Uttkarsh Narayan

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Boston, MA

Research Interests

My research sits at the intersection of **human-computer interaction**, **learning analytics**, and **community design**, investigating how data-driven media artifacts (such as dashboards, network visualizations, and AI-powered search interfaces) can transform transient educational experiences into persistent, knowledge-sharing communities. Drawing on **Research through Design** methodology, I combine qualitative approaches (co-design, thematic analysis, participatory design) with quantitative methods (learning analytics, statistical modeling) to investigate both instructor and learner perspectives in **game-based learning** environments.

My work has broad implications for **educational technology**, **data visualization**, and **online community design**. I am also actively interested in extending these ideas into new domains where **media interventions** can foster sustained engagement, collective knowledge, and meaningful impact in communities beyond formal education. I am particularly drawn to problems at the intersection of **human-AI interaction**, **information-seeking**, and **community-centered design**, where thoughtful system design can bridge temporal and social boundaries between people.

Education

Northeastern University *August 2021 – May 2026 (Expected)*
Ph.D., Interdisciplinary Design and Media, CAMD Boston, MA

- Dissertation: *Leveraging Data to Foster Persistent Game-Based Learning Communities*
- Advisor: Dr. Casper Harteveld Co-Advisor: Dr. Adriana de Souza e Silva
- Committee: Dr. Michael Correll, Dr. Camillia Matuk, Dr. Erica Kleinman

Northeastern University *August 2016 – May 2018*
M.S., Game Science and Design Boston, MA

- Thesis: *Pokémon Go and Social Anxiety: A Therapeutic Platform*

JSS Academy of Technical Education, UPTU *August 2010 – May 2014*
B.Tech., Computer Science Noida, India

Publications

[1] Uttkarsh Narayan. Pokémon Go and Social Anxiety: A Therapeutic Platform. Master's thesis, Northeastern University, United States – Massachusetts, 2018.

[2] Uttkarsh Narayan. Using Data to Empower Asynchronous Communities in Instructionist Game-Based Learning. In *Companion Proceedings of the Annual Symposium on Computer-Human Interaction in Play*, pages 280–283, Pittsburgh USA, October 2025. ACM.

[3] Alayt Issak, Uttkarsh Narayan, Ramya Srinivasan, Erica Kleinman, and Casper Harteveld. Kaleidoscope Gallery: Exploring Ethics and Generative AI Through Art. In *Proceedings of the*

2025 Conference on Creativity and Cognition, C&C '25, pages 949–963, New York, NY, USA, June 2025. Association for Computing Machinery.

[4] Mahsa Nasri, Uttkarsh Narayan, Mustafa Feyyaz Sonbudak, Aubrey Simonson, Maria Chiu, Jason Donati, Mark Sivak, Mehmet Kosa, and Casper Harteveld. Designing a Virtual Reality Training Apprenticeship for Cold Spray Advanced Manufacturing. In *2024 IEEE International Symposium on Mixed and Augmented Reality Adjunct (ISMAR-Adjunct)*, pages 541–544, October 2024.

[5] Aybike Ulusan, Uttkarsh Narayan, Sam Snodgrass, Ozlem Ergun, and Casper Harteveld. "Rather Solve the Problem from Scratch": Gamesploring Human-Machine Collaboration for Optimizing the Debris Collection Problem. In *27th International Conference on Intelligent User Interfaces*, IUI '22, pages 604–619, New York, NY, USA, March 2022. Association for Computing Machinery.

[6] Elina Tochilnikova, Amrit Patnaik, Ghada Alsebayel, Uttkarsh Narayan, Andrew Coeytaux, Valeria Ramdin, Miso Kim, and Casper Harteveld. "Guilty of Talking Too Much": How Psychotherapists Gamify Therapy. In *Proceedings of the 2022 CHI Conference on Human Factors in Computing Systems*, CHI '22, pages 1–17, New York, NY, USA, April 2022. Association for Computing Machinery.

[7] Josh Aaron Miller, Uttkarsh Narayan, Matthew Hantsbarger, Seth Cooper, and Magy Seif El-Nasr. Expertise and engagement: re-designing citizen science games with players' minds in mind. In *Proceedings of the 14th International Conference on the Foundations of Digital Games*, FDG '19, pages 1–11, New York, NY, USA, August 2019. Association for Computing Machinery.

