

Dylen Greenenwald

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RESEARCH INTERESTS

My interests include everything from web privacy all the way down to secure systems development. My current work focuses primarily on web and mobile device privacy; I specialize in identifying and remediating tracking mechanisms related to the online advertising ecosystem with particular attention on browser fingerprinting and audio-based interest tracking. Most of my research comes down to optimizing the trade-off between privacy and utility on the Web.

EDUCATION

University of Illinois at Urbana-Champaign, Urbana, IL August 2024 — May 2030
Ph.D. in Computer Science, *in progress*

University of Illinois at Chicago, Chicago, IL August 2022 — May 2024
B.S. in Computer Science
Summa Cum Laude

College of Lake County, Grayslake, IL August 2019 — December 2021
A.S. in General Studies

ACADEMIC EXPERIENCE

University of Illinois Urbana-Champaign Champaign, IL
Research Assistant August 2024 — Present

Online advertisements appear to become more targeted each day. While it is well documented that there are a plethora of signals that advertisers use to target ads, it remains unclear how they are able to obtain certain pieces of very personal information. In pursuit of answers to this question, I formed an interdisciplinary team to understand how mobile applications are using the microphone. We instrument the Android Permission Manager, AppOps Manager, and application-level recording APIs to analyze access control patterns that concern audio input.

Man-in-the-middle attacks have been a threat to ordinary users since the inception of the web. To reduce the likelihood of occurrence, Certificate Transparency was introduced. However, it remains unclear how effective it can be as there are generous windows to merge certificates into the CT logs (under which an attack could very well be carried out). Thus, we measure the CT ecosystem at large, seeking to understand the security implications of current CT log server implementations.

University of Utah Salt Lake City, UT
Research Assistant May 2024 — August 2024

As everyday life becomes more closely integrated with the Internet, ordinary citizens are becoming increasingly involved with online security and privacy mechanisms. Consequently, it has become nearly unavoidable to study computer security without an eye on the sociotechnical components. Mentored by Sameer Patil, I analyzed social engineering campaigns at scale. Specifically, we sought to identify structural patterns across thousands of user-reported phishing email scams in an effort to characterize the nature of identifiable social engineering attacks, contrasting them against their successful counterparts.

University of Illinois at Chicago Chicago, IL
Undergraduate Researcher August 2023 — May 2024

User privacy on the web is more important than ever before. In this increasingly untrustworthy online environment, many have decided to rely on browser extensions and other software to prevent adversarial tracking. The first project I worked on focused on trackers' and advertisers' potential to circumvent popular ad-blockers by navigating privacy-invasive traffic through inbuilt browser schemes (e.g. "about:blank"). Since most ad-blocking software relies on the origin of the entity requested by the user's browser, these routes – which essentially have no origin – present a unique property that is ripe for exploitation. Our goal was to showcase how this property can be leveraged to bypass mainstream ad-blocking filters, sowing the seeds for improvements to these technologies.

Often times, people may be enticed by a particularly well-personalized ad presented through arbitrary means. Ad re-targeting is a phenomenon in which users who get close to purchasing a product are followed across the web and bombarded with re-solicitations of the item. Currently, I am working on building data collection infrastructure for a project that seeks to measure, and consequently understand the effects and scale of this prominent issue with respect to the feasibility of a recently discovered privacy attack. We aim to expand upon and branch off from the findings of *Cart-ology* (CCS '22) by examining whether these attacks (referred to as "identity entanglement"), wherein the attacker infers sensitive information about a victim through ad interception via the knowledge of limited durable identifiers (e.g. an email address), is possible in the context of an ad ecosystem that is shifting its reliance from third-party cookies to identity provider platforms.

Several methods have enabled the pervasive tracking of users on the web, most notably through the use of third-party cookies. However, as all major browser vendors have already deprecated this mechanism or have announced plans to do so soon, other dangerously effective strategies for tracking have emerged. A large portion of the past decade of research in web security has delved deep into the capabilities and consequences of browser fingerprinting; recent work has even shown that authentication mechanisms can be bypassed through mimicking a victim's fingerprint. My project focused on extending upon this finding from *Phish in Sheep's Clothing* (Usenix Security '22) and *Cart-ology* (CCS '22) to see if identity entanglement attacks can be performed solely through spoofing a victim's fingerprint to advertising entities. We developed tooling to identify browser fingerprinting practices at the granularity of the frame (e.g. iframe, top-level, etc), then leveraged this tool to conduct a large-scale comparative analysis on fingerprinting techniques employed by popular websites.

