

Diogo Barradas

Research Interests

My research is focused on network security and privacy, with particular emphasis on statistical traffic analysis and Internet censorship circumvention. I take additional interest in digital forensics.

Work Experience

- 2022–Present **Assistant Professor**,
Cheriton School of Computer Science, University of Waterloo, Waterloo, ON, Canada.
Member of the CrySP research group and member of the Waterloo Cybersecurity and Privacy Institute.
- 2021 **Postdoctoral Fellow**,
Oct. – Nov. *Department of Computer Science, Rice University, Houston, TX, USA.*

Education

- 2016–2021 **Ph.D. in Information Systems and Computer Engineering**,
Instituto Superior Técnico, Universidade de Lisboa, Portugal.
Advisors: Luís Rodrigues, Nuno Santos
Thesis: Unobservable Multimedia-based Covert Channels for Internet Censorship Circumvention
- 2014–2016 **M.Sc. in Information Systems and Computer Engineering**,
Instituto Superior Técnico, Universidade de Lisboa, Portugal.
Advisors: Luís Rodrigues, Nuno Santos
Thesis: Unobservable Covert Streaming for Internet Censorship Circumvention
- 2011–2014 **B.Sc. in Information Systems and Computer Engineering**,
Instituto Superior Técnico, Universidade de Lisboa, Portugal.

Publications

Refereed Journal Articles

- PoPETs '23 Alexander Veicht, Cedric Renggli, **Diogo Barradas**, *DeepSE-WF: Unified Security Estimation for Website Fingerprinting Defenses*, Proceedings on Privacy Enhancing Technologies, Volume 2023 (2), 2023.
- COSE '18 **Diogo Barradas**, Tiago Brito, David Duarte, Nuno Santos, Luís Rodrigues, *Forensic Analysis of Communication Records of Messaging Applications from Physical Memory*, Computers & Security, Elsevier, Volume 86, 2018.
- PoPETS '17 **Diogo Barradas**, Nuno Santos, Luís Rodrigues, *DeltaShaper: Enabling Unobservable Censorship-resistant TCP Tunneling over Videoconferencing Streams*, Proceedings on Privacy Enhancing Technologies, Volume 2017 (4), 2017.

Refereed Conference Publications

- NDSS '24 Daniela Lopes, Jin-Dong Dong, Daniel Castro, Pedro Medeiros, **Diogo Barradas**, Bernardo Portela, João Vinagre, Bernardo Ferreira, Nicolas Christin, Nuno Santos, *Flow Correlation Attacks on Tor Onion Service Sessions with Sliding Subset Sum*, Proceedings of the 30th Network and Distributed System Security Symposium, San Diego, USA, 2024.
- Oakland '24 Patrick Kon, Aniket Gattani, Dhiraj Saharia, Tianyu Cao, **Diogo Barradas**, Ang Chen, Micah Sherr, Benjamin Ujcich, *NetShuffle: Circumventing Censorship with Shuffle Proxies at the Edge*, Proceedings of the 45th IEEE Symposium on Security and Privacy, San Francisco, CA, USA, 2024.
- AsiaCCS '22 Gabriel Figueira, **Diogo Barradas**, Nuno Santos, *StegoZoo: Enhancing WebRTC Covert Channels with Video Steganography for Internet Censorship Circumvention*, Proceedings of the 2022 ACM Asia Conference on Computer and Communications Security, Nagasaki, Japan, 2022.
- WebConf '21 Raymond Rambert, Zachary Weinberg, **Diogo Barradas**, Nicolas Christin, *Chinese Wall or Swiss Cheese? Keyword filtering in the Great Firewall of China*, Proceedings of the 30th The Web Conference, Ljubljana, Slovenia, 2021.
- NDSS '21 **Diogo Barradas**, Nuno Santos, Luís Rodrigues, Salvatore Signorello, Fernando Ramos, André Madeira, *FlowLens: Enabling Efficient Flow Classification for ML-based Network Security Applications*, Proceedings of the 27th Network and Distributed System Security Symposium, Virtual Event, USA, 2021.
- CCS '20 **Diogo Barradas**, Nuno Santos, Luís Rodrigues, Vítor Nunes, *Poking a Hole in the Wall: Efficient Censorship-Resistant Internet Communications by Parasitizing on WebRTC*, Proceedings of the ACM SIGSAC Conference on Computer and Communications Security, Virtual Event, USA, 2020.
- USENIX Security '18 **Diogo Barradas**, Nuno Santos, Luís Rodrigues, *Effective Detection of Multimedia Protocol Tunneling using Machine Learning*, Proceedings of the 27th USENIX Security Symposium, Baltimore, MD, USA, 2018.
- SECURITY '17 **Diogo Barradas**, Tiago Brito, David Duarte, Nuno Santos, Luís Rodrigues, *Forensic Analysis of Communication Records of Web-based Messaging Applications from Physical Memory*, Proceedings of the 14th International Conference on Security and Cryptography, Madrid, Spain, 2017.

