Haifeng Xu

Computer Science Department, University of Virginia
Rice Hall 522, 85 Engineer's Way, Charlottesville, VA 22903.
✉ hx4ad@virginia.edu   📱 www.haifeng-xu.com

RESEARCH INTERESTS

Artificial Intelligence, Computational Game Theory, Machine Learning, Optimization, Information Economics, the Design and Analysis of Algorithms

APPOINTMENTS

Alan Batson Assistant Professor   08/2019 – present
Department of Computer Science
University of Virginia, USA

Postdoctoral Fellow   08/2018 – 08/2019
Center for Research on Computation and Society (CRCS)
Harvard University, USA
Supervisors: Yiling Chen and David C. Parkes

Lecturer on Computer Science   09/2018 – 12/2018
Harvard John A. Paulson School of Engineering and Applied Sciences (SEAS)
I teach CS 182: Artificial Intelligence

EDUCATION

Ph.D. in Computer Science   08/2013 – 07/2018
University of Southern California, USA
Advisors: Shaddin Dughmi and Milind Tambe
Thesis: Information as a Double-Edged Sword in Strategic Interactions.
ACM SIGecom Doctoral Dissertation Award, honorable mention
IFAAMAS Victor Lesser Distinguished Dissertation Award, runner-up

MMath in Computational Mathematics   08/2012 – 08/2013
University of Waterloo, Canada

B.Sc. (honours) in Mathematics   08/2008 – 07/2012
School of Gifted Young, University of Science & Technology of China
I was a member of the HUA Loo-Keng Elite Program in Mathematics

HONORS & AWARDS

○ **ACM SIGecom Dissertation Award, Honorable mention**   2019

○ **IFAAMAS Victor Lesser Distinguished Dissertation Award, Runner-up**   2019

○ **Best Application System Demo Award, AAMAS 2019**.   2019

○ **Google Ph.D. Fellowship.**   2017

One of the three recipients worldwide in the category *Algorithms, Optimizations and Markets*

○ **CAMS Prize for Excellence in Research, USC Center for Applied Mathematical Sciences.** 2017
Awarded annually to two graduate students across the university

○ **Best Research Assistant Award, Computer Science Department, USC** 2017

○ **Best Paper Award, AAMAS Workshop on Security and Multi-agent Systems (SecMas)** 2016

○ **Best Student Paper Award, AAMAS 2016** 2016

○ **Shing-Tung Yau College Student Mathematics Contests, China**[1] 2011
– Silver Medal in Applied Mathematics (**Top 4 in the country**)
– Bronze Team Medal (**Top 4 teams in the country**)

○ **Microsoft Young Fellowship** 2011

○ **Meritorious Winner in Mathematical Contest of Modeling (MCM), US** 2011

INTERNSHIPS AND RESEARCH VISITS

Research Intern, Google Research 06/2016 – 08/2016
Mentors: Ashwinkumar Badanidiyuru and Kshipra Bhawalkar
Project: Targeting and strategic signaling in ad auctions [SODA'18]

Visiting Student, Simons Institute for the Theory of Computing 10/2015 – 12/2015
Program: Economics and Computation
Project: Signaling in Bayesian Stackelberg games [AAMAS'16]

Research Intern, Yahoo! Lab 06/2015 – 08/2015
Mentor: Ruggiero Cavallo
Project: Equilibrium analysis in Ad auctions with asymmetrically informed bidders

Course Member, *Foundations of Social Computing*, University of Waterloo 01/2013 – 04/2013
Instructor: Kate Larson
Course Project: Improving the efficiency of crowdsourcing contests [AAMAS'14]

Research Intern, Microsoft Research 07/2011 – 06/2012
Mentors: Bin Gao and Tieyan Liu
Project: Predicting advertiser bidding behaviors in ad auctions [WWW'13]

PUBLICATIONS

*For papers appearing at theoretical CS venues, the author order is alphabetical (α-β) by convention.

Refereed Journal Articles & Full Conference Papers

[25]. Jiarui Gan, **Haifeng Xu**, Qingyu Guo, Long Tran-Thanh, Zinovi Rabinovich and Michael Wooldridge. Algorithmic Persuasion with No Externalities. *Proceedings of the 20th ACM Conference on Economics and Computation* (**EC'19**).

