TIANYU ZHANG

(+1)780-937-3465 ◇ tianyu.zhang@autodesk.com ◇ skyu0221@gmail.com ◇ www.tianyuzhang.com

RESEARCH INTERESTS

Multi-Agent Reinforcement Learning, Diversity Learning, Transfer Learning, Meta-Learning, Combinatorial Optimization, Sim-to-Real Transfer, Simulation, Machine Learning, Control Optimization, Large Language Model

EMPLOYMENT

Senior AI Research Scientist, Autodesk Research, Canada 2024 - Present

- **LLM-enhanced CAD for manufacturing**: Applied Large Language Models (LLMs) to optimize computer-aided design (CAD) workflows in manufacturing, adding constraints to regularize design sketches, improving design precision and reducing production time.
- **RL for LLM fine-tuning**: Developed reinforcement learning (RL)-based fine-tuning strategies to align LLM outputs with the foundation models. Designed reward functions and implemented online/offline RL pipelines, significantly improving model reliability, controllability, and generalization across diverse tasks.

EDUCATION

PhD in Computer Science, University of Alberta, Edmonton, Canada 2019 - 2023
Advised by Omid Ardakanian GPA: 4/4
Recipient of the Alberta Graduate Excellence Scholarship (Government of Alberta, Canada) h-index: 12
2025 ACM SIGEnergy Doctoral Dissertation Award Honorable Mention

MSc in Computer Science, University of Alberta, Edmonton, Canada 2017 - 2019
Advised by Omid Ardakanian GPA: 4/4
Runner-up of the Departmental Outstanding Master Thesis Award

BSc Hon. in Computer Science, University of Alberta, Edmonton, Canada 2013 - 2017
Recipient of three ICPC regional contest medals GPA: 3.8/4

OTHER RESEARCH EXPERIENCES

Research Assistant, University of Alberta April 2018 - March 2024
Advisor: Omid Ardakanian

- **Zero-shot data-driven building HVAC control**: Developed and utilized RL-based VAV controller to achieve up to 30% energy savings in unseen commercial buildings, without training data from the building.
- **Few-shot thermal comfort modeling**: Identified multiple unit thermal comfort models using real-world data and developed two ensemble methods to train new models using minimal data, resulting in a 10-fold reduction in training costs during a thermal comfort classification experiment.
- **Building joint control**: Introduced action branching RL to control the lighting, shading, and HVAC system jointly. Explored the parameter trade-offs inherent in the convex combination of multiple objectives.
- **Occupant workspace assignment**: Developed an algorithm that optimally allocates workspaces to long-term and short-term occupants, ensuring optimal thermal conditions while also reducing the building's energy consumption.
- **Open-source toolkit developments**: Two open-source platforms for RL-based building control simulation and ML-based time-series forecasting evaluation were developed and contributed to the intergovernmental organization, the International Energy Agency (IEA).

SELECTED HONORS AND AWARDS

ACM SIGEnergy Doctoral Dissertation Award Honorable Mention	**2025**
Departmental Outstanding PhD Thesis Award Nomination	**2023**
Alberta Graduate Excellence Scholarship	**2022 - 2023**
University of Alberta Mary Louise Imrie Graduate Student Award	2022
NeurIPS ML4CO Competition Dual Task Runner-up	**2021**
ACM BuildSys Best Poster Runner-up	**2020**
Departmental Outstanding Master Thesis Award Runner-up	**2020**
University of Alberta Graduate Student Teaching Award	**2020**
University of Alberta Mary Louise Imrie Graduate Student Award	2019
North America ACM-ICPC Regional Contest Silver Medal	2017
University of Alberta Graduate Fellowship	2017 - 2023
University of Alberta Dean's Honor Roll	2015 - 2017
University of Alberta First Class Standing	2015 - 2017
North America ACM-ICPC Regional Contest Bronze Medal	2016
North America ACM-ICPC Regional Contest Bronze Medal	2015

PEER-REVIEWED PUBLICATIONS

E. Casey, **T. Zhang**, S. Ishida, J. R. Thompson, A. Khasahmadi, J. G. Lambourne, P. K. Jayaraman, K. D.D. Willis, "Aligning Constraint Generation with Design Intent in Parametric CAD", International Conference on Computer Vision (ICCV), 2025.

A. Rakhsha, **T. Zhang**, K. Madan, A. Farahmand, A. Khasahmadi, "Majority of the Bests: Improving Best-of-N via Bootstrapping", The Second AI for MATH Workshop at the 42nd International Conference on Machine Learning (ICML), 2025.

J. Yu, **T. Zhang**, O. Ardakanian, A. Wierman, "Online Comfort-Constrained HVAC Control via Feature Transfer", The Sixteenth ACM International Conference on Future Energy Systems (ACM e-Energy), 2025.

T. Zhang, O. Ardakanian, "Comfort-aware Optimal Space Planning in Shared Workspaces", The Fifteenth ACM International Conference on Future Energy Systems (e-Energy), 2024.

