2025 IEEE Symposium on Security and Privacy (SP 2025)

San Francisco, California, USA 12-15 May 2025

Pages 1-792



IEEE Catalog Number: CFP25020-POD **ISBN:**

979-8-3315-2237-7

Copyright © 2025 by the Institute of Electrical and Electronics Engineers, Inc. All Rights Reserved

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

*** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.

CFP25020-POD
979-8-3315-2237-7
979-8-3315-2236-0
1081-6011

Additional Copies of This Publication Are Available From:

Curran Associates, Inc 57 Morehouse Lane Red Hook, NY 12571 USA Phone: (845) 758-0400 Fax: (845) 758-2633 E-mail: curran@proceedings.com Web: www.proceedings.com



2025 IEEE Symposium on Security and Privacy (SP) **SP 2025**

Table of Contents

Message from the Program Chairs	xxxviii
Organizing Committee	xl
Program Committee	
External Reviewers	xlviii
Keynotes	1

Crime, Scams, and Fraud

SoK: Digging into the Digital Underworld of Stolen Data Markets Tina Marjanov (University of Cambridge, UK) and Alice Hutchings (University of Cambridge, UK)	. 1
Characterizing Robocalls with Multiple Vantage Points Sathvik Prasad (North Carolina State University), Aleksandr Nahapetyan (North Carolina State University), and Bradley Reaves (North Carolina State University)	19
Understanding the Efficacy of Phishing Training in Practice Grant Ho (University of Chicago and UC San Diego), Ariana Mirian (UC San Diego), Elisa Luo (UC San Diego), Khang Tong (UC San Diego Health), Euyhyun Lee (UC San Diego Health), Lin Liu (UC San Diego Health), Christopher A. Longhurst (UC San Diego Health), Christian Dameff (UC San Diego Health), Stefan Savage (UC San Diego), and Geoffrey M. Voelker (UC San Diego)	37
Restricting the Link: Effects of Focused Attention and Time Delay on Phishing Warning Effectiveness Justin Petelka (University of Washington, USA), Benjamin Berens (Karlsruhe Institute of Technology, Germany), Carlo Sugatan (University of Michigan, USA), Melanie Volkamer (Karlsruhe Institute of Technology, Germany), and Florian Schaub (University of Michigan, USA)	55
(Blind) Users Really Do Heed Aural Telephone Scam Warnings	N/A

Identifying Incoherent Search Sessions: Search Click Fraud Remediation Under Real-World 93 <i>Constraints</i> 93 <i>Runze Zhang</i> (Georgia Institute of Technology), Ranjita Pai Sridhar 93 (Microsoft Corporation), Mingxuan Yao (Georgia Institute of 93 <i>Technology</i>), Zheng Yang (Georgia Institute of Technology), David 94 Oygenblik (Georgia Institute of Technology), Haichuan Xu (Georgia 95 Institute of Technology), Vacha Dave (Microsoft Corporation), Cormac 95 Herley (Microsoft Corporation), Paul England (Microsoft Corporation), and Brendan Saltaformaggio (Georgia Institute of Technology) 95
 What We Talk About When We Talk About Logs: Understanding the Effects of Dataset Quality on Endpoint Threat Detection Research
CONnecting The EXtra doTS (CONTEXTS): Correlating External Information about Point of Interest for Attack Investigation

Threshold and Post-Quantum Cryptography

Ringtail: Practical Two-Round Threshold Signatures from Learning with Errors Cecilia Boschini (ETH Zürich), Darya Kaviani (UC Berkeley), Russell Lai (Aalto University), Giulio Malavolta (Bocconi University), Akira Takahashi (J.P.Morgan AI Research & AlgoCRYPT CoE), and Mehdi Tibouchi (NTT Social Informatics Laboratories)	149
Groundhog: A Restart-based Systems Framework for Increasing Availability in Threshold Cryptosystems	165
Ashish Kashinath (University of Illinois at Urbana-Champaign), Disha Agarwala (University of Illinois at Urbana-Champaign), Gabriel Kulp (Oregon State University), Sourav Das (University of Illinois at Urbana-Champaign), Sibin Mohan (The George Washington University), and Radha Venkatagiri (Georgetown University)	
Ring Referral: Efficient Publicly Verifiable Ad hoc Credential Scheme with Issuer and Strong User Anonymity for Decentralized Identity and More <i>The-Anh Ta (CSIRO Data61, Australia), Xiangyu Hui (University of</i> <i>Melbourne, Australia), and Sid Chi-Kin Chau (CSIRO Data61, Australia)</i>	184
Robust Threshold ECDSA with Online-Friendly Design in Three Rounds Guofeng Tang (Singapore Management University, Singapore) and Haiyang Xue (Singapore Management University, Singapore)	203
Security Attacks Abusing Pulse-level Quantum Circuits Chuanqi Xu (Yale University) and Jakub Szefer (Yale University)	222