Refereed Workshop Publications

- WPES '23 Prabhjot Singh, Shreya Arun Naik, Navid Malekghaini, **Diogo Barradas**, Noura Limam, *A First Look at Generating Website Fingerprinting Attacks via Neural Architecture Search*, Proceedings of the 22nd Workshop on Privacy in the Electronic Society (co-located with CCS), Copenhagen, Denmark, 2023.
- WPES '23 Daniela Lopes, Daniel Castro, **Diogo Barradas**, Nuno Santos, *TIGER: Tor Traffic Generator for Realistic Experiments*, Proceedings of the 22nd Workshop on Privacy in the Electronic Society (co-located with CCS), Copenhagen, Denmark, 2023.
- FOCI '23 Kevin Gallagher, **Diogo Barradas**, Nuno Santos, *Rethinking Realistic Adversaries for Anonymous Communication Systems*, Free and Open Communications on the Internet (co-located with PETS), Delft, Netherlands, 2023.
- STAST '23 Wei Hu, **Diogo Barradas**, *Work in Progress: A Glance at Social Media Self-Censorship in North America*, Proceedings of the 13th Workshop on Socio-Technical Aspects in Security (co-located with Euro S&P), Delft, Netherlands, 2023.
- WPES '22 Asim Waheed, Sara Qunaibi, **Diogo Barradas**, Zachary Weinberg, *Darwin's Theory Of Censorship: Analysing the Evolution of Censored Topics with Dynamic Topic Models*, Proceedings of the 21st Workshop on Privacy in the Electronic Society (co-located with CCS), Los Angeles, CA, USA, 2022.
- CPSIoTSec '22 Patrick Tser Jern Kon, **Diogo Barradas**, Ang Chen, *Stargaze: A LEO Constellation Emulator for Security Experimentation*, Proceedings of the 4th Workshop on CPS & IoT Security and Privacy (co-located with CCS), Los Angeles, CA, USA, 2022.

- LASER '21 **Diogo Barradas**, Nuno Santos, Luís Rodrigues, Salvatore Signorello, Fernando Ramos, André Madeira, *The Nuts and Bolts of Building FlowLens*, Proceedings of the Learning from Authoritative Security Experiment Results Workshop (co-located with NDSS), Virtual Event, USA, 2021.
- DICG '20 **Diogo Barradas**, Nuno Santos, *Towards a Scalable Censorship-Resistant Overlay Network based on WebRTC Covert Channels*, Proceedings of the 1st International Workshop on Distributed Infrastructure for Common Good (co-located with Middleware), Delft, Netherlands, 2020.
- EuroDW '18 **Diogo Barradas**, *Assessing the Feasibility of Machine Learning to Detect Network Covert Channels*, EuroSys Doctoral Workshop, Porto, Portugal, 2018.

Refereed National Conference Publications

- INForum 2019 André Madeira, **Diogo Barradas**, Nuno Santos, Luís Rodrigues, *Identificação de Canais Encobertos no Skype usando Esboços em SDNs*, Actas do Enésimo Simpósio de Informática, INForum 2019, Minho, Portugal, **Best Paper Award**.
- INForum 2016 **Diogo Barradas**, Nuno Santos, Luís Rodrigues, *Síntese de Vídeo para Evasão de Censura na Internet*, Actas do Oitavo Simpósio de Informática, INForum 2016, Lisboa, Portugal.

Posters and Technical Reports

- CCS '22 Daniela Lopes, Pedro Medeiros, Jin-Dong Dong, **Diogo Barradas**, Bernardo Portela, João Vinagre, Bernardo Ferreira, Nicolas Christin, Nuno Santos, *User Sessions on Tor Onion Services: Can Colluding ISPs Deanonimize Them at Scale?*, Proceedings of the ACM SIGSAC Conference on Computer and Communications Security, Los Angeles, CA, USA, 2022.

Teaching Experience

Courses taught while at University of Waterloo, Waterloo, ON, Canada.

