

Nouran Soliman

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CSAIL, Massachusetts Institute of Technology
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RESEARCH INTERESTS

- **Primary:** HCI, Social Computing, AI, Online Safety and Trust.
- **Secondary:** Online Collective Action, Moderation of Content, User Agency, Algorithmic Biases & Filter Bubbles, Team Productivity, Educational/Interactive Experiences, Mental Health, Healthcare.

EDUCATION

Massachusetts Institute of Technology <i>Ph.D. in Electrical Engineering and Computer Science</i> <i>Focus: Human-Computer Interaction</i> <i>PI: David Karger</i>	Cambridge, MA February 2022 – Present GPA: 5.0/5.0
Massachusetts Institute of Technology <i>M.Sc. in Electrical Engineering and Computer Science</i> <i>Focus: Human-Computer Interaction</i> <i>PI: David Karger</i>	Cambridge, MA Aug. 2019 – January 2022 GPA: 5.0/5.0
University of California Berkeley <i>Undergraduate Summer Session</i> <i>CS189: Introduction to Machine Learning (4 units)</i>	Berkeley, CA June 2018 – Aug. 2018 Grade: B+ (Above Average)
Arab Academy for Science and Technology <i>Bachelor of Engineering in Computer Science</i>	Alexandria, Egypt Sep. 2013 – June 2019 GPA: 3.98/4.0

TECHNICAL QUALIFYING EVALUATION

Graduate-Level Courses: (6.869) Advances in Computer Vision, (6.864) Advanced Natural Language Processing, (6.894) Interactive Data Visualization, (18.404/6.840) Theory of Computation

EXPERIENCE

Graduate Research Assistant <i>Haystack Group, CSAIL, MIT</i> <i>PI: David Karger, Full Professor at CSAIL, MIT</i>	June 2020 – Present Cambridge, MA
<ul style="list-style-type: none">• Conducting mixed methods research, user studies and system building to enhance user experiences and interactions on the web.• System building includes full-stack development and other CS methods as required (ex: ML, NLP, etc.)	
PhD Research Intern <i>Semantic Scholar Team, Allen Institute for AI (AI2)</i> <i>PIs: Amy X. Zhang (UW), Jonathan Bragg & Joseph Chee Chang (AI2)</i>	Dec. 2021 – August 2022 Seattle, WA
<ul style="list-style-type: none">• Designed a novel paradigm to identity representation called “meronymity” that allows users to selectively reveal specific aspects of their identity to balance privacy and credibility in public interactions within academia.• Built a system to implement meronymous communication.• Conducted a field study to evaluate the system and published the work at CHI 2024.	
PhD Research Intern <i>Knowledge Technologies and Intelligent Experiences, Microsoft Research</i> <i>PIs: Mark Encarnación, Michael Gamon and Nalin Singal</i>	June 2021 – August 2021 Redmond, WA
<ul style="list-style-type: none">• Conducted a qualitative study using a mixed-methods approach to define tasks at risk from the user’s perspective in Microsoft Planner team management tool.• Conducted a quantitative study using data analysis techniques to identify important features of a task at risk and to confirm results of qualitative study.	

- Performed feature engineering to extract important features for training ML models.
- Built, trained and improved performance of various ML models to predict if a task will be at risk. Achieved accuracy of 89% using an ensemble of sequence models (starting with a baseline of 55%). Used PyTorch.

Graduate Research Assistant

Sep. 2019 – June 2020

Imagination, Computation, and Expression Laboratory, CSAIL, MIT

Cambridge, MA

PI: Fox Harrell, Professor at MIT

- Developed an AI-based personalized interactive narrative experience for hip hop education in collaboration with Microsoft and the Universal Hip Hop Museum (UHHM). The tool has been deployed in the UHHM.

Undergraduate Research Intern

Jan. 2018 – Jan. 2019

Social Spaces Lab, University of Illinois at Urbana-Champaign (UIUC)

Champaign, IL

PIs: Karrie Karahalios, Professor at UIUC and Motahhare Eslami, Professor at CMU

- Worked on breaking political filter bubbles via social comparison on social media by designing and developing a customized Twitter reading tool and running user studies.

