

TIANYU ZHANG

Athabasca Hall, Edmonton, Alberta, Canada, T6G 2E8
(+1)780-937-3465 ◊ tzhang6@ualberta.ca ◊ www.tianyuzhang.com

RESEARCH INTERESTS

Machine Learning, Sensor Networks, Internet of Things, Reinforcement Learning, Optimization

EDUCATION

- Ph. D.**, University of Alberta, Canada *September 2019 - Present*
Department of Computing Science *GPA: 4/4*
Advisor: Dr. Omid Ardakanian
- M. Sc.**, University of Alberta, Canada *September 2017 - August 2019*
Department of Computing Science *GPA: 4/4*
Thesis Title: Building Occupancy and Thermal Modelling in the Wild*
*Departmental Outstanding Master Thesis Award Runner Up
Advisor: Dr. Omid Ardakanian
- Hon. B. Sc.**, University of Alberta, Canada *September 2013 - June 2017*
Major in Computing Science *GPA: 3.8/4*

HONORS AND AWARDS

- NeurIPS ML4CO Competition Dual Task Runner-up *2021*
- University of Alberta Departmental Outstanding Master Thesis Award Runner-up *2020*
- University of Alberta Graduate Student Teaching Award *April 2020*
- University of Alberta Mary Louise Imrie Graduate Student Award *April 2019*
- North America ACM-ICPC Regional Contest Silver Medal *November 2017*
- University of Alberta Graduate School Full Stipend Admission *September 2017*
- 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 *November 2016*
- 7th place in the Alberta Collegiate Programming Contest *October 2016*
- North America ACM-ICPC Regional Contest Bronze Medal *November 2015*

PUBLICATIONS

- T. Zhang**, A.K. GS, M. Afshari, P. Musilek, M.E. Taylor, O. Ardakanian, "Diversity for Transfer in Learning-based Control of Buildings", Proceedings of the 4th International Workshop on Applied Machine Learning for Intelligent Energy Systems, to appear. ACM, 2022.
- T. Zhang**, A. Banitalebi-Dehkordi, Y. Zhang, "Deep Reinforcement Learning for Exact Combinatorial Optimization: Learning to Branch", Proceedings of the 26th International Conference on Pattern Recognition, to appear. IEEE, 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*, Vol.264. Elsevier, 2022. *Impact Factor: 6.33*

T. Zhang, G. Baasch, O. Ardakanian, R. Evins, “On the Joint Control of Multiple Building Systems with Reinforcement Learning”, *Proceedings of the Twelfth International Conference on Future Energy Systems*. ACM, 2021. *Acceptance Rate: 23%*

M. Hossain, **T. Zhang**, O. Ardakanian, “Identifying Grey-box Thermal Models with Bayesian Neural Networks”, *Energy and Buildings*, Vol.238. Elsevier, 2021. *Impact Factor: 6.33*

T. Zhang, O. Ardakanian, “COBS: COmprehensive Building Simulator”, *Proceedings of the seventh International Conference on Systems for Energy-Efficient Buildings, Cities, and Transportation*. ACM, 2020. *Best poster runner-up*

M. Hossain, **T. Zhang**, O. Ardakanian, “Evaluating the Feasibility of Reusing Well-Suited Thermal Models in the Residential Sector”, *Proceedings of the first International Workshop on Urban Building Energy Sensing, Controls, Big Data Analysis, and Visualization*. ACM, 2019.

T. Zhang, A. Zishan, O. Ardakanian, “ODToolkit: Extensible Toolkit for Building Occupancy Detection”, *Proceedings of the Tenth International Conference on Future Energy Systems*. ACM, 2019: 35-46. *Acceptance Rate: 24%*

T. Zhang, O. Ardakanian, “A Domain Adaptation Technique for Fine-Grained Occupancy Estimation in Commercial Buildings”, *Proceedings of the International Conference on Internet of Things Design and Implementation*. ACM, 2019: 148-159. *Acceptance Rate: 28%*