Phecda: Post-Quantum Transparent zkSNARKs from Improved Polynomial Commitment and VOLE-in-the-Head with Application in Publicly Verifiable AES Changchang Ding (Indiana University, USA) and Yan Huang (Indiana University, USA)	240
Gold OPRF: Post-Quantum Oblivious Power-Residue PRF Yibin Yang (Georgia Institute of Technology), Fabrice Benhamouda (Amazon Web Services), Shai Halevi (Amazon Web Services), Hugo Krawczyk (Amazon Web Services), and Tal Rabin (Amazon Web Services)	259
Benchmarking Attacks on Learning with Errors Emily Wenger (Duke University, Meta AI), Eshika Saxena (Meta AI), Mohamed Malhou (Meta AI, Sorbonne Université), Ellie Thieu (University of Wisconsin - Madison), and Kristin Lauter (Meta AI)	279

LLM Security

Understanding Users' Security and Privacy Concerns and Attitudes Towards Conversational AI Platforms	8
On the (In)Security of LLM App Stores	7
GPTracker: A Large-Scale Measurement of Misused GPTs	6
Modifier Unlocked: Jailbreaking Text-to-Image Models Through Prompts	5
 Fuzz-Testing Meets LLM-Based Agents: An Automated and Efficient Framework for Jailbreaking Text-To-Image Generation Models	3

On the Effectiveness of Prompt Stealing Attacks on In-The-Wild Prompts	392
Yicong Tan (CISPA Helmholtz Center for Information Security), Xinyue	
Shen (CISPA Helmholtz Center for Information Security), Yun Shen	
(Flexera), Michael Backes (CISPA Helmholtz Center for Information	
Security), and Yang Zhang (CISPA Helmholtz Center for Information	
Security)	
Fun-tuning: Characterizing the Vulnerability of Proprietary LLMs to Optimization-based	
Prompt Injection Attacks via the Fine-Tuning Interface	411
Andrey Labunets (UC San Diego), Nishit Pandya (UC San Diego), Ashish	
Hooda (University of Wisconsin Madison), Xiaohan Fu (UC San Diego),	
and Earlence Fernandes (UC San Diego)	
HARMONYCLOAK: Making Music Unlearnable for Generative AI	430
Syed Irfan Ali Meerza (University of Tennessee Knoxville, USA), Lichao	
Sun (Lehigh University), and Jian Liu (University of Tennessee	
Knoxville, USA)	

Software Supply Chain Security

Hey, Your Secrets Leaked! Detecting and Characterizing Secret Leakage in the Wild
 Unveiling Security Vulnerabilities in Git Large File Storage Protocol
 My Model is Malware to You: Transforming AI Models into Malware by Abusing TensorFlow APIs 486 Ruofan Zhu (Zhejiang University, China), Ganhao Chen (Zhejiang University, China), Wenbo Shen (Zhejiang University, China), Xiaofei Xie (Singapore Management University, Singapore), and Rui Chang (Zhejiang University, China)
Speedrunning the Maze: Meeting Regulatory Patching Deadlines in a Large Enterprise Environment
 A Deep Dive Into How Open-Source Project Maintainers Review and Resolve Bug Bounty Reports 522 Jessy Ayala (University of California, Irvine), Steven Ngo (University

of California, Irvine), and Joshua Garcia (University of California, Irvine)

