

# Xiaorui Xue

Ph.D. candidate

## Address and Contact

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## Education Background

**Ph.D., Construction Management Technology** 2019 - present

Purdue University, Main Advisor: Jiansong Zhang  
Polytechnic Institute

**Master's, Civil Engineering** 2017 - 2019

Purdue University  
Lyles School of Civil Engineering

**Bachelor's, Civil Engineering** 2013 - 2017

Purdue University  
Lyles School of Civil Engineering

## Teaching Experience

CM 200 Intermediate Pre-Construction Management 2019 - present

Prepare question sheets for lab  
Prepare questions for exam  
Lead lab section  
Oversee exams  
Grade laboratory exercises and exams  
Manage electronic class management system (BrightSpace, Blackboard, and Gradescope)

## Journal Publications

**Xue, X.**, and Zhang, J. (2020). "Building codes Part-of-Speech tagging performance improvement by error-driven transformational rules." *Journal of Computing in Civil Engineering.*, 34(5), 04020035.

Xue, X., and Zhang, J. (2020). "Erratum for 'Building codes Part-of-Speech tagging performance improvement by error-driven transformational rules.'" *Journal of Computing in Civil Engineering.*, 35(1), 08220002.

**Xue, X.**, and Zhang, J. (2020). "Regulatory Information Transformation Ruleset Expansion to Support Automated Building Code Compliance Checking." *Automation in Construction.*, Under Review.

**Xue, X.**, Wu, J., and Zhang, J. (2021). "Semi-Automated Generation of Logic Rules for Tabular Information in Building Codes to Support Automated Code Compliance Checking." *Journal of Computing in Civil Engineering.*, accepted.

**Xue, X.**, and Zhang, J. (2021). "Part-of-speech tagging of building codes empowered by deep learning and transformational rules." *Advanced Engineering Informatics.*, 47(January 2021), 101235.

- Xue, X.**, and Zhang, J. (2021). “Rule-based Extraction and Visualization of Cross References in Building Codes.” *Advanced Engineering Informatics.*, Under Review
- Jin, W., **Xue, X.**, and Zhang, J. (2021). “Invariant Signature, Logic Reasoning, and Semantic Natural Language Processing (NLP)-Based Automated Building Code Compliance Checking (I- SNACC) Framework.” *Journal of Information Technology in Construction.*, Under Review

### **Papers in Preparation**

- Xue, X.**, and Zhang, J. (2021). “Automated Identification of Subject of Compliance of Building Code by Language Model.” In Preparation
- Xue, X.**, and Zhang, J. (2021). “Automated Sequence-to-Sequence Transformation of Building Codes to Logic clauses via Deep Learning.” In Preparation

### **Conference Publications**

- Xue, X.**, and Zhang, J. (2020). “Evaluation of Seven Part-of-Speech Taggers in Tagging Building Codes: Identifying the Best Performing Tagger and Common Sources Oa Errors.” Proc., ASCE Construction Research Congress, ASCE, Reston, VA, 498-507.
- Xue, X.**, Zhang, J., and El-Gohary, N. (2021). “Interactive Visual Representation of Inter-Connected Requirements in Building Codes” Proc., ASCE Construction Research Congress, ASCE, Reston, VA, Under Review.
- Li, H., Zhang, J., **Xue, X.**, Debs, L., Chang, S., Qu, M., Sparkling, L., Goldwasser, D., (2021). “Issues in Bi-directional Interoperability between BIM and BEM.” Proc., ASCE Construction Research Congress, ASCE, Reston, VA, Under Review

### **Datasets**

- Xue, X.**, Zhang, J. (2019). Part-of-Speech Tagged Building Codes (PTBC). Purdue University Research Repository. doi:10.4231/Y0ZQ-4946
- Xue, X.**, Zhang, J. (2019). Part-of-Speech Tagged Building Codes (PTBC). Purdue University Research Repository. In Prepare.

### **Presentations and Poster Sessions**

Oral presentation in the parallel track sessions within the CRC 2020 conference program of “Evaluation of Seven Part-of-Speech Taggers in Tagging Building Codes: Identifying the Best Performing Tagger and Common Sources of Errors”. Tempe, Arizona. 2020

Poster presentation within the CRC 2020 conference program of “Evaluation of Seven Part-of-Speech Taggers in Tagging Building Codes: Identifying the Best Performing Tagger and Common Sources of Errors”. Tempe, Arizona. 2020

Oral presentation in the parallel track sessions within the i3CE 2021 conference program of “A Robotic System Method and Rebar Construction with Off-the-Shelf Robots”. Orlando, Florida. 2021

## **Project Participation**

**PFI-RP: Automating Building Code Compliance Checking and Modular Construction Through Interoperable Building Information Modeling Technology (Award Number: 1827733)**

2019 - present

- Collected POS tagging result of POS taggers for general English on building codes
- Developed ruleset expansion method to expand range of checkable building code requirements of ACC systems
- Developed a method to extract and interactively visualize hierarchical and cross-reference structure

**Convergence Accelerator Phase I (RAISE): Civil Infrastructure Systems Open Knowledge Network (CIS-OKN) (Award Number: 1937115)**

2020

- Collected data of civil infrastructure assessments from State Department of Transportations (DOTs)
- Collected data for the generation of a construction domain ontology

## **Proposal Preparation**

**A proposal about BIM of road systems to a state DOT (Pending)**

- Literature review
- Prepared proposal document

**A proposal about network-level energy and traffic optimization to NSF (Pending)**

- Literature review
- Prepared the proposal document
- Preliminary data collection
- Primary result generation

## **Research Highlights**

Doctoral Researcher

2019 -

Construction Management Technology, Polytechnic Institute, Purdue University

**PFI-RP: Automating Building Code Compliance Checking and Modular Construction Through Interoperable Building Information Modeling Technology (Award Number: 1827733)**

- Investigated Part-of-Speech (POS) tagging of building codes using Natural Language Processing (NLP) techniques
- Collected POS tagging results of different POS taggers and human annotators on building codes
- Created a database of POS-tagged building codes, called Part-of-Speech Tagged Building Codes Dataset (PTBC)
- Resolved the problem that POS taggers that were developed on general English have under-desired performance on building codes by developing a technique called error-driven transformational rule
- Adapted deep learning models and combined them with error-driven transformational rule to develop a POS tagger that is tailored for building codes

Expanded range of checkable building codes of automated code compliance checking system with minimal marginal effort by adding new rules to existing ruleset  
Implemented a rule-based method to extract cross-references and hierarchical structure in building

### **Entrepreneurship Training**

The Firestarter cohort by Purdue Foundry	2019
Bring Your Technology to Market by Purdue's NSF I-Corps™ program	2021

### **Leadership and Service**

Served in ASCE DSA committee meeting, distributed meeting material, recorded meeting progress and collected voting results  
Peer-review of two journal papers for Advanced Engineering Informatic  
Peer-review of two conference papers for CRC 2022

### **Research interest**

Automated Code Compliance Checking, Virtual Reality, Deep Learning, Natural Language Processing, Building Information Modeling, Construction Management, Artificial Intelligence, Green Building, Sustainable Construction.

### **Memberships**

Student member of American Society of Civil Engineers  
American Society of Civil Engineers Data Sensing and Analysis Committee  
American Society of Civil Engineers Visualization, Information Modeling and Simulation Committee

### **Skills**

Python Programming, Deep Learning, Natural Language Processing, Microsoft Office, Electronic Class Management System (Blackboard, BrightSpace, Gradescope)