal of minimizing experimentation frequency (by $\sim 80\%$) on rats to promote *ethical* progress in research.
- **Localization with Starlink Satellite Signals**:
  Developed a state-of-the-art software-defined radio that collects radio signals, generates observations from dynamic filters, and estimates the receiver's location. This work was tested on Starlink signals and generated an *estimation error of 20 m* when initialized 100 km from the ground truth.
- **Teaching**:
  Served as a graduate teaching assistant for ECE 5200 (Introduction to Digital Signal Processing) and ECE 2060 Laboratory (Introduction to Digital Logic).

Undergraduate Projects

- **Solar Panel Fault Detection (Capstone)**:
  Proposed a *computer vision-based model* to detect faulty solar panels from thermographic images collected using a drone. The model was deployed on a Raspberry Pi and tested on several solar panel arrays where it successfully detected several faults causing unique thermal signatures.
- **LSTM Networks for Motion Prediction**:
  Conducted an analysis comparing the performance of *LSTM models and Kalman Filters* in predicting a moving object's future location. Testing on several datasets confirmed the superiority of LSTM models in capturing motion behavior.

Skills & Courses

- **Programming Languages**: Python, R, MATLAB, SQL
- **Frameworks**: TensorFlow, Keras, Scikit, CVX, Gurobi
- **Machine Learning/Statistics**: High Dimensional Probability and Statistics, Applied Regression Analysis, Machine Learning for Electrical and Computer Engineering
- **Natural Language Processing**: Completed *Natural Language Processing on Google Cloud* course. Covered topics: AutoML, Vertex AI, Pre-trained Models for Tokenization, and Advanced NLP Models

Selected Publications

1. **H. Kanj** and K. Lee, "Piecewise Linear Regression: A Parametric Solution," *Submitted to 29th International Conference on Artificial Intelligence and Statistics (AISTATS 2026).*
2. **H. Kanj**, S. Kim and K. Lee, "Variable Selection in Convex Piecewise Linear Regression," *Submitted to SIAM Journal on Mathematics of Data Science.*[PDF]
3. **H. Kanj**, S. Kim and K. Lee, "Max-Affine Regression via Sparse Gradient Descent," *2024 IEEE 13rd Sensor Array and Multichannel Signal Processing Workshop (SAM).*[PDF]
4. **H. Kanj**, S. Kozhaya and Z. Kassas, "Acquisition and Tracking of Starlink LEO Satellite Signals in Low SNR Regime," *Proceedings of the 36th International Technical Meeting of the Satellite Division of The Institute of Navigation (ION GNSS+ 2023).*[PDF]
5. S. Kozhaya, **H. Kanj**, and Z. Kassas, "Multi-constellation blind beacon estimation, Doppler tracking, and opportunistic positioning with OneWeb, Starlink, Iridium NEXT, and Orbcomm LEO satellites," *2023 IEEE/ION Position, Location and Navigation Symposium (PLANS).*[PDF]

Honors & Awards

- Dr. Burn Lin Travel Grant Award, The Ohio State University — 2024
- Best Student Paper Presentation Award, ION Global Navigation Satellite Systems Conference — 2023
- 2nd Winner, Official Governmental General Sciences Exams, Lebanese Ministry of Education — 2018