

# Jessica Boakye | PhD

UMass Amherst – USA

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## Education

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### University of Illinois at Urbana-Champaign (UIUC)

*PhD in Civil Engineering, Societal Risk and Hazard Mitigation*

*May 2016–Dec 2020*

### University of Illinois at Urbana-Champaign (UIUC)

*MSc in Civil Engineering, Structures*

*Aug 2014–May 2016*

### University of Massachusetts at Amherst (UMass Amherst)

*BS in Civil Engineering, Engineering Management Minor  
Commonwealth Honors College*

*Sep 2010–May 2014*

## Professional Experience

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### University of Massachusetts at Amherst

*Lecturer*

*Aug 2020–Present*

- Taught Risk Analysis (CEE 597RA) for Spring 2021 semester
- Taught Structural Analysis (CEE 331) for Fall 2021 semester

### University of Illinois at Urbana-Champaign

*Graduate Research Assistant, supervised by Paolo Gardoni*

*May 2016–Aug 2020*

- Completed PhD on "Modeling the Societal Impact of Natural Hazards. A conceptual framework was developed to measure the societal risk natural hazards pose to society. The capability approach, used in resource economics and by the United Nations, was 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 were estimated using physics-based fragility curves. High resolution predictive models for social vulnerability factors were developed using machine learning techniques.

### University of Illinois at Urbana-Champaign

*Graduate Teaching Assistant*

*Aug 2019–Dec 2019*

- Held weekly office hours, created a SAP 2000 tutorial, and graded material for undergraduate structural analysis (CEE 360).

### University of Illinois at Urbana-Champaign

*Graduate Advisor for REU student*

*Jan 2020–May 2020*

- Supervised an undergraduate researcher on a semester long project to explore regression techniques for social vulnerability factors.

### University of Illinois at Urbana-Champaign

*Graduate Advisor for REU student*

*Jan 2018–May 2018*

- 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.

### **University of Massachusetts at Amherst**

*Undergraduate Researcher, supervised by Behrouz Shafei*

*Sept 2012–May 2014*

- o Completed an honors thesis on "Seismic Design and Response of Skewed 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.
- o Participated in 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.

## **Internships**

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### **University of California, San Diego**

*REU Student*

*Jun 2013–Aug 2013*

- o Through this NSF-funded REU position, the shear strength of steel plate girders was evaluated under the supervision of Chia-Ming Uang. This research was aimed at quantifying the post-buckling strength due to tension field actions. Model tests were conducted in the Powell Lab and finite element analyses was conducted using ABAQUS.

### **Massachusetts Department of Transportation (MassDOT)**

*Student Intern*

*Jun 2012–Aug 2012*

- o Work included reviewing plans, estimates, special provisions, and environmental documents for both federal and non-federal construction projects in the Construction Contracts division of MassDOT.

### **Massachusetts Department of Transportation (MassDOT)**

*Student Intern*

*Jun 2011–Aug 2011*

- o 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.

## **Honors and Awards**

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Travel Grant

*New Energy Summit sponsored by the Arthur L. Irving Institute*

2022

Travel Grant

*NHERI Summer Institute for Early-Career Faculty*

2022

TIDE Ambassadors Fellowship Recipient

*University of Massachusetts at Amherst*

2021–2022

Full tuition waiver

*University of Illinois at Urbana-Champaign*

2016–2020

Travel Grant <i>Society for Risk Analysis</i>	2019
Support for Under – Represented Groups in Engineering (SURGE) Fellowship <i>University of Illinois at Urbana-Champaign</i>	2018
Graduate College Fellowship <i>University of Illinois at Urbana-Champaign</i>	2015–2017
Roy J. Carver Fellowship <i>University of Illinois at Urbana-Champaign</i>	2014
21st Century Leaders Award <i>University of Massachusetts at Amherst</i>	2014
ASCE New Faces of Civil Engineering - College Edition <i>American Society of Civil Engineers</i>	2013
Rising Researcher <i>University of Massachusetts at Amherst</i>	2013
John and Abigail Adams Scholarship <i>University of Massachusetts at Amherst</i>	2010-2014

