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** 3.78/4.0
- 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 Computer Science and Engineering Dept. Ph.D. students at Tandon
- **Relevant Coursework:** Visualization for Machine Learning, Machine Learning, Information Visualization, Computer Graphics, Big Data, 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

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 multimodal sensor data 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
- Developed *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 a graph network of almost 1500 nodes containing data relevant to glioblastoma (brain tumors) from the NCATS Genetic and Rare Diseases Knowledge Graph database 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)

- Castelo, S.*, Rulff, J.*, **McGowan, E.***,..., Silva, C. (2023). ARGUS: Assistive visualization of human-AI collaboration for task guidance in augmented reality.** Accepted *IEEE Transactions on Visualization and Computer Graphics, 23.*
- **McGowan, E.**, Sanjak J., Mathé E., Zhu Q. (2023). Integrative Rare Disease Biomedical Profile-based Network Supporting Drug Repurposing, A Case Study of Glioblastoma. Accepted *Orphanet Journal of Rare Diseases.*
- **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

- **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 natural language processing 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 create perceptron classifiers, naive Bayes classifiers, and k-nearest neighbors classifiers for both faces (labeled each image as ”face” or ”no face”) and digits (labeled each image as one of the ten digits 0-9) in Python

A* Pathfinding Agent Oct 2021

- Worked with a partner to create a random gridworld generator in Python
- Implemented forward, backward, and adaptive A* searches from an agent space to a target space in said gridworld in Python

Statistical Analysis Project Dec 2020

- Analyzed sample car data using Microsoft Excel by calculating descriptive statistics, confidence intervals, and correlation between variables, conducting hypothesis tests, ANOVA tests, and a regression analysis, and generating various data visualizations

Shoprite Saver Search Feb 2020

- Worked with a team to build and demo a web application within 24 hours at a hackathon (HackHers 2020)
- Independently built the front end using HTML and CSS, utilized Python to integrate with the back end
- Won Best First Time Hack, Runner-Up for Wakefern Corporate Challenge

Work Experience

Senior Peer Instructor May 2021 – May 2022

Rutgers Aresty Research Center *Remote, part-time*

- Promoted from Peer Instructor (see below)
- Managed small group of Peer Instructors
- 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

Research and Program Development Intern June 2020 – July 2020

Impact Center *Remote, part-time*

- Conducted comparative research on how Continuums of Care for homeless individuals are responding to the COVID- 19 crisis in order to improve the effectiveness of current virus transmission-mitigating measures
- Developed an after-action report for jurisdictions in San Diego and San Francisco, California, where the U.S. homelessness crisis is most severe
- Compiled data from over 500 news articles into two timelines, one outlining the spread of COVID-19 in San Diego and the other outlining the spread of COVID-19 in San Francisco, both of which were included in the aforementioned after-action report
- Delivered a virtual presentation on my findings to the CEO, the Program and Operations Director, and my intern cohort

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 as the representative for SJE on the Vice Chancellor for Student Affairs' Student Advisory Council
- Maintained frequent contact and served as a liaison for collaboration with the other three cultural council presidents

Co-President Apr 2020 – May 2022

oSTEM at Rutgers

- Collaborated with the global organization Out in STEM and the Center for Social Justice Education and LGBT Communities at Rutgers to 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 Overall Hack and Best AI Hack (HackHers at Rutgers 2022), Best First Time Hack and Wakefern Corporate Challenge Runner-Up (HackHers at Rutgers 2020), NJ State Seal of Biliteracy in Latin, Italian Department Award for Best Essay in an English 300 Level course, Dean's List (all 8 semesters)

Skills and Qualifications

- **Languages**: Python, JavaScript, Java, SQL, Cypher, MATLAB, Maple, HTML/CSS, LaTeX
- **Technical Proficiencies**: PyTorch, Keras, Scikit-learn, NumPy, Pandas, OpenCV, MySQL, Neo4j, D3.js, Three.js, WebGL, 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)

Research Interests

Data visualization, human-computer interaction, augmented reality, artificial intelligence, machine learning, application of the previous in healthcare