Undergraduate Research Intern

June 2017 – Sep. 2017

Adobe Dimension Team, Creative Intelligence Lab, Adobe Research

San Francisco, CA

PI: Qingnan Zhou, Research Engineer at Adobe and PhD. from NYU

- Worked on improving the performance of a ground-plane detection CNN by analyzing and expanding the dataset to re-train the model.

CONFERENCE PUBLICATIONS

N. Soliman, H. Kang, M. Latzke, J. Bragg, J. Chang, A. Zhang, D. Karger. Mitigating Barriers to Public Social Interaction with Meronymous Communication. Accepted at CHI 2024.

H. Kang, **N. Soliman**, M. Latzke, J. Chang, J. Bragg. ComLittee: Literature Discovery with Personal Elected Author Committees. In Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems (CHI '23), Hamburg, Germany, April 23-28, 2023.

U.Sarawgi, W.Zulfikar and **N.Soliman**, P.Maes. Multimodal Inductive Transfer Learning for Detection of Alzheimer's Dementia and its Severity. Accepted at ADRess Challenge INTERSPEECH, 2020.

D.Oslon and **N.Soliman**, F.Harrell. Breakbeat Narratives: A Personalized, Conversational Interactive Storytelling System for Museum Education. In Proceedings of CHI '20: CHI Conference on Human Factors in Computing Systems (CHI'20 Extended Abstracts), Honolulu, HI, April 25-30, 2020.

PATENTS, POSTERS AND TECHNICAL REPORTS

N. Soliman, S. Sarkar, M. Encarnación, M. Gamon, N. Singal. Characterizing and Predicting Tasks at Risk in Team Task Management. Microsoft Research, 2021.

N. Soliman, M. Eslami, K. Karahalios. Breaking Political Filter Bubbles using Social Comparison. UIUC, 2019.

N.Soliman, Q.Zhou. Improving Performance of Ground-plane Detection CNN. Poster presented at Adobe Expo Showcase, San Jose, CA, USA, 2017.

N.Soliman, A.Abdelhafiez, A.Kamel, H.Abdelrahman, O.Ali. LeftEagle: RoboCup 2D Soccer Simulation. Accepted at RoboCup 2016, Leipzig, Germany.

N.Soliman, M.Moustafa, S.Omar, A.Hamdy, A.Gamal. BlueRovotix: A Remotely Operated Vehicle designed to perform challenging tasks under harsh circumstances in the Arctic. Accepted at MATE international ROV Competition, St. John's, Newfoundland and Labrador, Canada, 2015.

Mitigating Barriers to Public Social Interaction with Meronymy

Dec. 2021 – August 2022

In communities with social hierarchies, fear of judgment can discourage communication. While anonymity may alleviate some social pressure, fully anonymous spaces enable toxic behavior and hide the social context that motivates people to participate and helps them tailor their communication. I explored a design space of meronymous communication, where people can reveal carefully chosen aspects of their identity and also leverage trusted endorsers to gain credibility. I implemented these ideas by building a system, LiTweeture, using React and Flask for scholars to meronymously seek and receive paper recommendations on Twitter and Mastodon. A formative study with 20 scholars confirmed that scholars see benefits to participating but are deterred due to social anxiety. From a month-long public deployment, I found that with meronymy, junior scholars could comfortably ask “newbie” questions and get responses from senior scholars who they normally found intimidating. Responses were also tailored to the aspects about themselves that junior scholars chose to reveal.