## Leadership Experience

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<b>Environmental Justice and Equity Human Health Risk Assessment and Modeling Workshop</b> <i>Member of workshop organizing committee</i>	2021
<b>UMass Amherst Diversity, Equity, and Inclusion Committee</b> <i>Member</i>	2020–Present
<b>UIUC CEE Graduate Student Advisory Council</b> <i>SRHM Chair</i>	2019–2020

## Invited Talks

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<b>Advancing Energy Justice: Tools for Justice40 and Equitable Deep Decarbonization</b> <i>Panelist</i>	2022
<b>Rensselaer Polytechnic Institute</b> <i>Seminar Speaker, Joint CEE and ISE Seminar</i>	2021
<b>Society for Risk Analysis</b> <i>Plenary Speaker, 40 Years of Risk Analysis</i> *Selected from a group of peers to represent the Students and Young Professionals	2020

## Conference Presentations

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<b>Engineering Mechanics Institute</b> <i>Integrating Big Data Analytics into Predictive Models for Socioeconomic Characteristics</i>	2021
<b>Society for Risk Analysis Annual Meeting</b> <i>Quantification metrics for resilience and equity</i>	2020

## Joint International Resilience Conference 2020

*Integrating Big Data Analytics into Predictive Models for Socioeconomic Factors* 2020

## Society for Risk Analysis Annual Meeting

*Integrating Big Data Analytics into Predictive Models for the Societal Impact of Natural Hazards* 2019

## International Forum on Engineering Decisions

*Using Opportunities in Big Data Analytics to Enhance Predictive Models of Societal Well-Being in the Aftermath of a Natural Hazard* 2018

## Refereed Journal Papers

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Xu, Y., Kohtz, S., **Boakye, J.**, Gardoni, P., Wang, P., (2022). "Physics-Informed Machine Learning for Reliability and Systems Safety Applications: State of the Art and Challenges". In: *Reliability Engineering & System Safety* (Under Review).

**Boakye, J.**, Murphy, C., Gardoni, P., Kumar, R., (2022). "Which consequences matter in risk analysis and disaster assessment?" In: *International Journal of Disaster Risk Reduction* 71.

**Boakye, J.**, Guidotti, R., Gardoni, P., Murphy, C., (2022). "The role of transportation infrastructure on the impact of natural hazards on communities". In: *Reliability Engineering & System Safety* 219.

**Boakye, J.**, Gardoni, P., Murphy, C., (2019). "Using opportunities in big data analytics to more accurately predict societal consequences of natural disasters". In: *Civil Engineering and Environmental Systems* 36.1, pp. 100–114.

## Book Chapters

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**Boakye, J.**, Murphy, C., Gardoni, P., (2018). "Resilience and sustainability goals for communities and quantification metrics". In: *Routledge Handbook of Sustainable and Resilient Infrastructure*. Ed. by Paolo Gardoni. Routledge New York. Chap. 4, pp. 50–69.

Nocera, F., Tabandeh, A., Guidotti, R., **Boakye, J.**, Gardoni, P., (2018). "Physics-based fragility functions: Their mathematical formulation and use in the reliability and resilience analysis of transportation infrastructure". In: *Routledge handbook of sustainable and resilient infrastructure*. Routledge, pp. 239–262.

## Conference Proceedings

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**Boakye, J.**, Muench, E., Shafei, B., (2015). "Vulnerability Assessment of Highly Skewed Bridges Under Seismic Excitations". In: *Transportation Research Board*.

## Funded Projects

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### Revised Load Rating Procedures for Deteriorated Prestressed Concrete Beams

PI: S. Breña, co-PIs: S. Gerasimidis, S. Civjan, **J. Boakye** 2021  
Massachusetts Department of Transportation (MassDOT), \$199,210

## Research Advising

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### Masters Students

*current*

- Scott Shorrock, Bridge Deterioration and Social Vulnerability, *Primary Supervisor*

### Masters Students

*completed*

- Asako Takeuchi (2021), Parametric Study of Integral Abutment Bridge Using Finite Element Model, *Dissertation Committee Member*

## Knowledge Area

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**Computer Languages:** MATLAB, Python, R, L<sup>A</sup>T<sub>E</sub>X

**Proficient Software:** Microsoft Office, GIS, SAP2000, ABAQUS