Abdul Haddi Amjad

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RESEARCH INTEREST

- Security & Privacy
- Software Engineering & Code Refactoring

OPEN SOURCE BUG HUNTING WITH WEBCHECK

We have reported the following issues to EasyList and EasyPrivacy authors on GitHub:

- #18244, #18243, #18242, #18230, #18185

EDUCATION

- **Virginia Tech**   Blacksburg, USA
  Ph.D. student in Computer Science   *Aug. 2021 – Present*
  - My research involves improving user privacy on websites by leveraging software engineering techniques and principles.
  - **Advisor:** Dr.Muhammad Ali Gulzar

- **National University of Computing and Emerging Sciences**   Lahore, Pakistan
  Bachelor of Science in Computer Science; GPA: 3.83/4.00   *Aug. 2017 – Aug. 2021*

RESEARCH WORK

- **Blocking Tracking JavaScript at the Function Granularity**:   Privacy-enhancing content blocking tools face challenges with mixed scripts that combine functionality and tracking. To address this, we propose NoT.JS, a JavaScript blocking tool that operates at a fine-grained, function-level granularity. NoT.JS analyzes dynamic execution contexts, including function call stacks and contexts, to create a detailed graph representation. Using supervised machine learning, NoT.JS identifies and removes tracking JavaScript functions while preserving functionality. Evaluation on top websites shows high precision (94%) and recall (98%), outperforming existing methods and resisting JavaScript obfuscation. NoT.JS successfully identifies and mitigates tracking in 62.3% of top websites' mixed scripts, predominantly third-party scripts engaged in tracking activities like cookie ghostwriting. Detected tracking functions not yet on filter lists are shared with filter list authors, revealing scripts that, while known for tracking, are spared due to potential functionality issues.

  - **Repository:** *here*.
  - **This work is under minor revision at ACM Conference on Computer and Communications Security (CCS), 2024**

- **Blocking JavaScript without Breaking the Web: An Empirical Investigation**: A large-scale measurement study of JavaScript (JS) blocking on 100K websites to determine whether blocking JS is feasible without breaking legitimate functionality. We evaluate the effectiveness of different JS blocking strategies in tracking prevention and functionality breakage using a combination of quantitative analysis and manual qualitative analysis. The results show that blocking all scripts is effective in reducing tracking but significantly degrades functionality on about two-thirds of the tested websites. Selective blocking based on a curated list provides a better tradeoff, but there are still about 15% of "mixed" scripts that can't be blocked without causing website breakage. Fine-grained blocking of a subset of JS methods reduces major breakage by $3.8X$ while providing the same level of tracking prevention.

  - **Paper:** *here*
  - **Video:** *here*.
  - **Repository:** *here*.
  - **This work is published at Proceedings on Privacy Enhancing Technologies Symposium (PETS), 2023**

- **TrackerSift: Untangling Mixed Tracking and Functional Web Resources**: Mixed web resources put content blockers in a bind: risk breaking legitimate functionality if they act and risk missing privacyinvasive advertising and tracking if they do not. TrackerSift progressively classifies and untangles mixed web resources (that combine tracking and legitimate functionality) at multiple granularities of analysis (domain, hostname, script, and method). TrackerSift is able to attribute 98% of the script-initiated network requests to either tracking or functional resources at the finest method-level granularity.

  - **Paper:** *here*.
  - **Repository:** *here*.
  - **Video:** *here*.
  - **This work is published at ACM Internet Measurement Conference (IMC), 2021.**

Experience

- **Virginia Tech**   Blacksburg, USA
  Graduate Research Assistant in SEED Lab   *Aug 2021 - Present*
- **Brave Software Inc**   San Francisco, USA
  Data Privacy Research Intern   *May 2023 - Jul 2023*
  - **Security Encryption in *Brave Talk*** : Worked on Solana NFT token-gating for Web3 brave-talk calls
- **Brave Software Inc**   San Francisco, USA
  Ads and Privacy Research Intern   *May 2022 - Jul 2022*
  - **Security Encryption in *Brave Talk*** : Worked closely with the Brave Talk team to introduce end-to-end communication encryption.
- **Educative Inc**   Lahore, Pakistan
  Edpresso Lead   *May 2019 - July 2021*
  - **Managed *Edpresso*** : Educative is fastest growing start-up and I led their Edpresso team for almost three years. We worked on creating free content for software developers. Right now Edpresso has more than 3 million views per month and creates largest organic traffic fro Educative.
- **FAST National University**   Lahore, Pakistan
  Teaching Assistant - Data Structures & Database Systems - Dr.Saira Karim & Dr.Zareen Alamgir   *2020*

Invited Talks

- **IEEE S&P:** Presented my NoT.JS project and explored its potential for supporting Google's privacy budgeting initiative..

- **Invited Speaker at Google Privacy Sandbox:** Presented my NoT.JS project and explored its potential for supporting Google's privacy budgeting initiative.

- **Ad-Filtering Developer Summit 2023:** Demystifying the Mystery of Privacy-Invasive JS Functions My talk is available on youtube: *here*.

- **Ad-Filtering Developer Summit 2022:** What's the next era of content blockers? My talk is available on youtube: *here*.

- **Ad-Filtering Developer Summit 2021:** How to disentangle tracking code from functional? My talk is available on youtube: *here*.

Community Service

- *Co-author and Data Analyst for the JavaScript chapter of the 2024 Web Almanac*

- *PETS Artifacts Committee Member*

References

- **Dr.Muhammad Ali Gulzar:** gulzar@cs.vt.edu

- **Dr.Zubair Shafiq:** zubair@ucdavis.edu

- **Dr.Igor Bilogrevic:** ibilogrevic@google.com