Study Club, Labor Union or Start-Up? Characterizing Teams and Collaboration in the Bug Bounty Ecosystem	539
CODEBREAKER: Dynamic Extraction Attacks on Code Language Models Changzhou Han (Swinburne University of Technology), Zehang Deng (Swinburne University of Technology), Wanlun Ma (Swinburne University of Technology), Xiaogang Zhu (The University of Adelaide), Minhui Xue (CSIRO's Data61), Tianqing Zhu (City University of Macau), Sheng Wen (Swinburne University of Technology), and Yang Xiang (Swinburne University of Technology)	559
Make a Feint to the East While Attacking in the West: Blinding LLM-Based Code Auditors with Flashboom Attacks Xiao Li (Nanjing University, China), Yue Li (Nanjing University, China), Hao Wu (Nanjing University, China), Yue Zhang (Drexel University, USA), Kaidi Xu (Drexel University, USA), Xiuzhen Cheng (Shandong University, China), Sheng Zhong (Nanjing University, China), and Fengyuan Xu (Nanjing University, China)	576

Keys and Passwords

Post-quantum Cryptographic Analysis of SSH	595
SoK: Dlog-based Distributed Key Generation	614
Verifiable Secret Sharing Simplified	633
Clubcards for the WebPKI: smaller certificate revocation tests in theory and practice	652
AccuRevoke: Enhancing Certificate Revocation with Distributed Cryptographic Accumulators 6 Munshi Rejwan Ala Muid (Virginia Tech), Taejoong Chung (Virginia Tech), and Thang Hoang (Virginia Tech)	564
RankGuess: Password Guessing Using Adversarial Ranking	682
Security Analysis of Master-Password-Protected Password Management Protocols	701

Open Sesame! On the Security and Memorability of Verbal Passwords
CMASan: Custom Memory Allocator-aware Address Sanitizer
GoSonar: Detecting Logical Vulnerabilities in Memory Safe Language Using Inductive Constraint Reasoning
Md Sakib Anwar (The Ohio State University, USA), Carter Yagemann (The
Ohio State University, USA), and Zhiqiang Lin (The Ohio State University, USA)
Evaluating the Effectiveness of Memory Safety Sanitizers
Emanuel Vintila (Technical University of Munich), Philipp Zieris (Fraunhofer AISEC), and Julian Horsch (Fraunhofer AISEC)
SwiftSweeper: Defeating Use-After-Free Bugs Using Memory Sweeper Without Stop-the-World 793 Junho Ahn (KAIST), Kanghyuk Lee (KAIST), Chanyoung Park (UNIST), Hyungon Moon (UNIST), and Youngjin Kwon (KAIST)
 BridgeRouter: Automated Capability Upgrading of Out-Of-Bounds Write Vulnerabilities to Arbitrary Memory Write Primitives in the Linux Kernel
Mon CHÉRI: Mitigating Uninitialized Memory Access with Conditional Capabilities
SoK: Challenges and Paths Toward Memory Safety for eBPF
IUBIK: Isolating User Bytes in Commodity Operating System Kernels via Memory Tagging
Extensions
Marius Momeu (Technical University of Munich), Alexander J. Gaidis (Brown University), Jasper v.d. Heidt (Technical University of Munich), and Vasileios P. Kemerlis (Brown University)