Characterizing and Predicting Tasks at Risk in Team Task Management

June 2021 – August 2021

Collaborative project management involves interacting with various tasks in a shared planning space where members add, assign, complete, and edit project-related tasks to have a shared view of the project’s status. This process directly impacts how individual team members select, prioritize, and organize tasks on which to focus on a daily basis. However, such coordination and task prioritization can become increasingly challenging for individuals working on multiple projects with big teams. Accordingly, tasks could become at risk and eventually not be completed on time, leading to personal or team losses in many situations. To support task-doers in completing their tasks, I conducted a mixed-methods study focusing on Microsoft Planner—a collaborative project management tool—to understand how users manage their tasks in a team setting, what challenges they encounter, and their preferred solutions. Based on the findings from a qualitative survey with 151 participants and my Planner log data analysis, I further developed a task at risk prediction model using various task characteristics and user actions. The experimental results suggest that a task at risk can be classified with high effectiveness (accuracy of 89%). This work provides novel insights on how users manage their tasks in team task management tools, what challenges they face, how they perceive a task at risk, and how tasks at risk can be modeled. Such an application can significantly improve the user experience in such tools by providing a personal assistant that helps users prioritize their tasks and pay attention to critical situations. This work was done for my Master’s thesis in collaboration with Microsoft Research.

Motivating Online Academic Discourse

June 2020 – Present

Large online discussions happen extensively on the web to exchange information, insights, humor, diverse opinions and others’ experiences. Archiving conversations available for future retrieval or contribution allows faster and more efficient consumption of information as well as better collaborations. With the growing number of tools and channels becoming available for researchers to engage with the public, and the rising significance of online platforms like science blogs, social media and sub-communities and engaging with audience, developing platforms tailored to guide, encourage and archive academic conversations around research papers is very valuable. In this project, I am exploring the needs, incentives and motivations of researchers seeking or creating online academic discourse through user studies, prototyping and focus groups. This need-finding stage will inform the development of a system tailored to better support academic conversations and the needs of researchers. The system implementation is being done in React and Flask.

Detecting Alzheimer’s Dementia and its Severity through spontaneous Speech

March 2020 – May 2020

Alzheimer’s disease is estimated to affect around 50 million people worldwide and is rising rapidly, with a global economic burden of nearly a trillion dollars. This calls for scalable, cost-effective, and robust methods for detection of Alzheimer’s dementia (AD). This work presents a novel architecture that leverages acoustic, cognitive, and linguistic features to form a multimodal ensemble system. In this project, I worked on feature engineering of the dataset and contributed to building, tuning and testing the model. This system achieves state-of-the-art test accuracy, precision, recall, and F1-score of 83.3% each for AD classification, and state-of-the-art test root mean squared error of 4.60 for Mini-Mental State Exam score regression. The source code is available [here](#).

COVID-19 Personal Awareness DataVis Game

March 2020 – May 2020

In this project, I developed an interactive datavis game that creates awareness about taking precautions against spread of COVID-19. The game allows the users to understand the effect of precautionary actions taken by them and the community by simulating the daily spread on COVID-19 through a game. The users can first select different levels of precautions such as wearing masks, washing hands and social distancing, then they can simulate the spread and finally observe the impact of their actions on number of infections with a daily graph. Thus, I use a gamified narrative, interactive simulation, and statistical and animated visualizations to create personal awareness of taking the precautionary actions to avoid the spread of COVID-19. To evaluate the experience of the visualization game, the team conducted an informal user-study with 10 participants and collected their qualitative feedback. The source code and more details are available [here](#).

[R]Evolution Of Hip Hop: Breakbeat Narratives

Nov. 2019 – Jan. 2020

This project presents a novel interactive narrative exhibit supporting general public learning about Hip Hop culture and history developed as a collaboration of the MIT Center for Advanced Virtuality, the Universal Hip Hop Museum, and Microsoft and supported by the TunesMap Educational Foundation and internationally known Afrofuturist artists Black Kirby. The exhibit's narrative system is personalized by categorizing users based on evaluating their input data light of a social psychology-based model based in musical identity theory. The system uses user input to determine which interactive narrative and customized music playlist to present to the user. My role was developing the interactive experience by developing an AI-based chatbot that talks to the user. The system has been deployed as the central interactive display within the [R]Evolution of Hip Hop for an exhibit of the Universal Hip Hop Museum which attracted more than 3500 visitors within the first 10 days. The Breakbeat Narrative experience has received positive feedback by the museum leadership, the visitors, the public and in popular press coverage (television, news, etc.)

