

# Jessica Boakye

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## Education

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### **Ph.D. in Civil Engineering**

*University of Illinois, Urbana – Champaign*

Dissertation topic: Measuring the Societal Risk of Natural Hazards

Ph.D. Advisor: Dr. Paolo Gardoni

Defense: August 4, 2020  
(Fall 2020)

### **M.Sc. in Civil Engineering**

*University of Illinois, Urbana - Champaign*

Concentration: Structural Engineering

(Spring 2016)

### **B.Sc. in Civil Engineering**

*University of Massachusetts, Amherst*

Minor: Engineering Management

(Spring 2014)

### **Commonwealth Honors College Member**

Honors Thesis: Seismic Design and Response Assessment of Skewed Bridges

Honors Thesis Advisor: Dr. Behrouz Shafei

## Publications

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### **Refereed Journal Articles**

- [1] **Boakye, J.**, Gardoni, P., and Murphy, C., (2019), “*Using Opportunities in Big Data Analytics to Enhance Predictive Models of Societal Well-Being in the Aftermath of a Natural Disaster*”, *Civil Engineering and Environmental Systems* pp 100-114.

### **Book Chapters**

- [1] **Boakye, J.**, Murphy, C., and Gardoni, P., (2018), “*Resilience and Sustainability Goals for Communities and Quantification Metrics*.” In *Handbook of Sustainable and Resilient Infrastructure*, edited by P. Gardoni. pp 50-69. Routledge.

- [2] Nocera, F., Tabandeh, A., Guidotti, R., **Boakye, J.**, and Gardoni, P. (2018), “*Physics-based Fragility Functions: Their Mathematical Formulation and Use in the Reliability and Resilience Analysis of Transportation Infrastructure*.” In *Handbook of Sustainable and Resilient Infrastructure*, edited by P. Gardoni. pp 237-258. Routledge.

## Conference Proceedings

[1] Boakye, J., Muench, E., & Shafei, B. (2015), “*Vulnerability Assessment of Skewed Bridges under Earthquake Loads*”, Transportation Research Board 94<sup>th</sup> Annual Meeting, January 11-15, Washington, D.C. (conference proceeding)

## Other Publications

[1] Boakye, J. (2014), “*Seismic Design and Response Assessment of Skewed Bridges*”, Honors College Dissertation, University of Massachusetts, Amherst

[2] Boakye, J. (2013), “*Analysis of Shear Strength in the End Panels of Bridge Girders*”, REU Final Report, Network for Earthquake Engineering Simulation (available online at NEEShub)

[3] Boakye, J. (2013), “*Analysis of Shear Strength in the End Panels of Bridge Girders*”, Poster Presentation at Quake Summit, August 5-8, Reno, NV (available online).

## Awards & Recognitions

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### **Coastlines and People (CoPe) Scoping Workshop** (2018)

Selected to attend an NSF-funded scoping workshop on coastlines and people

### **International Forum on Engineering and Decision Making (IFED)** (2018)

Invited to submit an extended version IFED paper for possible fast track publication in a special IFED edition of Civil Engineering and Environmental Systems (CEES)

### **Support for Under – Represented Groups in Engineering (SURGE) Fellowship** (2018)

A program to support minority students seeking doctoral degrees in engineering at the University of Illinois at Champaign - Urbana

### **Graduate College Fellowship** (2015-2017)

Awarded from the University of Illinois at Urbana-Champaign in recognition of academic achievement

### **Roy J. Carver Fellowship** (2014)

A highly competitive fellowship program for first-year engineering graduate students at the University of Illinois at Urbana-Champaign

### **21st Century Leaders Award** (2014)

A campus-wide recognition for graduating seniors who displayed high academic performance and enriched the campus community displaying leadership skills and bringing honor to the University of Massachusetts Amherst during their undergraduate degree

### **ASCE New Faces of Civil Engineering - College Edition** (2013)

One of ten undergraduate students chosen nationwide by the American Society of Civil Engineers (ASCE) for academic and extracurricular achievements demonstrating promises as future leaders in the civil engineering profession

