

Harrison Green



838 Park Ave
River Forest, Illinois
60305

harrisonmichaelgreen@gmail.com
<https://harrisongreen.me>

+1 708 209 9683

University of Pittsburgh

University of Pittsburgh / B.S. Computer Science, Minor Chemistry

- Honors College
- University of Pittsburgh Scholarship

Pittsburgh
Aug/17 - Apr/21

UTA for CS 0447 "Computer Organization & Assembly Language"

- Held office hours (15 hr/week)
- Ran recitations (once per week for each section)

Pittsburgh
Spring/19 (2 sections)
Fall/18

Clubs & Activities

Pitt Crypto (founded and ran meetings)

Russian Club

Intramural Soccer

Pitt Computer Science Club

Pitt Robotics & Automation Society (built AI tools for IARC 7 competition)

Research Experience

Durrant Lab @ Pitt / Computational Biology Research

- Developing machine-learning tools to design and optimize small-molecule drugs.
- Wrote JIT GPU-accelerated code with Numba that increased data augmentation speed by more than 100x.
- Wrote MPI parallelization code with mpi4py that allowed a task to run in less than 2 minutes across a supercomputing cluster instead of 31 hours.

Pittsburgh
Aug/19 - Current
Aug/18 - Apr/19

iGEM Summer Research Fellowship / Synthetic Biology Research

- Won Gold medal at iGEM 2019 Giant Jamboree.
- More info: (<https://2019.igem.org/Team:Pittsburgh>)
- **Computational:**
 - Designed and tested novel synthetic protein constructs to mimic intracellular logic gates for rapid, artificial signaling pathways.
 - Developed computational tools to assist protein construct design using genome and intein databases.
 - Developed tools to predict results of SDS-Page gels and ensure constructs would be distinguishable.
 - Developed Pittsburgh iGEM website (above).
- **Wetlab:**
 - Gibson cloning, DNA transformation, protein expression (in *E. coli*) and purification, *in-vitro* protein assays, SDS-Page gels.

Pittsburgh
May/19 - Jan/20

Work Experience

Durrant Lab @ Pitt / Research Technician

- See above

Pittsburgh
Apr/21 - Current

ForAllSecure / Software Engineer Intern

- Develop tools for automated structure-aware fuzzing.
- Found and reported several security vulnerabilities in popular open source projects.

Pittsburgh
Sep/20 - Current
Feb/20 - May/20

Google Brain / Software Engineer Intern

- Expanded the capabilities of bulk inference in TensorFlow Extended while working with teams from Google Cloud and Apache Beam to ensure efficiency and interoperability.

Mountain View (remote)
May/20 - Aug/20

Lucy Labs CryptoFinance / Software Engineer Intern

- Researched cryptocurrencies and developed real-time blockchain analysis tools that support efficient graph queries with Neo4j and Cypher.

New York (remote)
May/18 - Aug/18

IFM Technologies / Software Engineer Intern

- Independently developed a drone control interface with an Angular frontend and a NodeJS/Cassandra backend.
- Created a RESTful API server to run data processing jobs and to facilitate ROS/WebSocket communications between system components.

Chicago
Jun/16 - Sep/16

Channel IQ (acquired by Numerator) / Software Engineer Intern

- Developed .NET MVC UIs in C# to visualize and administrate large Cassandra datasets.
- Wrote automated Scala tasks to perform data processing with Apache Spark in a continuous integration workflow.

Chicago
Jun/15 - Feb/16

Publications

Green, H., Koes, D. R., & Durrant, J. D. (2021). **DeepFrag: a deep convolutional neural network for fragment-based lead optimization.** *Chemical Science*.

Green, H., & Durrant, J. D. (2021). **DeepFrag: An Open-Source Browser App for Deep-Learning Lead Optimization.** *Journal of Chemical Information and Modeling*.