Breaking Political Filter Bubbles via Social Comparison

Jan. 2018 – Jan. 2019

According to selective exposure theory, people tend to view content they agree with more to get more self-assurance. This causes people to live in ideological filter bubbles. Several methods have been proposed to encourage users to break their political filter bubbles, however, the idea of social comparison is novel. My work reported on a qualitative user study that encourages users to break the political filter bubble of their Twitter feed by reading more diverse viewpoints through social comparison. The user study was conducted after I developed political-bias-analyzing and Twitter-mirroring tools to compare the political slant of what a user reads and what other Twitter users read about a topic, and in general. The results have shown that social comparison can have a great impact on users' reading behavior by motivating them to read viewpoints from the opposing political party.

Improving Performance of Ground-plane Detection CNN in Adobe Dimension

June 2017 – Sep. 2017

Adobe Dimension offers 3D compositing to non-specialist end users by identifying the ground-plane in an image through estimating the horizon using a state-of-the-art ResNet CNN, then allowing the users to place their desired objects on the ground. This project was focused to improve the performance of the CNN for better image compositing by building a more robust dataset. My project laid the foundation of a pipeline to collect and annotate an expandable specialized dataset that handles the failure cases of the CNN previously trained on a panoramic-image dataset.

AWARDS AND SCHOLARSHIPS

Endowed Fellowship of the Arab Republic of Egypt for Graduate Studies Massachusetts Institute of Technology	Sep. 2019 – Present
Generation Google Scholar Award Selected among top 12 applicants worldwide by Google	July 2019
Adobe Scholar Award Selected among top 10 applicants worldwide, Adobe Systems	Dec. 2016
First place worldwide in super-team robotics soccer league RoboCup World Finals, João Pessoa, Brazil	July 2014

Six-year fully-funded Undergraduate Computer Engineering Scholarship Arab Academy for Science and Technology	Sep. 2013
Fourth place worldwide in technical report writing MATE Remotely Operated Vehicles International Robotics Competition, Seattle, USA	June 2013
Awarded MVP Best Presenter and “Guts and Glory” Prize MATE Remotely Operated Vehicles International Robotics Competition, Florida, USA	June 2012

SELECTED OUTREACH AND MENTIONS

Microsoft In Culture: Celebrating hip hop as an art form https://www.microsoft.com/inculture/arts/universal-hip-hop-museum-mit-ai/	Feb. 2020
Microsoft In Culture: The Universal Hip Hop Museum explores hip hop as an art https://www.youtube.com/watch?v=lHPGMp2-e5E&feature=youtu.be	Feb. 2020
MIT News: Exploring hip hop history with art and technology http://news.mit.edu/2019/exploring-hip-hop-history-art-and-technology-museum-1220	Dec. 2019
Adobe Research: Adobe Scholarship Award Winners Honorable Mention https://research.adobe.com/scholarship/previous-scholarship-award-winners/	June 2017

TECHNICAL SKILLS

Languages: Python, C/C++, Java, C#, JavaScript, HTML/CSS, PHP, SQL, D3
Frameworks: React, Flask, Vue, Node.js, Sequelize
Developer Tools: Git, VS Code, Visual Studio, Eclipse, Postman, Linux
Libraries: NumPy, Matplotlib, PyTorch, TensorFlow, Keras, scikit-learn

SELECTED SERVICES

Reviewer at CSCW https://dl.acm.org/conference/cscw	Feb. 2022 & March 2024
MIT Arab Student Organization Member https://asomit.squarespace.com/	Dec. 2023
MIT Communication Lab Fellow https://mitcommlab.mit.edu/eecs/meet-our-fellows-staff/	Dec. 2020
MIT Graduate Institute-Wide Resources for Easing Friction & Stress Member https://gsc.mit.edu/committees/hca/irefs/	Sep. 2020
MIT Graduate Application Assistance Program Mentor https://www.thrive-eecs.mit.edu/gaap	Sep. 2020
MIT Egyptian Student Association Member https://www.facebook.com/MITEGYPTIANS	Sep. 2019