Web Security

Predator: Directed Web Application Fuzzing for Efficient Vulnerability Validation Chenlin Wang (The Chinese University of Hong Kong), Wei Meng (The Chinese University of Hong Kong), Changhua Luo (The Chinese University of Hong Kong), and Penghui Li (Columbia University)	886
MOCGuard: Automatically Detecting Missing-Owner-Check Vulnerabilities in Java Web Applications Fengyu Liu (Fudan University), Youkun Shi (Fudan University), Yuan Zhang (Fudan University), Guangliang Yang (Fudan University), Enhao Li (Fudan University), and Min Yang (Fudan University)	903
RGFuzz: Rule-Guided Fuzzer for WebAssembly Runtimes Junyoung Park (KAIST), Yunho Kim (Hanyang University), and Insu Yun (KAIST)	920
RaceDB: Detecting Request Race Vulnerabilities in Database-Backed Web Applications An Chen (University of Georgia), Yonghwi Kwon (University of Maryland), and Kyu Hyung Lee (University of Georgia)	939
PFORTIFIER: Mitigating PHP Object Injection through Automatic Patch Generation Bo Pang (Sichuan University, China), Yiheng Zhang (Sichuan University, China), Mingzhe Gao (Alibaba Cloud Computing, China), Junzhe Zhang (National University of Singapore, Singapore), Ligeng Chen (Nanjing University, China), Mingxue Zhang (Zhejiang University, China), and Gang Liang (Sichuan University, China)	956
Detecting Taint-Style Vulnerabilities in Microservice-Structured Web Applications Fengyu Liu (Fudan University), Yuan Zhang (Fudan University), Tian Chen (Fudan University), Youkun Shi (Fudan University), Guangliang Yang (Fudan University), Zihan Lin (Fudan University), Min Yang (Fudan University), Junyao He (Alibaba Group), and Qi Li (Alibaba Group)	972
 Follow My Flow: Unveiling Client-Side Prototype Pollution Gadgets from One Million Real-World Websites Zifeng Kang (Johns Hopkins University), Muxi Lyu (Johns Hopkins University), Zhengyu Liu (Johns Hopkins University), Jianjia Yu (Johns Hopkins University), Runqi Fan (The State Key Laboratory of Blockchain and Data Security, Zhejiang University), Song Li (The State Key Laboratory of Blockchain and Data Security, Zhejiang University), and Yinzhi Cao (Johns Hopkins University) 	991
"Only as Strong as the Weakest Link": On the Security of Brokered Single Sign-On on the Web	1009
Tommaso Innocenti (Northeastern University, Boston, USA), Louis Jannett (Ruhr University Bochum, Germany), Christian Mainka (Ruhr University Bochum, Germany), Vladislav Mladenov (Ruhr University Bochum, Germany), and Engin Kirda (Northeastern University Boston, USA)	

Space and Cellular Security

 SoK: Space Infrastructures Vulnerabilities, Attacks and Defenses	28
 Space RadSim: Binary-Agnostic Fault Injection to Evaluate Cosmic Radiation Impact on Exploit Mitigation Techniques in Space	47
 Mind the Location Leakage in LEO Direct-to-Cell Satellite Networks	64
From Control to Chaos: A Comprehensive Formal Analysis of 5G's Access Control	81
 BaseBridge: Bridging the Gap between Emulation and Over-The-Air Testing for Cellular Baseband Firmware	01
Stateful Analysis and Fuzzing of Commercial Baseband Firmware	20
PGUS: Pretty Good User Security for Thick MVNOs with a Novel Sanitizable Blind Signature 11 Yang Yang (National University of Singapore, Singapore), Quan Shi (National University of Singapore, Singapore), Prosanta Gope (University of Sheffield, UK), Behzad Abdolmaleki (University of Sheffield, UK), and Biplab Sikdar (National University of Singapore, Singapore)	40

Invade the Walled Garden: Evaluating GTP Security in Cellular Networks	
Privacy	
 SoK: A Privacy Framework for Security Research Using Social Media Data	
GDPR in the Small: a field study of privacy and security challenges in schools	
 "Sorry for bugging you so much." Exploring Developers' Behavior Towards Privacy-Compliant Implementation	
A Low-Cost Privacy-Preserving Digital Wallet for Humanitarian Aid Distribution	
 Teaching Data Science Students to Sketch Privacy Designs through Heuristics	
Characterizing the Usability and Usefulness of U.S. Ad Transparency Systems	

Supporting Family Discussions About Digital Privacy Through Perspective-Taking: An	
Empirical Investigation	38
Zikai Wen (Virginia Tech, United States), Lanjing Liu (Virginia Tech,	
United States), and Yaxing Yao (Virginia Tech, United States)	
The Importance of Being Earnest: Shedding Light on Johnny's (False) Sense of Privacy 130)6
Wirawan Agahari (TU Delft, Tilburg University), Alexandra Dirksen	
(Technische Universitat Braunschweig), Martin Johns (Technische	
Universitat Braunschweig), Mark de Reuver (TU Delft), and Tobias	

Fiebig (Max Planck Institut fur Informatik, FG INET)

