

Erin McGowan

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Education

New York University Tandon School of Engineering

New York City

Ph.D. Computer Science

Sept 2022 – Present

- **Anticipated Graduation Date:** 05/2027, **GPA** 3.86/4.0
- Member of the [Visualization, Imaging, and Data Analysis Center](#) advised by [Claudio Silva](#)
- Recipient of the **Future Leader Fellowship**, the most competitive full funding award for Ph.D. students at Tandon
- **Relevant Coursework:** Big Data, Information Visualization, Visualization for Machine Learning, Machine Learning, Computer Graphics (C++), Design & Analysis of Algorithms I & II

Rutgers University

New Brunswick

B. A. Mathematics

Sept 2018 – May 2022

- **Minors** in Computer Science and Comparative Literature, **GPA** 3.79/4.0, graduated **Magna Cum Laude**
 - **Relevant Coursework:** Introduction to Artificial Intelligence, Brain-Inspired Computing, Principles of Information and Data Management (SQL), Introduction to Data Structures and Algorithms (Java), Introduction to Computer Science (Java), Introduction to Mathematical Reasoning, Mathematical Theory of Probability, Linear Optimization, Introduction to Linear Algebra (MATLAB), Linear Algebra, Abstract Algebra I, Cryptography, Graph Theory, Introduction to Real Analysis, Elementary Differential Equations, Multivariable Calculus, Introduction to Cognitive Science, Basic Statistics for Research
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Research

Perceptually-enabled Task Guidance

Sept 2022 – Present

with Dr. Claudio Silva

VIDA Center, New York University

- Worked with a team to develop [ARGUS](#), a visual analytics system for easy analysis of multimodal sensor data and ML model outputs used by researchers on the [DARPA Perceptually-enabled Task Guidance project](#) who seek to build an augmented reality (AR) assistant, using D3.js, JavaScript, and Python
- Wrote paper as joint first author titled "[ARGUS: Visualization of AI-Assisted Task Guidance in AR](#)," which earned a Best Paper Honorable Mention at IEEE Transactions on Visualization and Computer Graphics 2023
- Developing [ARPOV](#), a tool for creating and analyzing panoramic mosaic-based visualizations of object detection outputs tailored to AR applications, using OpenCV.js, WebGL, Javascript, and Three.js

Network Analysis for Drug Repurposing

June 2022 – Sept 2022

with Dr. Qian Zhu

National Center for Advancing Translational Sciences

- Extracted and cleaned data relevant to glioblastoma (brain tumors) from the NCATS Genetic and Rare Diseases Knowledge Graph database to construct an approximately 1500-node graph network using Neo4j, Cypher, and Python
- Performed network analysis on the graph network using Gephi, identifying 4 promising potential candidates for drug repurposing to treat glioblastoma and prompting two follow-up validation studies which began after my departure
- Presented findings at the National Institutes of Health (NIH) and National Center for Advancing Translational Sciences (NCATS) summer poster days
- Wrote a paper as first author titled "[Integrative Rare Disease Biomedical Profile-based Network Supporting Drug Repurposing, A Case Study of Glioblastoma](#)," which was published in the *Orphanet Journal of Rare Diseases*

Artificial Social Intelligence for Successful Teams

Feb 2021 – May 2022

with Dr. Patrick Shafto

CoDaS Lab, Rutgers University-Newark

- Worked with a team to develop a platform for conducting Theory of Mind (ToM) experiments via single and multiplayer games using Python, JavaScript, Heroku, Firebase, Redis, Socket.IO, FastAPI, and Git as part of the DARPA ASIST project
- Wrote Python script to preprocess JSON files from Firebase database using NumPy and Pandas

Physics-Informed Convolutional Neural Networks

May 2021 – Jan 2022

with Dr. Weihong 'Grace' Guo

DIMACS Center, Rutgers University

- Created a physics-driven convolutional neural network that predicts the porosity (a defect) of objects created via laser metal deposition (3D-printed metals) using Python, Keras, Scikit-learn, NumPy, Pandas, MATLAB, and Google Colab during the 2021 DIMACS REU Program (and continued to work with faculty mentor after duration of the REU program)
- Investigated the impact of incorporating physics-informed constraints into the CNN architecture itself via custom loss functions
- Published a paper as first author in *Sensors* journal titled "A Physics-Informed Convolutional Neural Network with Custom Loss Functions for Porosity Prediction in Laser Metal Deposition"
- Presented findings to REU administration, faculty mentors, and peers (presentation slides, research log, and further details linked above)

Publications (*Denotes Joint First Authors, **Denotes Best Paper Honorable Mention)

- **McGowan, E.**, Brewer, E., Silva, C. (2023). ARPOV: Expanding Visualization of Object Detection in AR with Panoramic Mosaic Stitching. *In Submission*.
- Castelo, S.* , Rulff, J.* , **McGowan, E.*** ,..., Silva, C. (2023). ARGUS: Assistive visualization of human-AI collaboration for task guidance in augmented reality.** *IEEE Transactions on Visualization and Computer Graphics*, doi: 10.1109/TVCG.2023.3327396.
- **McGowan, E.**, Sanjak J., Mathé E., Zhu Q. (2023). Integrative Rare Disease Biomedical Profile-based Network Supporting Drug Repurposing, A Case Study of Glioblastoma. *Orphanet J Rare Dis* 18, 301. doi:10.1186/s13023-023-02876-2
- **McGowan, E.**, Gawade, V., Guo, W. (2022). A Physics-Informed Convolutional Neural Network with Custom Loss Functions for Porosity Prediction in Laser Metal Deposition. *Sensors*, 22(2). doi:10.3390/s22020494

