

# Jaspreet Bhatia

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## EDUCATION

### 8/2014 – 4/2019 (Expected) Carnegie Mellon University, Pittsburgh, PA, USA

- Doctor of Philosophy, Software Engineering. Advisor: Prof. Travis Breaux
- Software engineering, requirements engineering, privacy, natural language processing, user studies, statistical data analysis, empirical research, applied deep learning, crowdsourcing

### 7/2011 – 8/2013 Indian Institute of Technology, Delhi, India

- Master of Science (Research), Computer Science. GPA= 8.71/10, Advisor: Prof. K.K. Biswas
- Ambiguity Detection in Natural Language Requirements Specifications

### 7/2007 – 5/2011 Indira Gandhi Institute of Technology, Delhi, India

- Bachelor of Technology, Computer Science. GPA= 83.28%, Advisor: Prof. Kalpana Yadav
- Open Source Software Reliability, Awarded best undergraduate research project

## EXPERIENCE

### Carnegie Mellon University

PA, USA

#### Graduate Research Assistant – Institute for Software Research, School of Computer Science

8/2014 – Present

- Automated extraction and analysis of privacy requirements from privacy policies using deep learning, crowdsourcing, natural language processing, and machine learning.
- Understanding and measuring perceived privacy risk by conducting user studies.

### Target Corporation

#### Minneapolis, Minnesota

#### Data Science Intern – EDABI Team

06/2018 – 8/2018

- Designed and implemented a validation framework and deep learning model to predict future Target sales.

### Indian Institute of Technology – Delhi

Delhi, India

#### Researcher – Software Engineering Group

7/2013 – 7/2014

- Automated identification of Business Rules in requirements documents using Machine Learning (ML) algorithms.
- Automated conversion of natural language requirements into logical form and UML diagrams – using an intermediate structured representation developed as part of my MS research.

### Tata Research Development and Design Centre

Pune, India

#### Research Intern – Software Engineering Lab

12/2012 – 1/2013

- Manual Analysis of real time industry requirements documents to identify the underlying issues.
- Evaluation of my ambiguity detection approach and requirements structuring approach (developed as part of my MS studies) on documents from the industry.

## PhD Research

### Identify Semantic Roles in Privacy Policies using Deep Learning

Advisor: Prof. Travis Breaux (Carnegie Mellon University)

- Developing a deep learning framework to identify semantics of data practices in privacy policies.
- Building an annotated corpus of privacy policies and implementing deep neural network architecture to identify semantic roles associated with data practices.
- Measure the effect of ambiguity in context on privacy risk by conducting user studies.

### Empirical Measurement of Perceived Privacy Risk.

Advisor: Prof. Travis Breaux (Carnegie Mellon University)

- Developed an empirically validated framework to measure perceived privacy risk.

- Tech-Transfer to Pacific Northwest National Laboratory (PNLL) on behalf of the National Security Agency (NSA) to protect personal privacy when sharing data to defend against cyber attacks
- Evaluated the framework for factors which affect the perceived privacy risk experienced by the user, such as – risk likelihood, data types, privacy harms, data purposes, and demographic factors such as age, education level, and ethnicity among others.
- Framework to benefit developers by helping them design systems that consider user privacy; regulators and privacy policy authors by helping them identify high and moderate risk data practices; and can be used to support the standardization of tools such as Privacy Impact Assessment.

#### **Automated Extraction of Requirements from Privacy Policies.**

Advisor: Prof. Travis Breaux (Carnegie Mellon University)

- Automated the extraction of requirements from website privacy policies using crowdsourcing, grounded analysis, natural language processing and machine learning techniques.
- Understanding and measuring the user’s perception about privacy and their interpretation of natural language in privacy policies by conducting empirical studies.

#### **Automated Detection and Measurement of Vagueness and Elasticity in Privacy Policies.**

Advisors: Prof. Travis Breaux (Carnegie Mellon University) and Prof. Joel Reidenberg (Fordham University)

- Identification and measurement of vagueness and elasticity in website privacy policy text using grounded analysis, user studies and natural language processing.

