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| CONTACTS | Email: shuocheng.zhang@mail.utoronto.ca | Phone: +1 604-767-8018 |
| EDUCATION | University of Toronto , Ontario, Canada 2017 - 2022 (expected) Bachelor of Applied Science in Civil Engineering, Minor in Artificial Intelligence Engineering Cumulative GPA: 3.95/4.00 | |
| PUBLICATIONS | Y. Zhao, H-N Li, X. Fu, S. Zhang , O. Mercan. <i>Seismic Analysis of a Large LNG Tank Considering the Effect of Liquid Volume</i> . Shock and Vibration (2020). https://doi.org/10.1155/2020/8889055 Y. Zhao, H-N Li, S. Zhang , O. Mercan, C. Zhang. <i>Seismic Analysis of a Large LNG Tank Considering Different Site Conditions</i> . Applied Sciences 10(22):8121 (2020). https://doi.org/10.3390/app10228121 | |
| ON-GOING WORK | <i>Effects of A Grid Baffle System on the Sloshing Potential and Seismic Response of a Cylindrical Tank: An Experimental and Numerical Study.</i> | |
| PRESENTATION | <i>Design of Nuclear Facilities for Aircraft Impact</i> . [Oral Presentation]. Women in Nuclear Global Conference, 2021. | |
| RESEARCH EXPERIENCE | Seismic Hazard Mitigation for Liquefied Natural Gas Storage Oct 2018 - Present <i>Supervised by Prof. Oya Mercan, U of T Center for Resilience of Critical Infrastructure</i> <ul style="list-style-type: none"> Modeled the liquid sloshing phenomenon in Abaqus and compared numerical results with shake-table experiments to validate the SPH-FEM methodology, presenting a new approach for simulating fluid-structure interaction under dynamic loading. Analyzed the seismic response of large LNG storage tanks using SPH-FEM to quantify the effect of unfavorable site conditions and high liquid levels, highlighting the need for structural optimization. Proposed a novel baffle configuration to improve the seismic performance of LNG tanks with structural stiffening and energy dissipation, reducing the maximum displacement by 50%. Automatic Core Logging using Core Imagery Apr 2021 - Present <i>Supervised by Prof. Sebastian Goodfellow, Senior thesis</i> <ul style="list-style-type: none"> Inspired by current inefficiencies in manual core logging work and proposed data-driven solutions to aid in decision making, speeding up the visual inspection process by five-fold. Implemented a Mask R-CNN model to detect lithology and facies from core photographs using instance segmentation, achieving a 90% accuracy compared to human geologists. Developed a deep learning model to calculate Rock Quality Designation (RQD) by classifying broken and intact rock from core images, revealing zones of rock weakness and informing geotechnical parameters such as settlement, bearing capacity and sliding potential. Collaborated with a mining engineering start-up to integrate my ML pipeline with their existing software and made real-world impact in the form of a commercial product. | |
| INDUSTRY EXPERIENCE | Terrestrial Energy Sept 2020 - Present <i>Civil Engineering Intern (full-time for 1-year, currently part-time)</i> <ul style="list-style-type: none"> Performed structural design and seismic analysis for an Integral Molten Salt Reactor (IMSR) power plant to meet qualification requirements and boost cost-competitiveness for deployment by 2028. Researched and developed methodologies to model aircraft impact on nuclear structures using a mass-spring-damper system and nonlinear time-history analysis, ensuring the protection of critical reactor components under external attacks. Created a Python application to automatically model and analyze hundreds of impact scenarios in SAP2000 with different aircraft type, impact location, and structural configurations, eliminating over 50 hours of manual work. Presented research findings at the 2021 Women in Nuclear Global Conference, informed other professionals of our methodology and raised awareness for critical infrastructure resilience. Arup July 2020 - Aug 2020 <i>Structural Engineering Intern</i> <ul style="list-style-type: none"> Proposed retrofitting methods to mitigate a crowd-induced floor deflection problem for Ohio State University by designing stiffeners and tuned-mass dampers, reducing floor acceleration by 70%. Added a wind/snow load module to a centralized C# platform that performs user-defined engineering calculations and creates formatted reports, replacing inconsistent and redundant Excel sheets and manual calculation packages with dynamically generated web APIs to save dozens of hours during each design cycle | |