[24]. (α-β) Thanh H. Nguyen and **Haifeng Xu**. Imitative Attacker Deception in Stackelberg Security Games. *Proceedings of the 28th International Joint Conference on Artificial Intelligence* (**IJCAI'19**).

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[1] A prestigious national contest organized by the famous mathematician Shing-Tung Yau (a winner of Fields Medal and Wolf Prize).

[23]. (α-β) Jerry Anunrojwong, Yiling Chen, Bo Waggoner and **Haifeng Xu**. Computing Equilibria of Prediction Markets via Persuasion. *Proceedings of the 15th Conference on Web and Internet Economics* (**WINE'19**).

[22]. Omkar Thakoor, Milind Tambe, Phebe Vayanos, **Haifeng Xu**, Christopher Kiekintveld, and Fei Fang. Cyber Camouflage Games for Strategic Deception. *Proc. 10th Conference on Decision and Game Theory for Security* (**GameSec 2019**).

[21]. **Haifeng Xu**, Kai Wang, Phebe Vayanos, Milind Tambe. Strategic Coordination of Human Patrollers and Mobile Sensors with Signaling for Security Games. *Proceedings of the 32th AAAI Conference on Artificial Intelligence* (**AAAI'18**).

[20]. (α-β) Ashwinkumar Badanidiyuru, Kshipra Bhawalkar, **Haifeng Xu**. Targeting and Signaling in Ad Auctions. *ACM-SIAM Symposium on Discrete Algorithms* (**SODA'18**).

[19]. **Haifeng Xu**, Shaddin Dughmi, Milind Tambe, Venil Loyd Noronha. Mitigating the Curse of Correlation in Security Games by Entropy Maximization. *Proceedings of the 17th International Conference on Autonomous Agents and Multiagent Systems* (**AAMAS'18**, short paper).

[18]. Aaron Schlenker, Omkar Thakoor, **Haifeng Xu**, Fei Fang, Milind Tambe, Long Tran-Thanh, Phebe Vayanos, Yevgeniy Vorobeychik. Deceiving Cyber Adversaries: A Game Theoretic Approach. *Proceedings of the 17th International Conference on Autonomous Agents and Multiagent Systems* (**AAMAS'18**).

[17]. (α-β) Shaddin Dughmi, **Haifeng Xu.** Algorithmic Bayesian Persuasion. *SIAM Journal on Computing*. [Supersedes the STOC'16 paper below.]

[16]. (α-β) Shaddin Dughmi, **Haifeng Xu**. Algorithmic Persuasion with No Externalities. *Proceedings of the 18th ACM Conference on Economics and Computation* (**EC'17**).

[15]. **Haifeng Xu**[*], Benjamin Ford[*], Fei Fang, Bistra Dilkina, Andrew Plumptre, Milind Tambe, Margaret Driciru, Fred Wanyama, Aggrey Rwetsiba, Mustapha Nsubaga and Joshua Mabonga. Optimal Patrol Planning for Green Security Games with Black-Box Attackers. *Proceedings of the 8th Conference on Decision and Game Theory for Security* (**GameSec'17**). (*Equal Contributions)

[14]. Aaron Schlenker, **Haifeng Xu**, Mina Guirguis, Christopher Kiekintveld, Arunesh Sinha, Milind Tambe, Solomon Sonya, Darryl Balderas, Noah Dunstatter. Don't Bury your Head in Warnings: A Game-Theoretic Approach for Intelligent Allocation of Cyber-security Alerts. *Proceedings of the 26th International Joint Conference on Artificial Intelligence* (**IJCAI'17**). **Highlighted in the press release opening the IJCAI'17 conference.**

[13]. (α-β) Shaddin Dughmi, **Haifeng Xu.** Algorithmic Bayesian Persuasion. *Proceedings of the 48th ACM Symposium on Theory of Computing* (**STOC'16**).

[12]. **Haifeng Xu.** The Mysteries of Security Games: Equilibrium Computation Becomes Combinatorial Algorithm Design. *Proceedings of the 17th ACM Conference on Economics and Computation* (**EC'16**).