Presentations

- Castelo, S.* , Rulff, J.* , **McGowan, E.*** ,..., Silva, C. (2023). ARGUS: Assistive visualization of human-AI collaboration for task guidance in augmented reality. *IEEE VIS 2023, online presentation*.
- **McGowan, E.**, Sanjak J., Mathé E., Zhu Q. (2022). Integrative Rare Disease Biomedical Profile-based Network Supporting Drug Repurposing, A Case Study of Glioblastoma. *National Institutes of Health Summer Poster Day and National Center for Advancing Translational Sciences Summer Poster Day*.
- **McGowan, E.**, Gawade, V., Guo, W. (2021). A Physics-Informed CNN for Porosity Prediction in Laser Metal Deposition. *Center for Discrete Mathematics and Theoretical Computer Science REU Symposium*.
- **McGowan, E.** Quincy, R. (2020). A Case Study of the Arturos and Ciriacos Communities in Brazil. *16th Annual Aresty Undergraduate Research Symposium*.

Selected Projects

DatasetsSummarizer

May 2022

- Worked with a team of three to develop a dashboard of interactive visualizations which describe and compare features of a large number of datasets in a single view (compatible with Jupyter Notebooks)
- Presented findings in journal article-style project report and video demo

PatentLLM Dec 2022

- Worked with a team of three to develop an augmented hierarchical transformer model for patent acceptance prediction using pytorch
- Presented findings in journal article-style project report (linked above)

AIDA Feb 2022

- Worked with a partner to develop an application that creates and suggests AI-generated image descriptions for Twitter users to add to their tweets before posting
- Independently implemented NLP model in Python for image description generation
- Won Best Overall Hack and Best AI Hack at a Rutgers University hackathon (HackHers 2022)

Face and Digit Classifiers Dec 2021

- Worked with a partner to implement perceptron classifiers, naive Bayes classifiers, and k-nearest neighbors classifiers from scratch in Python

Selected Work Experience

Teaching Assistant, Visualization for Machine Learning Jan 2024 – May 2024
NYU Center for Data Science *part-time*

- Plans and leads weekly lab lessons about data visualization for the purpose of developing explainable and trustworthy machine learning models
- Addresses student inquiries at weekly office hours

Senior Peer Instructor May 2021 – May 2022
Rutgers Aresty Research Center *Remote, part-time*

- Managed small group of Peer Instructors (see below)
- Planned and hosts recruitment events as the Chair of the Outreach and Events Committee

Peer Instructor Sept 2020 – May 2021
Rutgers Aresty Research Center *Remote, part-time*

- Mentored undergraduates during their first research experience by facilitating biweekly meetings that include discussions and activities related to different facets of research (e.g. ethics, effective oral presentation skills) in order to prepare research assistants to present at the Aresty Undergraduate Research Symposium
- Planned and hosted community service events as member of the Community Service Committee

Learning Assistant Sept 2020 – May 2021
Rutgers Learning Centers *Remote, part-time*

- Facilitated workshop discussions in an upper-level math course (Introduction to Mathematical Reasoning/Math 300)
- Hosted a formal study group for women-identifying students in the course

Leadership & Advocacy

Postgraduate Liaison Oct 2022 – Present
oSTEM at NYU

- Plans and hosts professional development and community-building events for LGBTQ+ STEM students with a focus on the graduate student experience

President Apr 2021 – May 2022
Rutgers Queer Caucus

- Set the agenda for and facilitates biweekly meetings with the Queer Caucus general body, which consists of the executive board members of all student organizations affiliated with the Center for Social Justice Education and LGBT Communities at Rutgers (SJE)
- Served on the Vice Chancellor for Student Affairs' Student Advisory Council
- Maintained frequent contact for collaboration with the other three cultural council presidents

Co-President

Apr 2020 – May 2022

oSTEM at Rutgers

- Collaborated with global nonprofit Out in STEM and Center for Social Justice Education and LGBT Communities to plan and host professional and social events for LGBTQ+ STEM students
- Secured and managed thousands of dollars in funding from the undergraduate student assembly each semester

HC Ally Mentor

Aug 2020 – May 2021

The Honors College of Rutgers

- Provided academic guidance and social support to a small group of Honors College scholars throughout their first year of college

Awards and Honors

- **Awards:** NYU Tandon Future Leader Fellowship (Ph.D. full funding), National Merit Scholarship, Rutgers Trustee Scholarship, Henry Rutgers Scholarship
- **Honors:** Best Paper Honorable Mention (IEEE VIS 2023), Dean's List (all 8 undergraduate semesters), Best Overall Hack and Best AI Hack (HackHers at Rutgers 2022), Best First Time Hack and Wakefern Corporate Challenge Runner-Up (HackHers at Rutgers 2020), Best Essay in an English 300 Level course (2020), NJ State Seal of Biliteracy in Latin

Skills and Qualifications

- **Languages:** Python, JavaScript, C++ , Java, SQL, Cypher, MATLAB, HTML/CSS, LaTeX
- **Technical Proficiencies:** PyTorch, Keras, Tensorflow, Scikit-learn, NumPy, Pandas, OpenCV, MySQL, Apache Spark, Neo4j, D3.js, Three.js, WebGL, OpenGL, Git, Heroku, Firebase, Redis, Socket.IO, FastAPI, VS Code, Jupyter Notebooks, Google Colab, Gephi, Tableau, NVivo
- CITI certified in Human Research, Social/Behavioral/Epidemiologic Research Investigators
- Completed certification course on Translational Science in the COVID-19 Pandemic via the National Center for Advancing Translational Sciences (NCATS)

Conferences

IEEE VIS (2023); Grace Hopper Celebration (2023, 2021); Out for Undergrad Tech (2021, 2020); oSTEM + Out to Innovate (2020)

Research Interests

Machine learning, artificial intelligence, augmented reality, human-computer interaction, data visualization and analytics