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| | Rocscience May 2019 - Aug 2019 <i>Geotechnical Software Engineering Intern</i> <ul style="list-style-type: none"> Implemented a strain comparison approach to compute earthquake-induced settlement of dry sand through research, back-end and front-end development in C++, which led to a feature update that helped hundreds of geotechnical engineers worldwide understand the seismic risks in their projects. Implemented a stress reduction method to quantify the improvement in settlement for different ground improvement techniques, enabling an optimized and cost-effective design selection process. |
| | U of T Entrepreneurship Hatchery Sept 2018 - Feb 2019 <i>3D-Printing Assistant</i> <ul style="list-style-type: none"> Managed 3D-printing requests from over 50 start-ups and design teams by offering design advice, estimating cost, scheduling timeline, and performing print jobs to facilitate rapid prototyping. |
| PROJECT EXPERIENCE | ML-Based Predictive Maintenance Algorithm for HVAC Systems Sept 2021 - Present <i>Multi-disciplinary Capstone Project, Supervised by Prof. Markus Bussmann and Prof. Seungjae Lee</i> <ul style="list-style-type: none"> Identified a gap in the current service approach of a HVAC contractor which relies on manual maintenance calls and proposed an ML-driven approach using sensor data from VAV systems Implemented a Deep Regressor Chain model with sequentially connected LSTM regressors to perform long term time series prediction and identify anomalies, then dispatch service prior to failures to reduce system downtime by 95% |
| | Real Time Face Mask Detection using CNN May 2021 - Aug 2021 <i>Final Course Project for "Applied Fundamentals of Machine Learning"</i> <ul style="list-style-type: none"> Implemented a SSD-MobileNetV2 model to detect and classify mask types as well as whether masks are worn correctly, increasing the efficiency of COVID-19 compliance check by ten-fold Connected the ML model to a live webcam for real-time detection and launched an iOS mobile application with an intuitive user interface to observe real-world use cases |
| | Autobuilder May 2021 - Aug 2021 <i>In-house program developed for U of T Seismic Design Team</i> <ul style="list-style-type: none"> Developed a Python application to take in user-defined constraints such as member sizes and bracing schemes, create all design combinations, feed them into SAP2000 for analysis, and extract results to eliminate hundreds of hours of manual modelling work Created a Qt interface that displays design choices and structural configurations in 3D to remove technological barriers and allow students with no programming background to use the application |
| LEADERSHIP | Co-Captain, U of T Seismic Design Team April 2020 - April 2021 <i>Designing Vertical Expansion for Healthcare Facilities</i> <ul style="list-style-type: none"> Led a team of 20 engineering and architecture students to design and analyze a structural addition to a hospital building to inform the feasibility of COVID-19 capacity expansion Produced a final design that ranked 3/37 internationally at the 2021 Undergraduate Seismic Design Competition by balancing construction cost and seismic performance |
| | Technical Director, U of T Concrete Canoe Team May 2020 - May 2021 <i>Designing and Racing a Canoe Made of Concrete</i> <ul style="list-style-type: none"> Provided guidance for 15 team members in materials selection, hull design, and structural analysis Leveraged Python and MATLAB to optimize speed and maneuverability, achieving 2nd place at the 2021 Canadian National Concrete Canoe Competition |
| TECHNICAL SKILLS | <i>Programming Languages:</i> Python, C++, C#, MATLAB, HTML/CSS, JavaScript, Excel VBA <i>Frameworks & Libraries:</i> PyTorch, Tensorflow, Numpy, Panda, Scikit-learn, SQL, Qt, Flask <i>Structural Analysis:</i> SAP2000, ETABS, SAFE, S-Frame, GSA, Tedds, Abacus FEA, Mathcad <i>Modeling and Mark-up:</i> AutoCAD, Revit, SketchUp, Bluebeam Revu |
| AWARDS | U of T Dean's Merit Award \$10000 Class of 5T5 Civil Engineering Scholarship \$4100 Canadian Federation of University Women Bursary \$1000 |
| REFERENCES | Dr. Oya Mercan Associate Professor of Civil Engineering at University of Toronto oya.mercan@utoronto.ca Dr. Sebastian Goodfellow Assistant Professor of Civil Engineering at University of Toronto sebastian.goodfellow@utoronto.ca Dr. Dan Nourzadeh Civil/Structural Engineer at Terrestrial Energy dnourzadeh@terrestrialenergy.com |