[11]. **Haifeng Xu**, Rupert Freeman, Vincent Conitzer, Shaddin Dughmi, Milind Tambe. Signaling in Bayesian Stackelberg Games. *Proceedings of the 15th International Conference on Autonomous Agents and Multiagent Systems* (**AAMAS'16**).

[10]. **Haifeng Xu**[*], Long Tran Thanh[*], Nick Jennings. Playing Repeated Security Games with No Prior Knowledge. *Proceedings of the 15th International Conference on Autonomous Agents and Multiagent Systems* (**AAMAS'16**). (*Equal Contributions)

[9]. Amulya Yadav, Hau Chan, Albert Jiang, **Haifeng Xu**, Eric Rice, Milind Tambe. Using Social Networks to Aid Homeless Shelters: Dynamic Influence Maximization Under Uncertainty. *Proceedings of the 15th International Conference on Autonomous Agents and Multiagent Systems* (**AAMAS'16**). **Best student paper award.**

[8]. **Haifeng Xu**, Albert X. Jiang, Arunesh, Sinha, Zinovi Rabinovich, Shaddin Dughmi, Milind Tambe. Security Games with Information Leakage: Modeling and Computation. *Proceedings of the 24th International Joint Conference on Artificial Intelligence* (**IJCAI'15**).

[7]. Yue Yin, **Haifeng Xu**, Jiarui Gan, Bo An, Albert X. Jiang. Computing Optimal Mixed Strategies for Security Games With Dynamic Payoffs. *Proceedings of the 24th International Joint Conference on Artificial Intelligence* (**IJCAI'15**).

[6]. Zinovi Rabinovich, Albert X. Jiang, Manish Jain, **Haifeng Xu**. Information Disclosure as a Means of Security. *Proceedings of the 14th International Conference on Autonomous Agents and Multiagent Systems* (**AAMAS'15**).

[5]. **Haifeng Xu**, Zinovi Rabinovich, Shaddin Dughmi, Milind Tambe. Exploring Information Asymmetry in Two-Stage Security Games. *Proceedings of the 29th AAAI Conference on Artificial Intelligence* (**AAAI'15**).

[4]. **Haifeng Xu**, Fei Fang, Albert X. Jiang, Vincent Conitzer, Shaddin Dughmi, Milind Tambe. Solving Zero-Sum Security Games in Discretized Spatio-Temporal Domains. *Proceedings of the 28th AAAI Conference on Artificial Intelligence* (**AAAI'14**).

[3]. Leandro Marcolino, **Haifeng Xu**, Albert X. Jiang, Milind Tambe, Emma Bowring. Give a Hard Problem to a Diverse Team: Exploring Large Action Spaces. *Proceedings of the 28th AAAI Conference on Artificial Intelligence* (**AAAI'14**).

[2]. **Haifeng Xu**, Kate Larson. Improving the Efficiency of Crowdsourcing Contests. *Proceedings of the 13th International Conference on Autonomous Agents and Multiagent Systems* (**AAMAS'14**).

[1]. **Haifeng Xu**, Bin Gao, Diyi Yang, Tieyan Liu. Predicting Advertiser Bidding Behaviors in Sponsored Search by Rationality Modeling. *Proceedings of the 22nd International Conference on World Wide Web* (**WWW'13**).

Book Chapters & Magazine Articles

[3]. Amulya Yadav, Hau Chan, Albert Jiang, **Haifeng Xu**, Eric Rice, Milind Tambe. Using Social Networks to Raise HIV Awareness Among Homeless Youth. *IBM Journal of Research and Development, 2017.*

[2]. Leandro S. Marcolino, **Haifeng Xu**, David Gerber, Boian Kolev, Samori Price, Evangelos Pantazis, and Milind Tambe. Multi-agent Team Formation for Design Problems. *Coordination, Organizations, Institutions and Norms in Agent Systems XI. Springer-Verlag Lecture Notes in AI, 2016.*

[1]. Leandro S. Marcolino, **Haifeng Xu**, Albert X. Jiang, Milind Tambe, and Emma Bowring. The Power of Teams that Disagree: Team Formation in Large Action Spaces. *Coordination, Organizations, Institutions and Norms in Agent Systems X. Springer-Verlag Lecture Notes in AI, 2015.*

PATENTS

○ Algorithmic Bayesian Persuasion (with Shaddin Dughmi), 2015
  US Provisional Application No. 62/137,613

PROFESSIONAL SERVICE

Tutorials

○ Tutorial on Information, Persuasion and Decision Making at EC 2018.

