

# Emma Tosch

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🌐 <http://blog.emmatosch.com>

## Research Interests

The research questions that motivate me relate to supporting sound experimental methodologies within complex software systems. I use methods from domain-specific programming language design to build languages and tools for data scientists and social scientists.

## Education

- Sep. 2020 **PhD, Computer Science**, University of Massachusetts Amherst.  
(Expected) Thesis: System Design for Digital Experiments  
Advisors: Profs. David Jensen and J. Eliot B. Moss
- Feb. 2015 **MS, Computer Science**, University of Massachusetts Amherst.
- May 2011 **MA, Computer Science**, Brandeis University.  
Note: Part of a combined post-baccalaureate and MA program in computer science.
- Jun. 2008 **BA, English Literature**, Wellesley College.

## Academic Appointments

- Jul. 2020 – present **Research Affiliate**, *College of Engineering and Mathematical Sciences, University of Vermont*, Temporary research affiliation until January 2021.
- Jan. 2021 **Assistant Professor**, *College of Engineering and Mathematical Sciences, University of Vermont*, Programming Languages, Information security and Data privacy (PLAID) Lab.
- May 2018 – Aug. 2020 **Research Assistant**, *University of Massachusetts Amherst*, Knowledge Discovery Lab,  
Supervisor: David Jensen.  
Developed tools and methods to evaluate autonomous black-box agents for the DARPA Explainable AI (XAI) program.
- May 2013 – Dec. 2016 **Research Assistant**, *University of Massachusetts Amherst*, PLASMA Lab, Supervisor: Emery Berger.  
Developed a domain specific programming language and runtime system to design, debug, and deploy scientific surveys on the web, at scale.
- Sep. 2011 – Jan. 2013 **Research Assistant**, *University of Massachusetts Amherst*, Computational Intelligence Lab, Supervisor: Lee Spector.  
Devised a new measure for evaluating parameters of evolutionary search based on techniques from nonparametric statistics.

## Industrial Research Experience

- Summer 2015 **Research Intern**, *Facebook, Inc. Menlo Park, CA*, Core Data Science – Economic Research Team, Statistics and Decision Science Team, Supervisor: Eytan Bakshy.  
Static Analysis for the PlanOut DSL
- Summer 2010 **Research Intern**, *Institute for Creative Technologies. Playa Vista, CA*, Supervisor: Ron Artstein.  
Natural language generation and question-answering system for virtual humans

## ■ Honors, Scholarships, and Awards

2020 SIGPLAN Research Highlight  
2015 WPI STEM Faculty Launch participant and travel grant  
2015 NCWIT Symantec Student Seed Funding (for UMass CS Women)  
2015 UMass Amherst School of Computer Science Outstanding Synthesis Award  
2014 OOPSLA Best Paper Award  
2014 PLDI ACM Student Research Competition (1st Place)  
2013 Future of Software Engineering Symposium Scholarship at Microsoft Research  
2013 Programming Languages Mentoring Workshop Scholarship  
2012 ACM-W conference scholarship (attended SIG-EVO)  
2010 Grace Hopper Celebration of Women in Computing Scholarship  
2005 Humanities Foundation Award in English Literature

