Babak (Bob) AminAzad

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About Me

I'm a senior systems engineer and detection architect at Cloudflare where I work with the Bot Management R&D team and I am a member of the AI Bureau at Cloudflare. My main responsibility is to design and develop robust systems to detect and block unwanted bot traffic towards websites. I research and build detection signals, train and deploy machine learning models, and contribute to our MLOps pipeline. Most recently, I have designed and deployed HTTP/3 fingerprint, residential proxy signals, and trained bot detection ML models currently used in production running on more than 46 million HTTP requests per second. I serve on the program committee of multiple top tier security conferences. I have graduated with a PhD from the Stony Brook University in 2022 where I worked under the supervision of Professor Nikiforakis at the PragSec Lab. My main research focus aimed at uncovering vulnerabilities and practices, that make the web insecure. More specifically, my research goal was to make web applications safer, by reducing their attack surface through software debloating. I incorporate static and dynamic analysis techniques to identify unused features in web applications and remove them. In my prior work, I have showed that this method of attack surface reduction is highly effective in removing exploitable vulnerabilities from web applications. I make parsers, code analyzers and symbolic execution engines. Orthogonally to my work on attack surface reduction, I studied browser fingerprinting and designed mechanisms to detect malicious bots on the internet and protect websites by differentiating malicious bot traffic from regular users.

Education

- **PhD in Computer Science** Stony Brook, NY
  Stony Brook University — *2017 - 2022*
- **MSc in Computer Science** Stony Brook, NY
  Stony Brook University — *2017 - 2020*
- **BSc in Software Engineering** Tehran, IR
  Shahid Beheshti University — *2010-2015*

Experience

- **Cloudflare**
  Senior Systems Engineer — *Jan 2023 - Present*
  - **Bot Management Team**: I work with the Bot Management ML and R&D team at Cloudflare as a senior systems engineer and my focus is on designing and developing robust bot detection schemes including research for novel browser fingerprinting methods and building machine learning models to detect unwanted bot traffic.
- **Cloudflare**
  Software Engineer Intern — *2021*
  - **HTTP 3 and QUIC Fingerprinting**: I worked with the Bot Management team at Cloudflare as an intern for the summer of 2021. My focus was to build fingerprinting methods for emerging web protocols to detect bot traffic.
- **Cloudflare**
  Software Engineer Intern — *2020*
  - **Bots Red Team Automation Platform**: I worked with the Bot Management team at Cloudflare as an intern for the summer of 2020. My focus was on bots that target Cloudflare. I implemented a scalable red teaming platform that automated bot attacks against the Bot Management platform.
- **Stony Brook University** Stony Brook, NY
  Research Assistant — *2018 - 2022*
  - **PragSec Lab**: My main focus is on attack surface reduction through software debloating. Orthogonally, I work on the topics of browser fingerprinting, bot detection and other areas of web security.
- **Stony Brook University** Stony Brook, NY
  Teaching Assistant — *2017 - 2018*
  - **Courses**: Undergraduate operating systems and introduction to software security.

› **Kashef Banking Security Governance** Tehran, Iran
Incident Response Engineer *2014-2016*

- **Banking Websites' SSL Configuration Report and Hardening Guide**: This project spanned over 35 national banks' internet banking websites, SSL protocol configuration of these sites was studied, factors like security against SSL vulnerabilities (Heartbleed, POODLE, FREAK, LogJam etc.), certificate signature algorithm and cipher suites negotiated with clients were taken into consideration and a hardening report was delivered to their admins to address the issues.
- **Mobile Banking Software Security Report and Secure Android Development Guide**: The android version of mobile banking applications of 35 national banks was studied, features like secure software distribution, frequent updates, tamper detection and integrity verification, secure communication channel to the server, cryptographic protocols, insecure data storage and presence of source code protection was tested, during this study several high impact vulnerabilities were found and reported. Lastly, a secure android development guide was produced to address common pitfalls in applications tested during this study.

