Education

New York University - Tandon School of Engineering — Brooklyn, NY
PhD, Game Design and Artificial Intelligence, GPA 3.809/4.00 — April 2024
- 2022-2024 GAANN Scholar recipient

Virginia Commonwealth University - College of Engineering — Richmond, VA
BS, Computer Science with minor in Mathematics, GPA 3.81/4.00 — May 2019
- 2019 College of Engineering Outstanding Student Award
- 2018 Wright Access Scholarship Recipient
- 2017 and 2018 EDU Tech Scholarship Recipient
- 2016 Provost Scholarship Recipient

Deep Run High School - Center for Information Technology — Glen Allen, VA
High School Diploma, GPA 4.94/4.00 (weighted) — Jun 2016
- 2015 NCWIT National Aspiring Award Winner
- 2014 NCWIT Regional Aspiring Award Winner

Research Experience

New York University - Tandon School of Engineering — Brooklyn, NY
PhD Researcher — Sep 2019 - present
- Thesis: Online Creative Collaborative Content Generation
- Studying game design and artificial intelligence under Dr. Julian Togelius
- Designed, developed, and published a range of online creative content generation tools featuring technologies such as general game-playing agents, quality diversity and evolutionary algorithms, large-language models, open-ended frameworks, and abstract simulation environments
- Led multiple teams of undergraduate and masters students in game AI research projects

Virginia Commonwealth University — Richmond, VA
Unity Programmer MCV moVR - Virtual Reality Physical Therapy Lab — Jan 2019 - Aug 2019
- Built 5-game virtual reality game suite for fibromyalgia patients (Build-A-Bot)
- Prototyped HTC Vive full-body motion capture system for animation
- Built pain rating system for viewing work-effort of physical activities
- Built card matching VR game for fibromyalgia patients
- Prototyped pain categorization and selection VR system

Natural Language Processing Undergraduate Researcher — Jun 2016 - Jan 2019
- Developed named-entity recognition system for drug occurrences
- Integrated interface for SemMed Database
- Helped develop literature based discovery neural network
- Developed latent semantic analysis system for doctor-patient interaction

University of Minnesota - Twin Cities — Minneapolis, MN
NSF Big Data REU Researcher — Jun 2018 - Aug 2018
- Worked in Dr. Victoria Interrante's virtual reality lab
- Designed and implemented a novel locomotion VR system
- Ran a user-based experiment with 10 participants for the performance of the system
- Work was featured in VCU Engineering news: https://egr.vcu.edu/news-events/news/archive/vr-skateboard.html

Leadership/Teamwork Experience

PCG Workshop 2024
Co-organizer for PCG Workshop 2024 — Worcester, MA
- Helped organize the 2024 Procedural Content Generation Workshop at FDG 2024 — Sept 2023 - May 2024

- Co-wrote and submitted the workshop proposal document

FDGTV
Producer / Presenter   Lisbon, Portugal
- Interviewed multiple academic authors and presenters at the FDG 2023 conference   Apr 2023
- Interviews were posted on the FDGTV YouTube channel

EXAG 2021
Co-organizer for EXAG 2021   Virtual
- Helped organize and host the 2021 Experimental AI in Games Workshop at AIIDE 2021   Mar 2021 - Oct 2021
- Maintained and updated the EXAG.org website
- Put together the Call for Papers, arranged presentation schedule, and recruited reviewers

Virginia Commonwealth University   Richmond, VA
Computer Science Student Advisory Board member   May 2018 - May 2019
- Communicated with both students and professors about state of the department
- Volunteer as ambassador at College of Engineering open houses
- Promote student-led social clubs and extracurricular activities

FRC Team 1086 - Blue Cheese   Glen Allen, VA
- Lead Programmer   May 2013 - Jul 2015
- FTC Captain   Jul 2015 - Feb 2016

Deep Run High School   Glen Allen, VA
- Founder / Leader of Computer Club Game Design Division   Oct 2012 - May 2015
- CyberPatriot (JV Captain)   Oct 2012 - May 2015