RESEARCH EXPERIENCES

Research Assistant, University of Alberta
Advisor: Dr. Omid Ardakanian

April 2018 - Present

- **Building joint control**: Investigated occupant-centric energy-efficient control policies in a simulated environment to minimize the total energy use and maintain human comfort.
- **Domain adaptation on occupancy estimation models**: Built a time-series occupancy estimation model and investigated the possibility of adapting the trained model to another similar environment to improve the estimation accuracy in the new environment.
- **ODToolkit**: Built an open-source platform for occupancy estimation.
GitHub Repository: <https://github.com/sustainable-computing/ODToolkit>
- **COBS**: Built an open-source simulation platform for building controls.
GitHub Repository: <https://github.com/sustainable-computing/COBS>

Associate Researcher, Huawei Technologies Canada Co., Ltd. *May 2021 - December 2021*

- **Combinatorial optimization**: Experimented with a reinforcement learning based variable selection policy for MILP problem branch-and-bound method.
- **Adversarial machine learning**: Designed a workflow for the user to evaluate the robustness of their machine learning classifier by finding the most effective attack model using neural architecture search.

OTHER SELECTED PROJECTS

Guitar Audio Recording Auto-transcription to Sheet Music

- We used LSTM, SVM, HMM and ANN to transcribe guitar audio to sheet music. The task of transcribing an audio file of a music recording difficult and time consuming for a human being. This is because there are various amounts of possible pitches that can be played simultaneously depending on the instrument being played.

Mathematical Modelling for Hardy-Weinberg Principle

- We built a mathematical model to validate the Hardy-Weinberg principle formally. Moreover, we used the Hardy-Weinberg Principle to track the gene frequency of the bird species. We examined the gene frequency of the lek during the mating season. Also, we determined the type of effect that the certain traits act on the genotype during the sexual selection.

Error Detection and Cleaning in Tables

- Huge collection of data could be found on the Web, and most of them are in the form of tables. However, errors in the tables must be identified and fixed before applying other applications. In this project, we extended the current state-of-art Auto-Detect error detection method to detect more errors in any tables.

Ground Delay Program Analysis

- We analyzed the Ground Delay Program (GDP) by using Association Rule mining algorithms and Piecewise Linear Regression. We used association rule to find out the relation between weather and GDP parameters. We also discussed the GDP's sensitivity to weather by applying regression on weather information. The result from Apriori and FP-Growth shows that the thunderstorm is the most effective to the GDP advisory duration.

COMPUTER SKILLS

Programming: C/C++, Python, Java, PHP, HTML, CSS, Kotlin, Matlab, R, EPL, Bash

Applications/Frameworks: GitHub, MySQL, Google Cloud, Django, EnergyPlus, SketchUp

Data Analysis: Excel, Pandas, Numpy, SPSS, SAS

Others: Algorithms, Machine learning models, Mathematical modelling

EXTRA-CURRICULAR ACTIVITIES

Member of the Sustainable Computing Lab *Since 2017*

Member of the Golden Key International Honor Society *Since 2015*

Member of the University of Alberta ACM-ICPC Team *Since 2015*

Member of the University of Alberta Programming Club *Since 2014*

TEACHING EXPERIENCES

Teaching Assistant, University of Alberta *September 2017 - Present*
CMPUT 275 - Tangible Computing *Winter 2021*
CMPUT 379 - Operating System Concepts *Fall 2019, Winter 2020, Fall 2020*
CMPUT 272 - Formal Systems and Logic in Computing Science *Winter 2017*
CMPUT 366 - Intelligent Systems *Fall 2017*
Peer Mentor, University of Alberta *September 2015 - August 2016*
CMPUT 201 - Practical Programming Methodology
CMPUT 204 - Algorithms I
CMPUT 291 - Introduction to File and Database Management

PROFESSIONAL TRAINING

Graduate Ethics Training Course *December 2017*
University of Alberta, Edmonton, Canada
Graduate Teaching and Learning Program *September 2017*
University of Alberta, Edmonton, Canada

LANGUAGES

Chinese (Mandarin): Native language
English: Professional working proficiency