Censorship and Traffic Analysis

Learning from Censored Experiences: Social Media Discussions around Censorship Circumvention Technologies
Transport Layer Obscurity: Circumventing SNI Censorship on the TLS-Layer
A Wall Behind A Wall: Emerging Regional Censorship in China
Anix: Anonymous Blackout-Resistant Microblogging with Message Endorsing
 Is Nobody There? Good! Globally Measuring Connection Tampering without Responsive Endhosts 1400 Sadia Nourin (University of Maryland, US and Max Planck Institute for Informatics, Germany), Erik Rye (University of Maryland, USA), Kevin
Bock (University of Maryland, USA), Nguyen Phong Hoang (University of British Columbia, Canada), and Dave Levin (University of Maryland, USA)
CountMamba: A Generalized Website Fingerprinting Attack via Coarse-Grained Representation and Fine-Grained Prediction

Provably Robust and Secure Steganography in Asymmetric Resource Scenarios
Sparta: Practical Anonymity with Long-Term Resistance to Traffic Analysis
Blockchain I
P2C2T: Preserving the Privacy of Cross-Chain Transfer
 Liquefaction: Privately Liquefying Blockchain Assets
Decentralization of Ethereum's Builder Market
A Composability Analysis Framework for Web3 Wallet Recovery Mechanisms
Signature-Free Atomic Broadcast with Optimal \$O(n^2)\$ Messages and \$O(1)\$ Expected Time 1547 Xiao Sui (Tsinghua University), Xin Wang (Tsinghua University), and Sisi Duan (Tsinghua University)
 Warning! The Timeout T Cannot Protect You From Losing Coins PipeSwap: Forcing the Timely Release of a Secret for Atomic Cross-Chain Swaps
Asymmetric Mempool DoS Security: Formal Definitions and Provable Secure Designs
Papercraft: Lattice-based Verifiable Delay Function Implemented

ML Attacks

Preference Poisoning Attacks on Reward Model Learning	622
Query Provenance Analysis: Efficient and Robust Defense against Query-based Black-box Attacks	641
Shaofei Li (Peking University, China), Ziqi Zhang (University of Illinois Urbana-Champaign, America), Haomin Jia (Peking University, China), Yao Guo (Peking University, China), Xiangqun Chen (Peking University, China), and Ding Li (Peking University, China)	.011
Architectural Neural Backdoors from First Principles	.657
 BAIT: Large Language Model Backdoor Scanning by Inverting Attack Target	.676
Prompt Inversion Attack against Collaborative Inference of Large Language Models	.695
PEFTGuard: Detecting Backdoor Attacks Against Parameter-Efficient Fine-Tuning	.713

Secure Transfer Learning: Training Clean Model Against Backdoor in Pre-Trained Encoder and

Downstream Dataset	1732
Yechao Zhang (Huazhong University of Science and Technology, China),	
Yuxuan Zhou (Huazhong University of Science and Technology, China),	
Tianyu Li (Huazhong University of Science and Technology, China),	
Minghui Li (Huazhong University of Science and Technology, China),	
Shengshan Hu (Huazhong University of Science and Technology, China),	
Wei Luo (Deakin University, Australia), and Leo Yu Zhang (Griffith	
University, Australia)	

Practical Poisoning Attacks with Limited Byzantine Clients in Clustered Federated Learning...... 1751 Viet Vo (Swinburne University of Technology), Mengyao Ma (The University of Queensland), Guangdong Bai (The University of Queensland), Ryan Ko (The University of Queensland), and Surya Nepal (Data61 CSIRO)

Network Security

Beyond the Horizon: Uncovering Hosts and Services Behind Misconfigured Firewalls
MANTIS: Detection of Zero-Day Malicious Domains Leveraging Low Reputed Hosting
Infrastructure 1789 Fatih Deniz (Qatar Computing Research Institute, Qatar), Mohamed 1789 Nabeel (Palo Alto Networks Inc., USA), Ting Yu (Qatar Computing 1789 Research Institute, Qatar), and Issa Khalil (Qatar Computing Research Institute, Qatar) 1789
Resolution Without Dissent: In-Path Per-Query Sanitization to Defeat Surreptitious Communication Over DNS Daiping Liu (Palo Alto Networks, USA), Ruian Duan (Palo Alto Networks, USA), and Jun Wang (Palo Alto Networks, USA)
SoK: Decoding the Enigma of Encrypted Network Traffic Classifiers
 TrafficFormer: An Efficient Pre-trained Model for Traffic Data