### **PUBLICATIONS**

#### **Journal Publications**

- Jaspreet Bhatia, Morgan Evans, Travis D. Breaux, "Semantic Incompleteness in Privacy Policy Goals." Invited paper: Springer Requirements Engineering Journal.
- Jaspreet Bhatia, Travis D. Breaux, "Empirical Framework for Understanding and Measuring Perceived Privacy Risk." Accepted to: ACM Transactions on Computer-Human Interaction, *Journal First paper*.
- Jaspreet Bhatia, Travis D. Breaux, Florian Schaub. "Privacy Goal Mining through Hybridized Task Re-composition" ACM Transactions on Software Engineering Methodology (TOSEM), 25(3): Article 22, 2016, *Journal First paper*.
- J.R. Reidenberg, J. Bhatia, T.D. Breaux, T.B. Norton, "Automated Comparisons of Ambiguity in Privacy Policies and the Impact of Regulation", Journal of Legal Studies, 45, 2, part 2, Mar 2016. (**Honorable Mention for Privacy Papers for Policymakers**)

#### **Conference Proceedings**

- Jaspreet Bhatia and Travis D. Breaux, "Semantic Incompleteness in Privacy Policy Goals." **Distinguished Paper Award**, 26th IEEE International Requirements Engineering Conference (RE'18), Banff, Canada, 2018.
- M. C. Evans, J. Bhatia, S. Wadkar, T. D. Breaux, "An Evaluation of Constituency-based Hyponymy Extraction from Privacy Policies." 25th IEEE International Requirements Engineering Conference (RE'17), Lisbon, Portugal, 2017.
- Jaspreet Bhatia, Travis D. Breaux, "A Data Purpose Case Study of Privacy Policies." Accepted to: RE@Next! track at 25th IEEE International Requirements Engineering Conference (RE'17), Lisbon, Portugal, 2017.
- J. Bhatia, T.D. Breaux, J.R. Reidenberg, T.B. Norton. "A Theory of Vagueness and Privacy Risk Perception." *Nominated for best paper award*. IEEE 24<sup>th</sup> International Requirements Engineering Conference (RE'16), Beijing, China, 2016.
- R. Slavin, X. Wang, M.B. Hosseini, J. Hester, R. Krishnan, J. Bhatia, T. D. Breaux, J. Niu. "PVDetector: A Detector of Privacy-Policy Violations for Android Apps." IEEE/ACM International Conference on Mobile Software Engineering and Systems (MOBILESoft), Austin, TX, 2016.
- R. Slavin, X. Wang, M.B. Hosseini, W. Hester, R. Krishnan, J. Bhatia, T.D. Breaux, J. Niu. "Toward a Framework for Detecting Privacy Policy Violation in Android Application Code," ACM/IEEE 38th International Software Engineering Conference (ICSE'16), Austin, Texas, 2016.
- Joel Reidenberg, Jaspreet Bhatia, Travis Breaux, "Automated Recognition of Privacy Policy Ambiguity", 8th Annual Privacy Law Scholars Conference, June 4-5, 2015.
- Richa Sharma, Jaspreet Bhatia, KK Biswas, "Automated Identification of Business Rules in Requirements Documents", Fourth International Advanced Computing Conference (IACC 2014), India.

#### **Workshop Proceedings**

- Daniel M Best, Jaspreet Bhatia, Elena S Peterson, Travis D Breaux. "Improved cyber threat indicator sharing by scoring privacy risk." IEEE International Symposium on Technologies for Homeland Security (HST), 2017.

- J. Bhatia, T. D. Breaux, L. Friedberg, H. Hibshi, D. Smullen, "Privacy Risk in Cybersecurity Information Sharing", 3rd ACM Workshop on Information Sharing and Collaborative Security, 2016.
- Jaspreet Bhatia, Morgan Evans, Sudarshan Wadkar, Travis D. Breaux "Automated Extraction of Regulated Information Types using Hyponymy Relations" IEEE 3rd International Workshop on Artificial Intelligence for Requirements Engineering (AIRE), Beijing, China, Aug. 2016.
- Jaspreet Bhatia, Travis D. Breaux "Towards an Information Type Lexicon for Privacy Policies" IEEE 8th International Workshop on Requirements Engineering and Law (RELAW), Ottawa, Canada, pp. 19-24, Aug. 2015.
- Richa Sharma, Jaspreet Bhatia, and K. K. Biswas. 2014, "Machine Learning for Constituency Test of Coordinating Conjunctions in Requirements Specifications", In Proceedings of the 3rd International Workshop on Realizing Artificial Intelligence Synergies in Software Engineering (RAISE 2014). ACM, New York, NY, USA, 25-31.
- Jaspreet Bhatia, Richa Sharma, KK Biswas, Smita Ghaisas, "Using Grammatical Knowledge Patterns for Structuring Requirement Specifications", Third International Workshop on Requirements Patterns (RePa 2013) held at 21st International Requirements Engineering Conference (RE'2013), pg 31-34, Brazil.