T. Zhang, O. Ardakanian, "Investigating the Impact of Space Allocation Strategy on Energy-Comfort Trade-off in Office Buildings", The Third ACM SIGEnergy Workshop on Societal Decarbonization (SoDec), 2023.

A. Zhumabekov, D. May, **T. Zhang**, A.K. GS, O. Ardakanian, M. E. Taylor, "Ensembling Diverse Policies Improves Generalizability of Reinforcement Learning Algorithms in Continuous Control Tasks", The Fifteenth ACM Adaptive and Learning Agents Workshop (ALA), 2023.

A.K. GS*, **T. Zhang***, O. Ardakanian, M.E. Taylor, "Mitigating an adoption barrier of reinforcement learning-based control strategies in buildings", Energy and Buildings, Elsevier, 2023.

T. Zhang, A.K. GS, M. Afshari, P. Musilek, M.E. Taylor, O. Ardakanian, "Diversity for Transfer in Learning-based Control of Buildings", The Thirteenth ACM International Conference on Future Energy Systems (e-Energy), 2022.

T. Zhang, A. Banitalebi-Dehkordi, Y. Zhang, "Deep Reinforcement Learning for Exact Combinatorial Optimization: Learning to Branch", The Twenty-sixth IEEE International Conference on Pattern Recognition (ICPR), 2022.

T. Zhang, J. Gu, O. Ardakanian, J. Kim, "Addressing data inadequacy challenges in personal comfort models by combining pretrained comfort models", Energy and Buildings, Elsevier, 2022.

T. Zhang*, G. Baasch*, O. Ardakanian, R. Evins, "On the Joint Control of Multiple Building Systems with Reinforcement Learning", The Twelfth ACM International Conference on Future Energy Systems (e-Energy), 2021.

*Equal contribution

M. Hossain*, **T. Zhang***, O. Ardakanian, "Identifying Grey-box Thermal Models with Bayesian Neural Networks", Energy and Buildings, Elsevier, 2021.

T. Zhang, O. Ardakanian, "COBS: COmprehensive Building Simulator", The Seventh ACM International Conference on Systems for Energy-Efficient Buildings, Cities, and Transportation (BuildSys), 2020.

M. Hossain*, **T. Zhang***, O. Ardakanian, "Evaluating the Feasibility of Reusing Well-Suited ThermalModels in the Residential Sector", The first ACM International Workshop on Urban Building Energy Sensing, Controls, Big Data Analysis, and Visualization (UrbSys), 2019.

T. Zhang, A. Zishan, O. Ardakanian, "ODToolkit: Extensible Toolkit for Building Occupancy Detection", The Tenth ACM International Conference on Future Energy Systems (e-Energy), 2019.

T. Zhang, O. Ardakanian, "A Domain Adaptation Technique for Fine-Grained Occupancy Estimation in Commercial Buildings", The Fourth ACM/IEEE International Conference on Internet of Things Design and Implementation (IoTDI), 2019.

THESIS

T. Zhang, "Data-Enabled Optimization of Building Operations", Ph.D. Thesis, University of Alberta, December 2023. **Nominated for the University of Alberta Department of Computing Science Outstanding PhD Thesis Award. ACM SIGEnergy Doctoral Dissertation Award Honorable Mention.**

T. Zhang, "Building Occupancy and Thermal Modelling in the Wild", Master Thesis, University of Alberta, August 2019. **Runner-up of the University of Alberta Department of Computing Science Outstanding Master Thesis Award.**

TEACHING EXPERIENCES

Teaching Assistant, CMPUT 274 – Tangible Computing	Fall 2023
Teaching Assistant, CMPUT 275 – Tangible Computing II	Winter 2021
Teaching Assistant, CMPUT 379 – Operating System Concepts	Fall 2019, Winter 2020, Fall 2020
Teaching Assistant, CMPUT 272 – Formal Systems and Logic in Computing Science	Winter 2017
Teaching Assistant, CMPUT 366 – Intelligent Systems - Reinforcement Learning	Fall 2017
Peer Mentor, CMPUT 201 – Practical Programming Methodology	Fall 2015, Winter 2016
Peer Mentor, CMPUT 204 – Algorithms I	Fall 2015, Winter 2016
Peer Mentor, CMPUT 291 – Introduction to File and Database Management	Fall 2015, Winter 2016

EXTRA-CURRICULAR ACTIVITIES

Reviewer of ICML	Since 2025
Member of the Autodesk AI Lab	Since 2024
Reviewer of Energy and Buildings, Elsevier	Since 2023
Talent of the Alberta Machine Intelligence Institute (Amii)	Since 2022
Reviewer of Artificial Intelligence Review, Springer	Since 2022
Reviewer of Pervasive and Mobile Computing, Elsevier	Since 2019
Member of the Sustainable Computing Lab	2017 - 2024
Member of the Golden Key International Honor Society	Since 2015
Member of the University of Alberta ACM-ICPC Team	2015 - 2017
Member of the University of Alberta Programming Club	2014 - 2019

*Equal contribution