- 2023 **Instructor**, CS458/658 - Computer Security and Privacy.
Spring Term
- 2023 **Instructor**, CS858 - Internet Censorship and Surveillance.
Winter Term
- 2022 **Instructor**, CS458/658 - Computer Security and Privacy.
Spring Term
- 2022 **Instructor**, CS858 - Internet Censorship and Surveillance.
Winter Term

Courses taught while at Instituto Superior Técnico, Universidade de Lisboa, Portugal.

- 2018 – 2019 **Teaching Assistant**, Forensics Cyber Security, Course Unit Quality grade: 8.5/9.
Fall Semester
- 2017 – 2018 **Teaching Assistant**, Network and Computer Security, Course Unit Quality grade: 8.69/9.
Fall Semester

Student Supervision

Current Students

- 2022 - Adrian Cruzat La Rosa, MMath – University of Waterloo
- 2022 - Prabhjot Singh, MMath – University of Waterloo
- 2022 - Shreya Arun Naik, MMath – University of Waterloo
- 2023 - Sina Kamali, MMath – University of Waterloo
- 2022 - Michael Wrana, Ph.D. – University of Waterloo (co-advisor: N. Asokan)

Past Students

- 2022 - 2023 Norhan Abbas, MMath – University of Waterloo (co-advisor: Mei Nagappan)
2023 Rujing Li, URA – University of Waterloo
2023 Daniel Phan, URA – University of Waterloo
2023 Scott Sum, URA – University of Waterloo
2021 - 2022 Afonso Carvalho, M.Sc. – Instituto Superior Técnico, U. Lisboa (co-advisor: Nuno Santos)
2021 - 2022 Francisco Silva, M.Sc. – Instituto Superior Técnico, U. Lisboa (co-advisor: Nuno Santos)
2021 - 2022 José Brás, M.Sc. – Instituto Superior Técnico, U. Lisboa (co-advisor: Nuno Santos)

Professional Service

Program Committee

- 2023 ACM Conference on Computer and Communications Security (CCS)
2021 - 2023 Privacy Enhancing Technologies Symposium (PETS)
Rated Excellent Reviewer in 2022 and 2023
2023 Free and Open Communications on the Internet (FOCI)
2023 International Symposium on Research in Attacks, Intrusions and Defenses (RAID)
2023 International Conference on Network and System Security (NSS)
2023 International Conference on Metaverse Computing, Networking and Applications (MetaCom)
2023 IEEE Conference on Dependable and Secure Computing (DSC)
2021 - 2022 International Conference on Security and Cryptography (SECRYPT)
2021 - 2022 International Conference on Information and Communications Security (ICICS)

Program Co-chair

- 2022 Workshop on Formal Foundations and Security of Programmable Network Infrastructures (FFSPIN)
(co-located with ACM SIGCOMM)

Shadow Program Committee

- 2021 IEEE Symposium on Security and Privacy (S&P)

Funding

- 2023-2028 **Discovery Grant**, *Natural Sciences and Engineering Research Council of Canada*.
CAD \$155,000 + \$12,500 ECR supplement [100% share]
2022-2027 **Startup Grant**, *University of Waterloo*.
CAD \$120,000 [100% share]
2022-2025 **Innovation for Defence Excellence and Security (IDEaS)**, *Department of National Defence*.
CAD \$1,499,923 [3% share, co-applicant]
2022-2024 **NSERC Research Incentive Fund**, *University of Waterloo*.
CAD \$30,000 [100% share]
2022 **Pluggable Transports Small Grants Program**, *Internews*.
Eur \$34,000 [0% share, co-applicant]

Additional Experience

- 2020 **Short-Term Research Scholar**, *Carnegie Mellon University*.
Feb – Aug My project focused on the measurement and understanding of Internet censorship conducted by state-level actors. I collaborated with Professor Nicolas Christin at CMU's CyLab Security & Privacy Institute.
2017 **Summer Internship**, *University of Texas at Austin*.
Jul – Aug I studied the application of machine learning techniques to the problem of gesture recognition. My internship was supervised by Professor Lili Qiu.

Awards

- ISOC.PT ANRW 2020 **Best Research Paper and Internet Impact Acknowledge Mention, *Diogo Barradas, Nuno Santos, Luís Rodrigues, On the unobservability of multimedia-based covert channels for Internet censorship circumvention***, Applied Network Research Workshop – Internet Society Portugal Chapter (ISOC.PT ANRW).
- GSD 2018 **Doctoral Student Merit Award, *Diogo Barradas***, Distributed Systems Group (GSD), INESC-ID, Instituto Superior Técnico, Universidade de Lisboa.