Negar Kamali

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RESEARCH INTERESTS

• Generative AI • AI-Assisted Decision Making • Uncertainty Quantification • Conformal Prediction • Explainable AI

EDUCATION

Ph.D. in Computer Science *2022-present* — Northwestern University
Evanston, IL, USA

Ph.D. in Computational Mechanics *2013-2018* — University of Illinois at Chicago
Chicago, IL, USA

M. Sc. in Computational Mechanics *2010-2013* — University of Tehran
Tehran, Iran

B.Sc. in Civil Engineering *2006-2010* — Tabriz University
Tabriz, Iran

HONORS & AWARDS

Northwestern University | *Cognitive Science Advanced Research Fellowship* 2024

Northwestern University | *ACM CHI Best Paper Honorable Mention* 2024

Northwestern University | *Todd M. and Ruth Warren and the Chookaszian Family Fellowship* 2022 & 2023

Univ. of Illinois, Chicago | *Chancellor's Student Service and Leadership Award* 2017

Univ. of Illinois, Chicago | *Excellence in Undergraduate Mentoring Scholarship* 2017

Univ. of Illinois, Chicago | *Chicago Consular Corps of Engineers Scholarship* 2017

Univ. of Illinois, Chicago | *UIC Presenter Award* 2016

Univ. of Illinois, Chicago | *Graduate Student Council UIC Award* 2016

ACADEMIC EXPERIENCE

Northwestern University | *Research Assistant at MU Collective Lab* September 2022 - Present

Project: Enhancing Human Triage of Synthetic and Manipulated Media

- Conducting digital experiments to improve human detection of AI-generated vs. real media.
- Assessing accuracy in identifying AI-generated images across varying scene complexities.
- Analyzing factors causing overlooked artifacts in AI-generated media.
- Investigating the impact of fake image exposure on real image perception.

Project: Conformal Prediction Set Utility Evaluation

- Exploring conformal prediction sets as a method for generating valid confidence sets in distribution-free uncertainty quantification.
- Conducting a thematic analysis on perceptions of AI assistance during an experiment where participants labeled in-distribution and out-of-distribution images.

Project: Co-design Patient-Facing Machine Learning Strategies for Prenatal Stress Reduction

- Collaborating with the Center for Advancing Safety of Machine Intelligence (CASMI)
- Investigated preferred interactions of pregnant people with next-day machine learning stress predictions along with preferred explanations, and recommendations
- Directing various participatory design sessions catering to a diverse group

- Crafting co-design approaches for effective virtual engagement with research participants
- Devising a prototype for the patient-oriented Decision Support Tool (DST) showcasing different facets of machine learning including predictions, explanations, bias, uncertainty, risk, and stress management recommendations

Univ. of Illinois at Chicago | *Research Assistant* 2013-2018

- Developed an Enriched Reproducing Kernel Particle Method (RKPM) to solve for linear and nonlinear wave propagation PDEs.
- conducted numerical simulation wave propagation in multiscale material.
- Wrote several user subroutines for commercial software Abaqus.

PUBLICATIONS

Conference Publications

- "Evaluating the Utility of Conformal Prediction Sets for AI-Advised Image Labeling", D. Zhang, A. Chatzimparmpas, **N. Kamali**, J. Hullman, *Proceedings of the 2024 CHI Conference on Human Factors in Computing Systems,* 2024
  - Best Paper (Honorable Mention) Award
- "Patient-facing Machine Learning for Prenatal Stress Reduction in the United States: A Co-design Toolkit", M. Ullua, **N. Kamali**, G. Fernandes, E. Soyemi, M. Beltzer, N. G. Menon, N. Alshurafa, M. Jacobs, *Presented at CSCW '23 workshop "Supporting User Engagement in Testing, Auditing, and Contesting AI",* 2023
- "Patient-Facing Machine Learning for Prenatal Stress Reduction in the United States: A Co-design Toolkit", M. Ullua, **N. Kamali**, G. Fernandes, E. Soyemi, M. Beltzer, N. Alshurafa, M. Jacobs, *Under review for ACM FAccT Conference on Fairness, Accountability, and Transparency (FAccT)",* 2024

