Willa Potosnak

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Education

Carnegie Mellon University (CMU), School of Computer Science 08/22 - 05/27 (anticipated)
Ph.D. in Robotics

Advisor: Dr. Artur Dubrawski

Research Focus Areas: Forecasting (Univariate and Multivariate), Time Series Foundation Models, Reasoning-based Zero-shot Generalization

Duquesne University, Rangos School of Health Sciences 05/22

B.S., Biomedical Engineering with Minor in Mathematics

Summa Cum Laude

Selected Research Experience

Amazon Applied Science Intern 05/2025 - 12/12/2025

- Investigated the influence of deep learning training paradigms on computational efficiency, optimization stability, and model generalization
- Published theoretical and empirical findings demonstrating that the forking-sequences training scheme achieves more consistent gradient behavior, lower forecast variance, and higher inference efficiency compared to window-sampling baselines across diverse encoder architectures
- Continued collaboration with the team through a paid, part-time research extension following the summer internship

Industry Research Collaborations - Energy Sector

- Developed novel multivariate forecasting methods in collaboration with a top international sustainable electric power corporation, leveraging time-series channel-aware compressive attention within Transformer-based architectures and improving upon traditional attention baselines
- Designed a hybrid ML-Physics model in collaboration with a leading wind turbine manufacturer to predict severe wind events; the model outperformed both purely physics-based and ML baselines, providing more accurate time-to-event estimates with longer lead times, successfully predicting 65% of severe wind events across various turbines with lead times of up to 13 minutes and enabling slower and safer machine shutdowns

Industry Research Collaborations - Health Sector

- Developed a novel hybrid global-local architecture and a pharmacokinetic (PK) encoder that informs deep learning models of patient-specific treatment effects in collaboration with clinicians at the University of Pittsburgh Medical Center (UPMC); our architecture improves upon patient-specific models by 15.8% on average and surpasses baselines by up to 16.4% on simulated data and 4.9% on real-world data for individual patients during critical events of severely high and low glucose levels
- Developed ML models using time-series patient data recorded during cardiac surgeries in collaboration with clinicians at UPMC; our models demonstrate improved risk predictions for multiple postoperative outcomes, including mortality, compared to the baseline Society of Thoracic Surgeons (STS) models deployed nationally, while identifying hundreds of patients eligible for reassignment to lower-risk categories from the STS model, enabling more focused triage efforts on higher-risk patients

Skills

Coding Languages & Software: Python, PyTorch, PyTorch Lightning, Hugging Face Transformers, AWS (S3, SageMaker, EC2), Git, Linux, LaTeX, Code Review Tools (industry-scale), MATLAB, HTML

Publications and Presentations

Preprints

G1. **Potosnak, W.**, Challu C., Olivares K. G., Goswami, M., Wiliński, M., Żukowska, N., Dubrawski, A. W. (2025). Investigating Compositional Reasoning in Time Series Foundation Models.
[Paper] [Code]

Conference and Journal Publications

C1. Wiliński, M., Goswami, M., **Potosnak, W.***, Żukowska, N.*, Dubrawski, A. W. (2025). Exploring Representations and Interventions in Time Series Foundation Models. Proceedings of the Forty-Second International Conference on Machine Learning.
[Paper] [Code]

C2. **Potosnak, W.**, Challu, C., Olivares, K. G., Dufendach, K. A., Dubrawski, A. W. (2025). Global Deep Forecasting with Patient-Specific Pharmacokinetics. Proceedings of the Conference on Health, Inference, and Learning, PMLR, 177.
[Paper] [Code]

C3. **Potosnak, W.**, Dufendach, K. A., Nagpal, C., Kaczorowski, D. J., Yoon, P., Bonatti, J., Miller, J. K., Dubrawski, A. W. (2024). Intraoperative Features Improve Model Risk Predictions Following Coronary Artery Bypass Grafting. *Annals of Thoracic Surgery Short Reports*.
[Paper]

C4. Nagpal, C., **Potosnak, W.**, Dubrawski, A. (2022). auton-survival: an Open-Source Package for Regression, Counterfactual Estimation, Evaluation and Phenotyping with Censored Time-to-Event Data. *Proceedings of the 7th Machine Learning for Healthcare Conference*, *PMLR*, 182, 1-24.
[Paper] [Blog] [Code]

C5. **Potosnak, W.**, Caldas, S., Dufendach, K. A., Clermont, G., Miller, J. K., Dubrawski, A. (2022). Robust Rule Learning for Reliable and Interpretable Insight into Expertise Transfer Opportunities. in *Proceedings of the Thirty-Sixth AAAI Conference on Artificial Intelligence.*
[Paper]

Peer-Reviewed Workshop Papers and Presentations

P1. **Potosnak, W.**, Wolff M., Oreshkin B., Cao M., Mahoney M. W., Efimov D., Olivares K. G. (2025). Forking Sequences. *NeurIPS Workshop on GPU-Accelerated and Scalable Optimization.*
[Paper]