University of Illinois at Chicago

Teaching Assistant

Chicago, IL

January 2023 — May 2024

Introductory and intermediate level courses compose the foundation for a computer scientist's understanding of the field; I have worked on several teaching staffs to date, including discrete mathematics (CS 151), program design (CS 141), machine organization (CS 261), and systems programming (CS 361). As part of each of these courses, I held office hours, conducted lab, and designed assignments. Each of these responsibilities refined a distinct skill: clear individual communication, orchestration of group collaboration, and instrumentation of critical thinking, both in myself and the students.

Project Vision

Tutor, Mentor

Chicago, IL

January 2023 — May 2023

Project Vision is a non-profit organization in the Chinatown area of Chicago that aims to enable opportunity to a historically at-risk and underprivileged population. I worked there as a tutor, mentoring students after school in various topics, including mathematics, statistics, physics, and computer science. Our staff not only facilitated academic improvement on the order of letter grades, but acted as role models for the kids, helping them to feel like they belong in an increasingly diverse academic community. Participation is free for students in the area, and there are support systems set up to ensure their continued success.

Code Ninjas

Code Sensei

Libertyville, IL

December 2022 — December 2023

Code Ninjas offers many programs to families which allow their kids to get started with programming early. The main curriculum is designed for students aged 7-15 years old, but there was also a series of "juniors" courses that engaged students as young as five years old. In addition to teaching students the fundamentals of programming through game development, we also offered camps during the summer and winter that centered on themes that excited the kids, such as Roblox, Minecraft, etc.

PROJECTS

Gather, *in progress*

February 2024 — Present

A light-weight web application for facilitating the painless management of social organization, whether it's for a casual meeting with friends or scheduling a formal dinner with colleagues. Gather allows users to form groups where they can easily schedule events through a simple iterative voting system and the applications internal interest maintenance, calendar management, and usage of an AI-powered web crawling worker. The project was built with an extensive technology stack, including (but certainly not limited to) Vue, Nuxt, Hano and deployed via Cloudflare Workers. It was developed as part of UIC's SparkHacks 2024 and received the 2nd place prize on the empowerment track. It is still in the early stages of development.

Personal Website, *in progress*

December 2023 — Present

A simple single-page application to serve as a one-stop shop for all things Dylen Greenenwald. It will feature a downloadable CV, personal interests and hobbies, a brief summarization of my background, available services along with contact information. The project is tentatively being built with Astro, Tailwind CSS, DaisyUI, and deployed with Cloudflare Workers. While it is currently not available in a functioning capacity, the site can be viewed at <https://greenenwald.com>. I plan on an initial release by the end of the summer of 2025.

SELECTED COURSES

Graduate Courses

- CS 523 - Advanced Operating Systems
- CS 563 - Advanced Computer Security
- CS 568 - Advanced Security and Privacy
- CS 594 - Topics in Applied Cryptography
- CS 598 - Endpoint Threat Detection & Investigation

Undergraduate Courses

- CS 398 - Undergraduate Research
- CS 361 - Systems Programming

Mixed Courses

- CS 484 - Secure Web Application Development
- CS 450 - Introduction to Networking
- CS 412 - Introduction to Machine Learning
- CS 401 - Computer Algorithms I

OTHER EXPERIENCES

Nvisia

Chicago, IL

DevSecOps Intern

December 2023 — January 2023

We worked in interdisciplinary teams to develop a full-stack web application that provides an internal profile-building service for Nvisia in order to market their consultants to clients without tediously refactoring resumes for each new project. I developed templated pipelines to facilitate the continuous integration and delivery of the frontend, backend, and database to the Azure Cloud environment. As part of this project, I interfaced directly with a Kubernetes cluster deployed to Azure for various diagnostic procedures and configured the ingress to the application through a secure, dedicated gateway. Additionally, I integrated all components of the application and began a database migration via Terraform.

SKILLS

Skill Domains: Security research, pentesting, networking, system administration, web development, DevSecOps

Programming: C, C++, C#, Java, JavaScript, TypeScript, Python, HTML/5, CSS, SQL, Rust, Golang, F#
Software: Azure Cloud, Kubernetes, Docker, React, Next, Express, Astro, Firebase, MongoDB, PostgreSQL, Unity
Soft Skills: Leadership, critical thinking, adaptability, clear communication, creativity

REFERENCES

Prof. Nikita Borisov

Professor, Computer Science, University of Illinois Urbana-Champaign

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Prof. Jason Polakis

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Dr. Bernard Dickens

Independent Developer, ErgoDark

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