# Colan Biemer

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## Experience

**PhD Candidate, Northeastern University (September 2019 - Present)**

- Developed a method that assembles video game levels with a Markov Decision Process for dynamic difficulty adjustment, and all the work is open-sourced for others to build on.
- Published six peer-reviewed papers on topics including dynamic difficulty adjustment, Markov decision processes, procedural level generation, level linking, and player reflection in leading game conferences.
  - "On Linking Level Segments" was nominated for best paper at the IEEE CoG 2022 conference.
- Programmed games from scratch for online player studies (*Recformer*, *DungeonGrams*, and *Fruit-3*).
- Teaching Assistant for undergrad (C++) and graduate courses (Game Engines and Computer Graphics).
  - Nominated for "Outstanding Graduate Teaching Award."

**Applications Programmer, Brain Game Center (August 2017 - June 2019)**

- Lead developer of *PolyRules!*, an iOS game built to improve players' task-switching capabilities.
  - A weight loss study included a condition where players played PolyRules! as part of the program. Their BMI decreased by an average of 0.3 more than in the other condition of the study. Additionally, they reported an "improved attention to details, concentration, focus, and memory" from playing PolyRules!
- Created a submodule used by all Unity games, addressing a previous problem of code synchronization across multiple repositories. This submodule contains essential tools, scripts, and core game features.
- Built a data management tool using AWS Cognito and S3, incorporating user authentication, permission controls, and game configurations utilized by researchers to collect data and manage their studies.

**Information Technology Research Center Co-op, BMW (April 2016 - September 2016)**

- Developed Hive query and then reduced the runtime from one month to ~6 hours by utilizing a fifty-node cluster to page the query and parallelize the required updates.
- Developer and administrator for an ELK stack and cluster to provide NHTSA data for analysts.
- Built an eight-node Raspberry Pi cluster to offer interns a low-stakes introduction to cluster computing.

**R&D Innovations Team Development Co-op, iPipeline (April 2015 - September 2015)**

- Developed "Text-a-Quote," a texting chatbot with Twilio that queried users for information and sent back a life insurance quote.Made"Pipe-SMS," which provided an API for sending texts (e.g., confirmation codes).

## Sample Side-Projects

- Implemented a highly optimized Rust implementation of Connect-4 that used bitboards for improved memory efficiency and reduced time complexity during solution testing.
- Developed a graph simplification method for pathfinding on randomly generated mazes that reduced the overall number of nodes by approximately 31.4% and edges by approximately 65.1%.
- Built a visualization of collision detection with a quadtree implemented in TypeScript.
- Programmed *Skyscraper Tetris*, a version of *Tetris* played on both sides of the Cira Centre skyscraper in Philadelphia, which won the Guinness World Record for the "World's Largest Architectural Video Game."

## Education

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| Northeastern University | PhD | Computer Science | Exp. 08/2025 |
| | MS | Computer Science | 2021 |
| Drexel University | BS | Computer Science (w/ Math Minor) | 2017 |

## Skills

**Languages:** C, C++, C#, Python, JS/Typescript, and more

**Tools:** Git, Unity, SQLite, OpenGL, Raylib, SDL3, Box2d, Terminal, Vim, AWS, GCP, and more.