P2. Olivares K. G., Wolff M., Konstantinova T., Ramasubramanian S., Wilson A. G., Potapczynski A., **Potosnak W.**, Cao M., Oreshkin B., Efimov D. (2025). A Realistic Evaluation of Cross-Frequency Transfer Learning and Foundation Forecasting Models. *NeurIPS Workshop on Recent Advances in Time Series Foundation Models (BERT²S).*
[Paper]

P3. **Potosnak, W.**, Challu, C., Goswami, M., Wiliński, M.,Żukowska, N., Dubrawski, A. W. (2024). Implicit Reasoning in Time Series Forecasting. *NeurIPS 2024 Workshop on Time Series in the Age of Large Models* & *NeurIPS 2024 System 2 Reasoning At Scale Workshop.*
[Paper]

P4. Wiliński, M., Goswami, M., Żukowska, N., **Potosnak, W.,** Dubrawski, A. W. (2024). Unveiling and Manipulating Concepts in Time Series Foundation Models. *NeurIPS 2024 Workshop on Time Series in the Age of Large Models* & *NeurIPS 2024 Workshop on Foundation Model Interventions.*
[Paper]

P5. Żukowska, N., Goswami, M., Wiliński, M., **Potosnak, W.,** Dubrawski, A. W. (2024). Towards Long-Context Time Series Foundation Models. *NeurIPS 2024 Workshop on Time Series in the Age of Large Models* & *NeurIPS 2024 Fine-Tuning in Modern Machine Learning: Principles and Scalability Workshop.*
[Paper]

P6. Dufendach, K. A., Liu, M. **Potosnak, W.**, Jacquemyn, X., Pompeu Sá, M., Kaczorowski, D. J., Dubrawski, A. W., Sultan, I. (2024). Machine learning identifies patients who derive survival benefit from coronary revascularization. *Society of Thoracic Surgeons Coronary Conference.*

P7. **Potosnak, W.**, Challu, C., Olivares, K. G., Miller, J. K., Dubrawski, A. W. (2024). Severe Wind Event Prediction with Multivariate Physics-Informed Deep Learning. *ICLR Tackling Climate Change with Machine Learning Workshop*.
[Paper] [Poster] [Slides]

P8. **Potosnak, W.**, Challu, C., Olivares, K. G., Dubrawski, A. W. (2023). Forecasting Response to Treatment with Deep Learning and Pharmacokinetic Priors. *Machine Learning for Health (ML4H) Findings Track Collection.*

P9. **Potosnak, W.**, Dufendach K. A., Kaczorowski, D., Miller, J. K., Dubrawski, A. (2022). Machine Learning Models with Intraoperative Features Improve Risk Predictions Following CABG. *Society of Thoracic Surgeons Coronary Conference.*
[Abstract]

P10. Dufendach, K. A., Nagpal, C., **Potosnak, W.**, Dubrawski, A., Kaczorowski, D., (2022). Novel Machine Learning Technique Defines Patients Who Benefit from Off-Pump CABG. *Society of Thoracic Surgeons Coronary Conference*.
[Abstract]

P11. **Potosnak, W.**, Caldas, S., Dufendach, K. A., Clermont, G., Miller, J. K., Dubrawski, A. (2021). Robust Interpretable Rule Learning to Identify Expertise Transfer Opportunities in Healthcare. *NeurIPS 2021 Workshop Bridging the Gap: from Machine Learning Research to Clinical Practice.*

P12. **Potosnak, W.,** Dufendach, K. A., Wertz, A., Miller, J. K., Kilic, A., Dubrawski, A. (2021 January 29-31). Continuous Intraoperative Data Analysis Using Machine Learning Reveals Multiple Parameters to Predict Post-CABG Renal Failure. *Society of Thoracic Surgeons (STS) 57th Annual Meeting.*

P13. Rühling Cachay, S., **Potosnak, W.*,** Erickson, E.*, Bucker, A. F. C.*, Pokropek, E.*****, Osei, S., Lütjens, B. (2020). Graph Neural Networks for Improved El Nino Forecasting. *NeurIPS 2020 Workshop on Tackling Climate Change with Machine Learning*.
[Paper]

Achievements and Awards

Honorable Mention for application to the National Science Foundation Graduate Research Fellowship Program (NSF GRFP), 2024. [Awardee List]

Nominated and accepted to the Undergraduate Consortium (UC) mentorship program at the Thirty-Sixth AAAI Conference on Artificial Intelligence (AI) (AAAI-22)

Student panelist for the 2021 Artificial Intelligence and Data Science Education Leadership meeting hosted by CSforAll and supported by the White House Office of Science and Technology Policy (OSTP) and the National Science Foundation (NSF)