**Rising Researcher** (2013)

A campus-wide recognition for four undergraduate students of University of Massachusetts (UMass) Amherst who made an exceptional progress in research, scholarship, and creative activities

**NSF-Funded REU** (2013)

A competitive NSF-funded Research Experience for Undergraduates (REU) position at Network for Earthquake Engineering Simulation (NEES) facilities in University of California, San Diego

**John and Abigail Adams Scholarship** (2010-2014)

A four-year scholarship presented to high-school students with an outstanding performance on the Massachusetts Comprehensive Assessment System (MCAS)

***Web Recognitions***

- Featured on the homepage of UMass Amherst
- Featured in the UMass College of Engineering - Points of Pride magazine
- Featured on the UMass College of Engineering website
- Featured on the UMass Civil and Environmental Engineering website
- Featured on the ASCE website

**Research Experience**

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**Modeling the Societal Impacts of Natural Hazards** (2016-present)  
*University of Illinois, Urbana - Champaign*

This research is being conducted as a doctoral thesis. A conceptual framework is being developed to measure the societal risk natural hazards pose to society. The capability approach, used in resource economics and by the United Nations, is being used to quantify the societal consequences of natural hazards by coupling physical damage to infrastructure systems with social vulnerability factors. Physical damage to structural systems such as bridges and buildings during hazardous events is estimated using physics-based fragility curves. High resolution probabilistic predictive models for social vulnerability factors are developed using machine learning techniques and incorporate information from big data. Physical damage and social vulnerability factors are then used to create prediction models for indicators of societal impact.

**Seismic Design and Response Assessment of Skewed Bridges** (2012-2014)  
*University of Massachusetts, Amherst*

This research was conducted as an Honors Thesis and focused on measuring the effects of skew angles on the seismic response of highway bridges. The bridges were reinforced concrete and both seat-type and integral abutments were studied. The effects of gap and soil-structure

interaction were also investigated. The vulnerability of bridges was quantified using appropriate seismic fragility curves.

**Shear Strength and Post-Buckling Response of Steel Plate Girders** (Summer 2013)  
*University of California, San Diego*

Through this NSF-funded REU position, the shear strength of steel plate girders was evaluated. This research was aimed at quantifying the post-buckling strength due to tension field actions. I was involved in the model tests conducted in the Powell Lab in addition to the finite element analyses of models using ABAQUS.

**Computational Structural Simulation Research Group** (2012-2013)  
*University of Massachusetts, Amherst*

A research group of ten undergraduate students worked on introductory finite-element analysis using SAP2000. This effort included a range of structures starting from simple 2D components to complex 3D systems. Various design strategies and analysis methods were discussed.

## Teaching Experience

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**Graduate Teaching Assistant** (Fall 2019)  
*University of Illinois, Urbana - Champaign*

Tasks included holding weekly office hours, creating a SAP 2000 tutorial, and grading material for undergraduate structural analysis (CEE 360).

**Graduate advisor for REU** (Spring 2020)  
*University of Illinois, Urbana - Champaign*

Supervised an undergraduate researcher on a semester long project to fit a regression model for household income

**Graduate advisor for REU** (Spring 2018)  
*University of Illinois, Urbana - Champaign*

Supervised an undergraduate researcher on a semester long project to gather and visualize census data in GIS and analyze bridge plans to find relevant material properties to be used in a fragility analysis.

## Internships

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**MassDOT Construction Contracts** (Summer 2012)

Work included reviewing plans, estimates, special provisions, and environmental documents for both federal and non-federal construction projects.

**MassDOT Construction** (Summer 2011)

Work was done alongside a resident engineer and general construction inspector to oversee a bridge reconstruction project in Needham, MA. Weekly safety inspections and construction meetings were

catalogued along with daily logs on site production. Concrete pours and temporary/permanent sheet piling operations were also observed.

### Professional Affiliations & Memberships

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International Society of Catastrophe Managers  
American Society of Civil Engineers  
American Concrete Institute  
American Institute of Steel

### Computer Skills

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GIS, R, Matlab, Python, SAP2000, Abaqus, CSiBridge, AutoCAD, Microsoft Office, and Visual Basic