Poster Presentation

- "Evaluating the Utility of Conformal Prediction Sets for AI-Advised Image Labeling", D. Zhang, A. Chatzimparmpas, **N. Kamali**, J. Hullman, *Human+AI Symposium at the University of Chicago,* 2023
- "Co-Designing Patient-Facing Machine Learning for Prenatal Stress Reduction", M. Ulloa, **N. Kamali**, G. Fernandes, E. Soyemi, M. Beltzer, B. Kaveladze, N. Alshurafa, M. Jacobs, *ISRII, Ireland,* 2024

Journal Publications

- "Patient Perspectives of Machine Learning for Prenatal Stress Reduction: A Qualitative Analysis", M. Ullua, **N. Kamali**, G. Fernandes, E. Soyemi, M. Beltzer, N. Alshurafa, M. Jacobs, *under preparation for JMIR,* 2024
- "Harmonic-enriched reproducing kernel approximation for highly oscillatory differential equations", A. Mahdavi, Sh. W. Chi, **N. Kamali**, *ASCE's Journal of Engineering Mechanics,* 2020
- "Influence of Mesoscale and Macroscale Heterogeneities in Higher Harmonics Under Plastic Deformation", **N. Kamali**, N. Tehrani, A. Mostavi, Sh. W. Chi, D. Ozevin, J.E. Indecochea, *Journal of Non-destructive Evaluation,* 2019
- "Numerical study on how heterogeneity affects ultrasound higher harmonics generation", **N. Kamali**,A. Mahdavi, Sh. W. Chi, *Nondestructive Testing and Evaluating,* 2019
- "Wavelet Based Harmonics Decomposition of Ultrasonic Signal in Assessment of Plastic Strain in Aluminium", A. Mostavi, **N. Kamali**, N. Tehrani, Sh. W. Chi *Nondestructive Testing and Evaluating,* 2018

Doctoral Thesis | Enriched Numerical Method for Wave Propagation and Assessing Material Damage Using Nonlinear Acoustics, ***Negar Kamali,*** 2018

SUMMARY OF RELATED SKILLS AND QUALIFICATIONS

- **Programming** | JavaScript, Python, HTML, CSS, SQL, MATLAB, R, Fortran, Git
- **ML** | Proficient in TensorFlow, PyTorch, SKLearn and other ML tools
- **Software** | Tableau, Abaqus, Ansys, AutoCAD, Rhinoceros 3D, Grasshopper, Solidworks
- Extensive and in-depth collaboration with experimental researchers in group, for NSF funded research

- Familiarity with the principles of experiment design and statistical decision theory
- Favorite courses taken so far: Bayesian Statistics, Decision Theory, Introduction to Law and Digital Technologies

INDUSTRIAL EXPERIENCE

Software Developer | US API Manager | *SkyCiv* Jan 2021 - Sept 2022

- Developing cloud-based software for structural engineers

Structural Engineer | Automation Expert | *Arup* Nov 2020 - Jan 2021

- Developing and maintaining an automated design and analysis workflow for end-to-end collaboration

Structural Engineer Professional | *SOM* Jun 2018 - Nov 2021

- Research on Finite Element (FE) topology optimization for different structural elements
- ML prediction of post-tensioned tendons with TensorFlow's CNN
- Classifying building damages with TensorFlow's CNN

PROFESSIONAL AFFILIATIONS

- Graduate Society of Women Engineers, Professional Development Officer, *Northwestern University*, 2023-2024
- Graduate Society of Women Engineers, Founder and President, *Univ. of Illinois at Chicago*, 2016
- Active reviewer for professional journals such as Journal of Engineering Mechanics, Journal of Applied Sciences, and Journal of Soft Computing in Civil Engineering, 2019-2022