**Pengyuan (Bill) Zhai**
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## EDUCATION

**2012-2016** **Tabor Academy** **Marion, MA**
- GPA: 4.0
- Leadership: Founder and CEO of BooksWillRoll Organization, Captain of Tabor Academy Varsity Cross-country Team, Mariposa DR Foundation Julia Alvarez Library Digital Management System Head.
- Member: Tabor Academy Varsity Sailing Team, Tabor Musical Cast, Tabor Jazz Band, Tabor Madrigal Singers

**2016-present** **University of California—Berkeley, College of Engineering** **Berkeley, CA**
- Double Major**:** Civil and Environmental Engineering (CEE), Industrial Engineering & Operations Research (IEOR)
- Minor: Electrical Engineering and Computer Science (EECS)

## ACADEMIC RESEARCH SUMMARY

**Semi-supervised DCGAN in Structural Damage Detection**

**Spring, 2019-present** ***Structural Health Monitoring through Semi-supervised GAN , Prof. Khalid M. Mosalam***
**Department of Civil and Environmental Engineering, UC Berkeley**
**Pacific Earthquake Engineering Research Center**

- Designed the Balanced Semisupervised Generative Adversarial Network (BSS-GAN) for structural damage assessment under under low-data and imbalanced-class regime. Paper: https://drive.google.com/a/berkeley.edu/file/d/1D9Ik5bCnFtiCEL4dwB8_mHZ-sq9Mgi3N/view?usp=sharing
- Compared performance between BSS-GAN and GAN-based augmentation pipeline in spalling detection setting.

**Urban-scale Energy Simulation and Analysis**

**Summer, 2019-present** ***Urban-scale Building Energy Optimization, Dr. Tianzhen Hong***
**Lawrence Berkeley National Laboratory**
- Designed an optimization engine for CBES (Commercial Building Energy Saver, https://citybes.lbl.gov) to find the optimal building energy conservation measures (ECMs), given energy performance and financial savings constraints.
- Developed building energy benchmark datasets that cover more than 2 million building in NYC, LA, Chicago and Fresno.
- Optimized data joining efficiency between geospatial multi-polygon footprints and building benchmark attributes through the R-tree algorithm.

**Computational Structural Analysis and Optimization**

**Fall, 2018-present** ***FEDEASLab, Prof. Filip C. Filippou*** **Department of Civil and Environmental Engineering, UC Berkeley**

- Developed cross-platform version of the computational structural analysis software FEDEASLab (Matlab Finite Elements for Design, Evaluation and Analysis of Structures)—FEDEASWeb (http://fedeaslab-env-1.n6uigqqscz.us-east-2.elasticbeanstalk.com), a web-based application that analyzes structural response under complicated discrete or continuous static loading.
- Currently investigating plastic analysis algorithms and structural optimization algorithms. Plastic structural analysis with the Simplex Algorithm: https://docs.google.com/document/d/1BvAWrmHG07LFLH6yV4N_WDlg5rA809DkzrRmr6KDKgA/edit?usp=sharing

**Machine Learning and Data Modeling**

**Summer, 2018** ***Breathing Facade Project, Prof. Hayden Taylor*** **Department of Mechanical Engineering, UC Berkeley**
- Processed environmental time series sensor data from Punggol Elementary School, Singapore, and created a machine learning model through random forest regression method to discover data patterns.
- Predicted the fluctuation of environmental parameters (temperature, humidity, CO2 concentration, etc) for mechanical response of the Breathing Facade air conditioning units.

## TECHNICAL SKILLS

**System Modeling and Optimization**
- Specialize in designing efficient algorithms (Dantzig-Wolfe Decomposition with Subgradient Method, Bender's Decomposition) to solve linear/non-linear programming problems, mixed integer programming problems, graph optimization, and network flow problems on multiple platforms including Python, Julia, AMPL and Matlab.
- Perform basic financial/economic system analysis to optimize business operations.

**Website & database programming**
- Conventional and Progressive Web Application Development. Frontend, server and database design with tools such as React.js, Java Servlet, Firebase, and MySQL.

**Structural Design and Analysis**
- Steel and reinforced concrete structural design through LRFD.
- Proficient in structural analysis and design softwares such as OpenSees, SAP2000, Revit and Ansys.
- Computational structural analysis and optimization.

**Entrepreneurship**

**2019-present** **Co-founder, Pack** **Berkeley, CA**
- Co-founded Pack, a mobile application that helps college students to gather walk around campus at night more safely.
- Currently designing and implementing algorithms that increase scheduling and route-planning efficiency.

**2013** ***CEO*****, BooksWillRoll Organization** **Marion, MA**
- Founded BooksWillRoll Organization, a non-profit textbook exchange solution provider.
- Created BooksWillRoll™ Network, a web-based book exchange platform.