## ■ Publications

- OOPSLA 2019 **PlanAlyzer: Assessing Threats to the Validity of Online Experiments**, *Proceedings of the 2019 ACM International Conference on Object Oriented Programming Systems Languages and Applications (OOPSLA)*, Emma Tosch, Eytan Bakshy, Emery Berger, David D. Jensen, J. Eliot B. Moss.  
**Selected as a SIGPLAN research highlight.**
- NeurIPS Workshop 2018 **ToyBox: Better Atari Environments for Testing Reinforcement Learning Agents**, *John Foley, \* Emma Tosch, \* Kaleigh Clary, David D. Jensen*, Systems for Machine Learning Workshop at the 32nd Conference on Neural Information Processing Systems (NeurIPS).
- NeurIPS Workshop 2018 **Measuring and Characterizing Generalization in Deep Reinforcement Learning**, *Sam Witty, Jun Ki Lee, Emma Tosch, Akanksha Atrey, Michael Littman, David D. Jensen*, Critiquing and Correcting Trends in Reinforcement Learning Workshop at the 32nd Conference on Neural Information Processing Systems (NeurIPS).
- NeurIPS Workshop 2018 **Critiquing and Correcting Trends in Reinforcement Learning Workshop at the 32nd Conference on Neural Information Processing Systems (NeurIPS)**, *Kaleigh Clary, Emma Tosch, John Foley, David D. Jensen*, Let's Play Again: Variability of Deep Reinforcement Learning Agents in Atari Environments.
- CODE 2015 **Formal Verification and Automated Causal Inference for Internet-Scale Experiments**, Emma Tosch, *E. Bakshy*, Conference on Digital Experimentation (CODE@MIT).
- OOPSLA 2014 **SurveyMan: Programming and Debugging Surveys at Scale**, Emma Tosch, *E. Berger*, Proceedings of the 2014 ACM International Conference on Object Oriented Programming Systems Languages and Applications (OOPSLA).  
**Best Paper Award**
- GECCO Workshop 2012 **Achieving COSMOS: A metric for determining when to give up and when to reach for the stars**, Emma Tosch, *L. Spector*, Proceedings of the 14th International Conference on Genetic and Evolutionary Computation Conference Companion (GECCO).
- ICCS 2011 **Compositional Autoconstructive Dynamics**, *Kyle I. Harrington, Emma Tosch, Lee Spector, Jordan Pollack*, Proceedings of the 8th International Conference on Complex Systems.
- FLAIRS 2011 **Evaluating Conversational Characters Created through Question Generation**, *Grace Chen, Emma Tosch, Ron Artstein, Anton Leuski, David Traum*, Proceedings of the 24th International Florida Artificial Intelligence Research Society Conference (FLAIRS).

## Teaching Experience

- Spring 2018 **Instructor**, *Reasoning Under Uncertainty*, University of Massachusetts Amherst, Undergraduate.  
Co-taught with Luis Pineda
- Fall 2017 **Teaching Assistant**, *Advanced Logic*, University of Massachusetts Amherst, Upper Undergraduate/Graduate.  
Taught by Prof. Neil Immerman
- Spring 2017 **Teaching Assistant, Guest Lecturer**, *Reasoning Under Uncertainty*, University of Massachusetts Amherst, Undergraduate.  
Spring 2013 Taught by Prof. Andrew McGregor
- Spring 2011 **Teaching Assistant, Guest Lecturer**, *Introduction to Theory of Computation*, Brandeis University, Undergraduate.  
Taught by Dr. Antonella DiLillo
- Fall 2010 **Teaching Assistant**, *Structure and Interpretation of Computer Programs*, Brandeis University, Undergraduate.  
Taught by Prof. Harry Mairson
- Spring 2010 **Teaching Assistant**, *Data Structures*, Brandeis University, Undergraduate.  
Taught by Dr. Antonella DiLillo

## Advising and Mentoring Experience

- Summer 2016 **Mentor**, *Project on detecting adversarial behavior amongst online survey-takers*, Rosario Huamani Carpio, Pomona College, B.A. 2018.  
REU Program, PLASMA Lab, University of Massachusetts Amherst
- Summer 2015 **Mentor**, *Project for developing a SurveyMan graphical interface in React*, Prakhar Srivastav, Columbia University, M.S. 2016.  
Google Summer of Code, PLASMA Lab, University of Massachusetts Amherst
- Summer 2013 **Mentor**, *Early-stage research project on developing tools for writing sound online surveys*, Molly McMahon, University of Massachusetts Amherst, B.A. 2015.  
Spring 2014 REU Program & Independent Study, PLASMA Lab, University of Massachusetts Amherst

## Teaching Training

- Fall 2015. Active Learning Training with Rachel Rybaczuk.
- Fall 2015. CIRTL Course. Diversity in College Classroom: Teaching the STEM Undergraduate.