Technical Work Experience
New York University
Adjunct Professor - CS-GY 6553 / CS-UY 4553   Brooklyn, NY
- Co-taught the undergraduate / graduate level spring semester Game Design class   Jan - May 2023, 2024
- Created and taught lectures and ran administrative tasks such as entering grades
- Answered student questions and aided with game engine technical difficulties
- Critiqued and reviewed prototype games during class presentations
- Taught Spring semester 2023 and 2024

Teaching Assistant   Brooklyn, NY
- Teaching assistant for multiple CS graduate and undergraduate classes   Aug 2020 - Dec 2023
- Artificial Intelligence (CS-GY 6613) - Fall semester 2020 and 2021
- AI for Games (CS-GY 6943) - Spring semester 2021
- Game Design (CS-UY 4553, CS-GY - 6553) - Spring semester 2022 and Fall semester 2023
- Graded projects, wrote homework assignments, and tutored during office hours

modl.ai
Research Consultant Contractor   Copenhagen, Denmark (Remote)
- Researched and developed the flexible replay prototype system for the startup modl.ai   Jul 2023 - Sep 2023
- Used the Unity game engine to develop a regression testing game environment
- Designed and developed a local search-based agent to replay and adapt to user playtraces of levels

LAIKA Team
Research Consultant Contractor   Copenhagen, Denmark (Remote)
- Researched and developed the Character Creator tool for the startup company LAIKA   May 2022 - Aug 2022
- Researched up-and-coming NLP technologies to implement in the LAIKA product

Virginia Commonwealth University   Richmond, VA
Teaching Assistant - CMSC 257   Aug 2018 - May 2019
- Teaching assistant grading projects, aiding with lab assignments, and tutoring during office hours

CodeVA   Richmond, VA
Teaching Assistant - Game Design Summer Camp   Aug 2015 - Sep 2015

- Assisted with teaching Scratch and game development to elementary school children

University of Richmond   Richmond, VA
Web Services Intern   Jun 2015 - Aug 2015
- Intern to the back-end web services team monitoring statistics for web traffic

Invited Talks, Conferences, and Workshops
Schloss Dagstuhl Seminar 2024   Wadern, Germany
- Invited to attend Schloss Dagstuhl Seminar 2024   Jun 2024
- Seminar Topic: Computational Creativity for Game Development

MIT / Foster America Youth Tech Workshop 2023   New York, NY
- Invited panelist for the first MIT / Foster America Youth Tech Workshop   Dec 2023
- Talked about research work and life story to foster youth ages 16-25
- Discuss generative AI and brainstormed app product design in break-out groups

ALOE Workshop 2023   New Orleans, LO
- Invited speaker for the Agent Learning in Open-Ended Environments Workshop Dec 2023
- Workshop during the NeurIPS 2023 conference in New Orleans, Louisiana
- Talk Title: Amorphous Fortress: Exploring Emergent Behavior in Open-Ended Simulations

Games for Change 2023   New York City, NY
- Invited speaker for the Games for Change conference in New York City, New York Jul 2023
- Talk Title: Using AI in Game Design

PWLConf 2022   St. Louis, MO
- Invited speaker for the Papers We Love conference in St Louis, Missouri   Sep 2022
- Talk Title: 3CG: Collaborative and Creative Content Generation in Game Design

Game Devs of Color 2022   Virtual
- Invited speaker for the Game Devs of Color conference (virtual)   Sep 2022
- Talk Title: Developing Cooler PCG Systems based on Real-Time Player Input

Technical Skills
Programming Languages
- Javascript, Python (Keras, Tensorflow, numpy, matplotlib, regex), PHP, MySQL, C#, C++, C, Java, Perl
Software, game engines, and operating systems
- HTML5, AWS, Heroku, Unity, PICO-8, Bitsy, Google Sheets, git, jupyter-notebook, unix, MACOS, Windows