(Co-)Chair

○ Workshop on Strategic Reasoning for Societal Challenges (SRSC) with AAMAS 2019.

○ Workshop on AI for Imperfect Information Games with AAAI 2018.

○ [Workshop on Adversarial Reasoning in Multi-Agent Systems](#) with AAMAS 2017.

Senior Program Committee

○ AAAI Conference on Artificial Intelligence 2020 (Emerging Track on AI for Social Impact)

○ AAAI Conference on Artificial Intelligence 2019 (AI for Social Impact Track)

Program Committee

○ ACM Conference on Economics and Computation (EC): 2019

○ AAAI Conference on Artificial Intelligence (AAAI): 2020, 2019, 2018

○ International Joint Conference on Artificial Intelligence (IJCAI): 2019, 2017, 2016, 2015

○ International Conference on Autonomous Agents and Multiagent Systems (AAMAS): 2019

○ Conference on Decision and Game Theory for Security (GameSec): 2019, 2018, 2017

Journal Reviewing Activities

○ Games and Economic Behavior (GEB): 2019

○ Artificial Intelligence (AIJ): 2019

○ Journal of Artificial Intelligence Research (JAIR): 2017

○ Autonomous Agents and Multi-Agent Systems (JAAMAS): 2019, 2018, 2017

○ Theoretical Computer Science (TCS): 2018

○ Transactions on Cloud Computing: 2018

Conference Reviewing Activities

STOC (2017), FOCS (2016), SODA (2020, 2019, 2018, 2015), AAAI (2015), AAMAS (2016), ICALP (2017), WINE (2020), ITCS (2018), SAGT (2019)

(SELECTED) INVITED TALKS

○ *Algorithmic Persuasion with No Externalities*
Workshop on the Economics of Strategic Communication and Persuasion, Montreal, Nov 2018.

○ *Algorithmic Persuasion*
Harvard EconCS Seminar, Nov 2018.

○ *Information as A Double-Edged Sword in Strategic Interactions*
The Institute for Interdisciplinary Information Sciences (IIIS), Tsinghua University, June 2018.

○ *Strategic Coordination of Human Patrollers and UAVs with Signaling for Security Games*
Computational Sustainability Open Graduate Online Seminar, May 2018.

○ *The Mysteries of Security Games: Equilibrium Computation Becomes Combinatorial Algorithm Design*
Southern California Symposium on Network Economics and Game Theory (NEGT), Caltech, Jan 2018.

○ *Strategic Coordination of Human Patrollers and Mobile Sensors with Signaling for Security Games*
CMU CyLab, October 2017.

○ *Persuasion Through the Computational Lens*
China Theory Week, Shanghai, China, July 2017.

○ *Algorithmic Persuasion: Theory and Applications*
Multiagent Systems Professional Group (MSPG) Online Seminar Series, May 2017.

- *Algorithmic Bayesian Persuasion*
  "Young" Workshop on Economics and Computation (YoungEC) , Tel Aviv, Israel, January 2017,

- *Persuasion Through the Computational Lens*
  Caltech Social and Information Sciences Laboratory (SISL) Seminar Series, October 2016.

- *Algorithmic Bayesian Persuasion*
  Google Research Seminar Series, Mountain View, July 2016.

TEACHING

Lecturer

- UVA CS 6501: Topics in Learning and Game Theory (graduate)   Fall'19

- Harvard University CS 182: Artificial Intelligence (undergraduate)   Fall'18

Guest Lecturer

- USC ISE 599: Security and Game Theory   Spring'16
  - Lecture 1: *Security Games and Combinatorial Algorithm Design*
  - Lecture 2: *Information Leakage in Security Games*

- USC CSCI 270: Introduction to Algorithms and the Theory of Computing   Spring'16
  - Lecture 1: *Reductions among NP-Complete Problems*