## Other Work Experience

- May 2017 – **Project Assistant**, *University of Massachusetts Amherst*, Prof. Charles Weems, Amherst, MA.  
Aug. 2017
- Sep. 2014 – **Software Engineering Intern**, *Google, Inc.*, Mountain View, CA.  
Dec. 2014
- Mar. 2008 – **Data Warehouse Analyst**, *Recombinant Data Corp.*, Newton, MA.  
May 2009

## Selected Talks and Presentations

### Software Infrastructure for Machine Learning

7 Dec. 2018 **Poster presentation**, *NeurIPS Systems for ML Workshop*, Montreal, QC.

4 Oct. 2018 **Oral presentation (full)**, *IBM AI Systems Day*, Cambridge, MA.

### Programming Languages and Experimentation

23 Oct. 2019 **Oral Presentation (full)**, *OOPSLA 2019*, Athens, Greece.

9 Dec. 2016 **Invited talk**, *Wellesley College*, Wellesley, MA.

31 May 2016 **Oral presentation (full)**, *NEPLS Spring 2016*, Amherst, MA.

17 Oct. 2015 **Poster presentation**, *CODE@MIT*, Cambridge, MA.

### Programming and Debugging Surveys

8 Nov. 2016 **Invited talk**, *SPLASH-I*, Amsterdam, Netherlands.

1 Oct. 2015 **Invited talk**, *Union College*, Schenectady, NY.

13 May 2015 **Invited talk**, *Google, Inc.*, Cambridge, MA.

22 Oct. 2014 **Oral presentation (full)**, *OOPSLA 2014*, Portland, OR.

11 Jun. 2014 **Oral presentation (short)**, *PLDI Student Research Competition*, Edinburgh, Scotland.

25 Jan. 2014 **Oral presentation (full)**, *POPL OBT Workshop*, San Diego, CA.

### Detecting Convergence in Population-based Genetic Programming Methods

7 July 2012 **Oral presentation (full)**, *GECCO Understanding Problems Workshop*, Philadelphia, PA.

### General Non-technical Topics in Computing

22 Oct. 2019 **Panelist**, *Programming Languages Mentoring Workshop*, Athens, Greece.

23 Jun. 2019 **Panelist**, *Programming Languages Mentoring Workshop*, Phoenix, AZ.

24 Apr. 2015 **Panelist**, *MassMutual Women in Technology Conference*, Springfield, MA.

## Professional Activities and Service

2019 **Evaluator**, *SLE Artifact Evaluation Committee*.

2018 **Evaluator**, *ECOOP Artifact Evaluation Committee*.

Jan. 2016 – **Graduate Representative**, *University of Massachusetts Amherst, College of Information and Computer Sciences Faculty*.

2016 **Student Volunteer**, *PLDI Conference*.

Jun. 2016 – **Webmaster**, *CS Women*, University of Massachusetts Amherst, College of Information and Computer Sciences.

Jan. 2016 – **Treasurer**, *UMass CS Women*, University of Massachusetts Amherst, College of Information and Computer Sciences.

Jan. 2015 – **Co-Chair**, *UMass CS Women*, University of Massachusetts Amherst, College of Information and Computer Sciences.

2016 **Reviewer**, *PLDI External Review Committee*.

2016 **Reviewer**, *ECOOP External Review Committee*.

2016 **Reviewer**, *POPL OBT Workshop Program Committee*.

2015 **Participant**, *WPI STEM Faculty Launch*.

2015 **Participant**, *ACM-W Early Career Mentoring Workshop*.

2016 **Reviewer**, *ECOOP DSLDI Workshop Program Committee*.

2016 **Evaluator**, *PLDI Artifact Evaluation Committee*.

2014 **Reviewer**, *NCWIT Aspirations Scholarship*.

2015 **Reviewer**, *POPL Artifact Evaluation Committee*.

2014 **Student Volunteer**, *SPLASH Conference*.

Sep. 2011 – **Steward**, *Graduate Employee Organization, UAW 2322*, University of Massachusetts  
May 2014 Amherst.