Research Experience

GhostLab, CAMD — Northeastern University *August 2021 – Present*
PhD Researcher Boston, MA

- Built an **end-to-end data collection pipeline from scratch** using C# (Unity) and PHP to capture player behavior and performance data for the **XERT** VR training simulation, generating **thousands of granular interaction-level data points** across 22 participants; conducted a multi-stage quantitative analysis using Python, including reliability testing (Cronbach's alpha), normality checks (Shapiro-Wilk), non-parametric significance testing (Wilcoxon signed-rank, Cohen's d), and predictive modeling (Pearson correlations, OLS regression) to evaluate knowledge retention, usability, and in-game interaction patterns — demonstrating **significant knowledge transfer from VR training to real-world task performance** across pre/post/retention assessments.
- Extended and automated a **data pipeline** for GeoExplorer using C# (Unity) and PHP for raw data collection in JSON format, and a **Python backend** for automated processing and structuring of multi-modal game data — including timestamps, player actions, scores, and survey responses — across **1,250 students and 166 courses** from 2019 to present, powering the instructor-facing GBLAD.
- Conducted a multi-phase **co-design and interview study** with 11 geotechnical engineering instructors across 9+ universities to surface design requirements for a **Game-Based Learning Analytics Dashboard (GBLAD)**, deployed across 20+ universities; applied inductive thematic analysis to generate 11 themes across 4 design categories characterizing instructor assessment needs and community knowledge-sharing practices; dashboard adoption resulted in instructors reporting **increased confidence in GBL implementation** and improved ability to substantiate game effectiveness claims with data.
- Conducting a follow-up **mixed-methods study** with the same instructor cohort, investigating

data analytical reasoning and shared interpretation strategies via a **think-aloud protocol** and **deductive coding** framework grounded in the Community of Inquiry model, to examine how cross-cohort GBL data fosters a sense of community among instructors.
- Conducted an open-ended survey study with 44 game developers across Reddit and Discord communities; applied **inductive thematic analysis** to generate 155+ codes, iteratively consolidated into **14 themes**, characterizing information-seeking practices in creative workflows like game development and establishing empirical design requirements for a constructionist GBL artifact.
- Co-designing an **AI-powered search engine with network graph visualization** for the **StudyCrafter** constructionist GBL platform through iterative **focus group sessions** with student stakeholders, supporting learner project discovery and remixing across cohorts.

NU Game Studio — Northeastern University *August 2018 – August 2021*
Senior Research Assistant Boston, MA

- Designed and developed **Debris**, a gamified human-machine collaboration experiment built in **Unity (C#)** integrated with a **MATLAB optimization algorithm**; the game tasked domain-expert players with solving a **multi-objective debris collection problem** in a simulated disaster scenario, enabling real-time collaboration between human players and an intelligent algorithm — contributing to a peer-reviewed publication at **ACM IUI 2022**.
- Led a **heuristic design overhaul** of the **StudyCrafter** constructionist GBL platform; synthesizing participant feedback from general implementation and usability testing to drive platform-wide UX improvements.
- Served as **sole game developer** for multiple educational game titles including **StudyCrafter**, **Debris**, and **TinySea**, built in **Unity (C#)**; led the full development lifecycle from usability testing and iterative design sessions through to implementation, translating participant feedback and design roadmaps into functional game builds.
- Mentored and onboarded new research team members on UX methods and game development pipelines.

Work Experience

Khoury College — Northeastern University *August 2017 – May 2018*
Game Developer Boston, MA

- Contributed as game programmer on **Foldit**, a citizen science protein folding game; developed tutorial levels and UI features to improve player onboarding.
- Conducted usability studies to evaluate and refine tutorial design and overall UX.

StoryLab — College of Art Media and Design *January 2017 – August 2017*
Back-End Developer Boston, MA

- Developed the backend framework for the Storylab research platform using JavaScript and Node.js.

Centre for Development of Advanced Computing (CDAC) *May 2013 – August 2013*
Software Engineering Intern Noida, India

- Led development of a web-based reimbursement management system using Jakarta Struts.

Technical Skills

Research Methods: Participatory design, co-design, thematic analysis, grounded theory, semi-structured interviews, survey research, usability testing, Research through Design (RtD), learning analytics, discourse analysis

Programming & Tools: Python, R, SQL, JavaScript, HTML/CSS, C#, C++, Figma, Git, Unity, Unreal, LaTeX, Qualtrics

Service & Professional Activities

- Reviewer, *ACM CHI Conference on Human Factors in Computing Systems* (Late Breaking Work, Posters) 2025, 2026
- Reviewer, *ACM CHI Conference on Human Factors in Computing Systems* (Full Papers) 2025
- Reviewer, *ACM CHI PLAY: The Annual Symposium on Computer-Human Interaction in Play* (Full Papers) 2025
- Reviewer, *IEEE Conference on Games (CoG)* 2023, 2025

Grants & Funding

- NSF #1915247, #1915121 — GeoExplorer Project 2021–Present
- NSF #2142396, #1915247 — StudyCrafter Project 2018–Present