Ropp, P. J., Spiegel, J. O., Walker, J. L., Green, H., Morales, G. A., Milliken, K. A., Ringe, J. J., & Durrant, J. D. (2019). **Gypsum-DL: an open-source program for preparing small-molecule libraries for structure-based virtual screening.** *Journal of Cheminformatics*, 11(1), 34. <https://doi.org/10.1186/s13321-019-0358-3>

GraphFuzz: Fuzzing Low Level API with Dataflow Graphs (first author, forthcoming)

- Working at ForAllSecure, I've developed several techniques to improve automated structure-aware fuzzing for vulnerability discovery. Specifically, my research involves modeling a series of API calls as a direct acyclic graph and designing new algorithms to perform graph mutations. This approach makes it easier to fuzz targets with complex API patterns such as graphics libraries, scientific computing libraries and databases. Using this technique, I've already discovered several security vulnerabilities in popular open source projects including the Skia graphics library, which is used in Chrome and Android.

Presentations

TheHackerMind Ep. 24: "Hacking Biology"

- <https://thehackermind.com/ep-24-hacking-biology>
- Interviewed by Robert Vamosi on TheHackerMind podcast

Online
June/21

NYU CSAW HackML / Team SiceML

- Won "1st place Attack"
- Competed in the NYU CSAW HackML competition and presented the project during the final round to a live audience.
- Ran a live-demo and answered questions during a poster presentation.

New York
Nov/19

iGEM 2019 / Team Pittsburgh

- Presented research findings to 50+ audience members
- Presented a research poster during a 3 day conference

Boston
Oct/19

CURE Lab / Antibiotics Discovery

- Held a poster presentation to present research from the CURE Lab course at the University of Pittsburgh.

Pittsburgh
Apr/19

Tech Crunch Disrupt / IFM Technologies

- Participated in IFM Technologies' presentation at the Tech Crunch Disrupt competition.

San Fransisco
Sep/16

CTF (Cybersecurity Competitions)

Individual Awards

GoogleCTF 2020 / Most Creative Writeup (1 of 10 awarded)

- <https://ctf.harrisongreen.me/2020/googlectf/exceptional/>

GoogleCTF 2020 / Best Writeup (1 of 30 awarded)

- https://ctf.harrisongreen.me/2020/googlectf/registers_matter/

Team Awards

Square CTF 2020 / 1st place

Online

NYU CSAW CTF Finals 2020 / 7th place

New York*

Booz Allen Hamilton HackIN 2020 / 1st place

Online

Midnight Sun CTF 2020 Finals / 2nd place

Stockholm*

UIUCTF 2020 / 1st place

Online

NYU CSAW CTF Finals 2019 / 3rd place

New York

Tencent CTF 2019 Finals / 11th place

Shanghai

NYU CSAW CTF Finals 2018 / 18th place

New York

Projects

- bn-riscv-disassembler** / github.com/hgarrereyn/bn-riscv-disassembler **2020**
- Built with: **Python**
 - A RISC-V disassembler plugin for Binary Ninja.
- riscv-sym** / github.com/sicesquad/riscv-sym **2020**
- Built with: **Python, Z3**
 - A RISC-V symbolic execution engine built with Z3 developed for use in the CSAW ESC 2020 competition.
- Clairvoyance** / github.com/hgarrereyn/Clairvoyance **2019**
- Built with: **NodeJS, Express, JavaScript, HTML5, PixiJS, Socket.IO**
 - An unofficial, offline replay viewer for MIT Battlecode 2019
 - Won “Most valuable community contribution”
- OCRaAP** / github.com/hgarrereyn/OCRaAP **2018**
- Built with: **Python, TensorFlow, NumPy, OpenCV**
 - A graphical programming language interpreter where you write programs by drawing symbols on a piece of paper. Developed as a joke.
- MiniBit** / harrisongreen.me/minibit/ **2017**
- Built with: **Integrated circuits, wires**
 - A custom designed 8-bit CPU built out of integrated circuits on a bunch of breadboards.
- MiniBit-Verilog** / github.com/hgarrereyn/MiniBit-Verilog **2017**
- Built with: **Verilog**
 - A full Verilog implementation of my MiniBit computer used for debugging and development.
- AudioScroll** / github.com/hgarrereyn/AudioScroll-Extension **2015**
- Built with: **JavaScript**
 - A Chrome extension that uses the doppler effect to detect hand motion in front of a microphone which is used to scroll a web page.

Hobbies & Interests

Piano + Guitar
Bouldering
Soccer
Foreign Languages