Talks and Publications

› **Using machine learning to detect bot attacks that leverage residential proxies (Link)**
Babak (Bob) AminAzad, *Santiago Vargas, Adam Martinetti* *Clouldflare blog 2024*

› **AnimateDead: Debloating Web Applications Using Concolic Execution**
Babak AminAzad, *Rasoul Jahanshahi, Christos Tsoukaladelis, Manuel Egele, and Nick Nikiforakis* *Usenix Security 2023*

› **Minimalist: Semi-automated Debloating of PHP Web Applications through Static Analysis**
Rasoul Jahanshahi, ***Babak AminAzad***, *Nick Nikiforakis, and Manuel Egele* *Usenix Security 2023*

› **Role Models: Role-based Debloating for Web Applications (Artifacts)**
Babak AminAzad, *and Nick Nikiforakis* *CODASPY 2023*

› **The Droid is in the Details: Environment-aware Evasion of Android Sandboxes**
Brian Kondracki, ***Babak AminAzad***, *Najmeh Miramirkhani, and Nick Nikiforakis* *NDSS 2022*

› **Catching Transparent Phish: Analyzing and Detecting Two-Factor Authentication Phishing Toolkits**
Brian Kondracki, ***Babak AminAzad***, *Oleksii Starov, and Nick Nikiforakis* *ACM CCS 2021*

› **Good Bot, Bad Bot: Characterizing Automated Browsing Activity**
Xigao Li, ***Babak AminAzad***, *Amir Rahmati, and Nick Nikiforakis* *IEEE S&P 2021*

› **Less is More (Artifacts)**
Babak AminAzad, *and Nick Nikiforakis* *SSSS 2020*

› **Web Runner 2049: Evaluating Third-Party Anti-bot Services (Video)**
Won the Best Video Presentation Award
Babak AminAzad, *Oleksii Starov, Pierre Laperdrix, and Nick Nikiforakis* *DIMVA 2020*

› **Taming The Shape Shifter: Detecting Anti-fingerprinting Browsers (Video)**
Babak AminAzad, *Oleksii Starov, Pierre Laperdrix, and Nick Nikiforakis* *DIMVA 2020*

› **Less is More (Invited talk)** Georgia Tech Cybersecurity Lecture Series
Web Application Attack Surface Reduction Through Software Debloating *April, 2020*

› **Gas What? I can see your GasPots. Studying the fingerprintablity of ICS honeypots in the wild**
Mohammad-Reza Zamiri-Gourabi, Ali Razmjoo-Qalaei, and ***Babak AminAzad*** *ACSAC ICSS 2019*

› **Less is More: Quantifying the Security Benefits of Debloating Web Applications**
OWASP Global AppSec DC *2019*

› **Less is More: Quantifying the Security Benefits of Debloating Web Applications (Video - Artifacts)**
Babak AminAzad, *Pierre Laperdrix, and Nick Nikiforakis* *Usenix 2019*

› **Fingerprinting users on the web.**
Babak AminAzad *P0SCON 2018*

› **Penetration Testing Methods for Android Applications.**
Babak AminAzad *1st OffseConf 2016*

› **Ransomware Threats and Mitigation Techniques.** 5th Annual Conference on EBanking and Payment Systems
Babak AminAzad *January, 2016*

SERVICES

- Reviewer for Usenix Security 2025
- Reviewer for the web conference, WWW 2025
- Reviewer for ACM CCS 2024
- Reviewer for Raid 2024 conference
- Reviewer for the web conference, WWW 2024
- Reviewer for RAID 2023 conference
- Reviewer for Transactions on The Web (TWEB) Journal in 2021
- OWASP Global Appsec San Fransisco 2020 Review Committee Member
- Usenix Security 2020 Artifact Evaluation Committee Member
- IEEE S&P 2020 Poster Review Committee Member
- MADWEB 2020 External Reviewer
- DIMVA 2019 External Reviewer
- IEEE S&P 2020 Shadow PC Member
- IMC 2019 Shadow PC Member
- NECCDC 2020 Proctor

AWARDS

- Best systems and security poster for "debloating web applications" Stony Brook Graduate Research Day 2022
- Best paper award for "Catching transparent phish: Analyzing and detecting MITM phishing toolkits" CSAW 2021
- Best presentation award for Web Runner 2049: Evaluating third-party anti-bot services DIMVA 2020