## INVITED TALKS AND PRESENTATIONS

- ACM Computer Human Interaction (CHI) 2019
- NIST Cybersecurity Risk Management Conference, Baltimore, 2018
- International Requirements Engineering Conference (IEEE RE), 2015, 2016, 2017, 2018
- FTC PrivacyCon, Washington DC, 2018
- IEEE/ACM International Conference on Software Engineering (IEEE ICSE), Argentina, 2017
- IEEE International Symposium on Technologies for Homeland Security (IEEE HST), Boston, 2017
- Privacy Law Scholar's Conference (PLSC), Berkley, 2017
- C3E workshop at Georgia Institute of Technology, Atlanta, 2016
- Contracting over Privacy Workshop, University of Chicago, 2015

## TECHNICAL SKILLS

- **Languages:** JAVA, Python (*beginner*), JavaScript (*beginner*)
- **Concepts:** Software Engineering, Requirements Engineering, Privacy, Natural Language Processing, User Studies, Statistical Analysis of Qualitative and Quantitative Survey Data, Applied Deep Learning
- **Softwares:** Eclipse, WEKA, Stanford Parser, Stanford Tagger and Stanford NLP tools, SPSS, R, Tensorflow

## HONORS & AWARDS

- **Distinguished Paper Award (RE'2018)**
- **Honorable Mention for Privacy Papers for Policymakers 2016 ([Press Release](#))**
- **Best Paper Award Nomination (RE'2016)**
- Graduate Research Scholarship, Institute for Software Research, Carnegie Mellon University (2014-Present).
- Graduate Research Scholarship by Human Resource & Development Ministry, Govt. of India (2011-2013).
- Travel grant for Grace Hopper conference 2012, India.
- 99.5%ile among 0.137 million applicants in Graduate Aptitude Test in Engineering (GATE ) 2011.
- Department rank 2 out of 70 students in CSE department during undergraduate studies at IGIT.

## SERVICE

- Graduate Admissions Committee, Institute for Software Research, CMU, 2015.
- Reviewer: Artificial Intelligence in Requirements Engineering (AIRE) workshop 2017, 2018; Artificial Intelligence and Law journal 2018.
- Sub-reviewer International Conference on Software Engineering 2015, 2017.

## POSITIONS OF RESPONSIBILITY (Teaching)

Carnegie Mellon University

Teaching Assistant, 17-333 / 17-733 / 19-608 / 95-818 – Privacy Policy, Law and Technology

Pittsburgh, India

8/2018 – 12/2018

- This graduate course focuses on policy issues related to privacy from the perspectives of governments, organizations, and individuals, and technology related privacy concerns.
- Responsible for – grading exams, assignments and quizzes; conducting office hours.

Teaching Assistant, 17-652, 752 – Methods: Deciding What to Design

8/2016 – 12/2016

- This graduate course covers requirements engineering methods, including goal-oriented requirements, use cases and contextual design.
- Responsible for – grading assignments and reading questions; conducting office hours and recitations.
- Guest lecture – Creative requirements engineering.

**Indian Institute of Technology – Delhi**

**Delhi, India**

**Head Teaching Assistant, CSL 101– Introduction to Computer Science**

1/2013 – 5/2013

- Responsible for contributing to exam and assignment questions, preparing marking guidelines, conducting labs, evaluation of assignments, demonstrations, viva, evaluation of answer scripts.
- Coordinator for the group of 400 students and 20 TAs.

**Teaching Assistant, CSL 201 – Data Structures**

7/2012 – 12/2012

- Responsible for evaluation of assignments, demonstrations, viva, Evaluation of answer scripts and conducting labs.