Publications
- **Charity, M.**, Earle, S., Rajesh, D., Wilson, M., & Togelius, J. (2024, July) Amorphous Fortress: Observing Emergent Behavior in Multi-Agent FSMs. arXiv preprint arXiv:2306.13169. In the Proceedings of the World Congress on Computational Intelligence, 2024.
- Anjum, A., Li, Y., Law, N., **Charity, M**., & Togelius, J. (2024, May) The Ink Splotch Effect: A Case Study on ChatGPT as a Co-Creative Game Designer. In the Proceedings of the 19th International Conference on the Foundations of Digital Games.
- Earle, S., **Charity, M**, Rajesh, D., Wilson, M., & Togelius, J. (2023, December). Quality Diversity in the Amorphous Fortress : Evolving for Complexity 0-Player Games. Accepted to ALOE 2023.
- Merino, T., Negri, R., Rajesh, D., **Charity, M.**, & Togelius, J. (2023, October). The Five-Dollar Model: Generating Game Maps and Sprites from Sentence Embeddings. In Proceedings of the AAAI Conference on Artificial Intelligence and Interactive Digital Entertainment (Vol. 19, No. 1, pp. 107-115).
- **Charity, M**., Bhartia, Y., Zhang, D., Khalifa, A., & Togelius, J. (2023, August). A Preliminary Study on a Conceptual Game Feature Generation and Recommendation System. arXiv preprint arXiv:2308.13538.
- **Charity, M.**, Rajesh, D., Earle, S., & Togelius, J. (2023, July). Amorphous Fortress: Observing Emergent Behavior in Multi-Agent FSMs. arXiv preprint arXiv:2306.13169. Artificial Life Conference - ALIFE for and from Games Workshop, 2023.

- Merino, T., **Charity, M**., & Togelius, J (2023, April). Interactive Latent Variable Evolution for the Generation of Minecraft Structures. International Conference on the Foundations of Digital Games Workshop on Procedural Content Generation.
- **Charity, M.**, Dave, I., Khalifa, A., & Togelius, J. (2022, November). Baba is Y'all 2.0: Design and Investigation of a Collaborative Mixed-Initiative System. IEEE Transactions on Games.
- Green, M. C., Khalifa, A., **Charity, M.**, & Togelius, J. (2022, September). Persona-driven Dominant/Submissive Map (PDSM) Generation for Tutorials. In Proceedings of the 17th International Conference on the Foundations of Digital Games (pp. 1-10).
- **Charity, M.**, & Togelius, J. (2022, October). Aesthetic Bot: Interactively Evolving Game Maps on Twitter. In Proceedings of the AAAI Conference on Artificial Intelligence and Interactive Digital Entertainment (Vol. 18, No. 1, pp. 18-25).
- **Charity, M**., Memon, N., Jiang, Z., Sen, A., & Togelius, J. (2022, September). Diversity and Novelty MasterPrints: Generating Multiple DeepMasterPrints for Increased User Coverage. In 2022 International Conference of the Biometrics Special Interest Group (BIOSIG) (pp. 1-4). IEEE.
- **Charity, M**., & Togelius, J. (2022, August). Keke AI Competition: Solving puzzle levels in a dynamically changing mechanic space.
- Green, M. C., Khalifa, A., **Charity, M.**, Bhaumik, D., & Togelius, J. (2022, July). Predicting Personas Using Mechanic Frequencies and Game State Traces. In 2022 IEEE Congress on Evolutionary Computation (CEC) (pp. 1-8). IEEE.
- Jaramillo, C., **M. Charity**, R. Canaan, and J. Togelius. (2020, October) Word Autobots: Using Transformers for Word Association in the Game Codenames. *Proceedings of the AAAI Conference on Artificial Intelligence and Interactive Digital Entertainment*, vol. 16, no. 1, Oct. 2020, pp. 231-7
- **Charity, M**., D. Rajesh, R. Ombok, and L. B. Soros. (2020, October) Say 'Sul Sul!' to SimSim, A Sims-Inspired Platform for Sandbox Game AI. *Proceedings of the AAAI Conference on Artificial Intelligence and Interactive Digital Entertainment*, vol. 16, no. 1, Oct. 2020, pp. 182-8
- **Charity, M.,** Khalifa, A., & Togelius, J. (2020, July). Baba is Y'all: Collaborative Mixed-Initiative Level Design. 2020 IEEE Conference on Games (CoG), 542-549.
- **Charity, M.,** Green, M. C., Khalifa, A., & Togelius, J. (2020, September). Mech-elites: Illuminating the mechanic space of gvg-ai. In International Conference on the Foundations of Digital Games (pp. 1-10).