SCAD: Towards a Universal and Automated Network Side-Channel Vulnerability Detection 1861
Keyu Man (University of California, Riverside), Zhongjie Wang
(University of California, Riverside), Yu Hao (University of
California, Riverside), Shenghan Zheng (University of California,
Riverside), Xin'an Zhou (University of California, Riverside), Yue Cao
(University of California, Riverside), and Zhiyun Qian (University of
California, Riverside)
SYN Proof-of-Work: Improving Volumetric DoS Resilience in TCP
Low-cost and Robust Global Time Synchronization
Marc Wyss (ETH Zurich, Switzerland), Marc Frei (ETH Zurich,

Blockchain II

Constant latency and finality for dynamically available DAG	1910
Sailfish: Towards Improving the Latency of DAG-based BFT	928
Cauchyproofs: Batch-Updatable Vector Commitment with Easy Aggregation and Application to Stateless Blockchains	1947
 MicroNova: Folding-based arguments with efficient (on-chain) verification	.964
Permissionless Verifiable Information Dispersal (Data Availability for Bitcoin Rollups)	1983
An Attack on TON's ADNL Secure Channel Protocol	2002
 VITARIT: Paying for Threshold Services on Bitcoin and Friends	2018

"Check-Before-you-Solve": Verifiable Time-lock Puzzles 2	2037
Jiajun Xin (Hong Kong University of Science and Technology, Hong Kong	
SAR) and Dimitrios Papadopoulos (Hong Kong University of Science and	
Technology, Hong Kong SAR)	
Technology, Tiong Kong STIK,	

ML Defenses

Verifiable Boosted Tree Ensembles	7
 SoK: Dataset Copyright Auditing in Machine Learning Systems	6
 GRID: Protecting Training Graph from Link Stealing Attacks on GNN Models	5
TSQP: Safeguarding Real-Time Inference for Quantization Neural Networks on Edge Devices211 Yu Sun (Beihang University), Gaojian Xiong (Beihang University), Jianhua Liu (Beihang University), Zheng Liu (Beihang University), and Jian Cui (Beihang University)	4
 Fight Fire with Fire: Combating Adversarial Patch Attacks using Pattern-randomized Defensive Patches	3
Alleviating the Fear of Losing Alignment in LLM Fine-tuning	2
On the Conflict between Robustness and Learning in Collaborative Machine Learning	1
DataSentinel: A Game-Theoretic Detection of Prompt Injection Attacks	0

Human Centered Security and Privacy I

Ownership and Gatekeeping vs. Safeguarding and Consent: How Migrant Parents Navigate Child Data Management Complexities	1
"It's time. Time for digital security.": An End User Study on Actionable Security and Privacy Advice	
"Not the Right Question?" A Study on Attitudes Toward Client-Side Scanning with Security and Privacy Researchers and a U.S. Population Sample	
"Why would money protect me from cyber bullying?": A Mixed-Methods Study of Personal Cyber Insurance	:
Security and Privacy Experiences of First- and Second-Generation Pakistani Immigrants to the US: Perceptions, Practices, Challenges, and Parent-Child Dynamics	
Let's Get Visual - Testing Visual Analogies and Metaphors for Conveying Privacy Policies and Data Handling Information	
"I'm pretty expert and I still screw it up": Qualitative Insights into Experiences and Challenges of Designing and Implementing Cryptographic Library APIs	

Secure Data Processing I

 OPERA: Achieving Secure and High-performance OLAP with Parallelized Homomorphic Comparisons
DataSeal: Ensuring the Verifiability of Private Computation on Encrypted Data
CHLOE: Loop Transformation over Fully Homomorphic Encryption via Multi-Level Vectorization and Control-Path Reduction
Improved Constructions for Distributed Multi-Point Functions2414Elette Boyle (NTT Research and Reichman University), Niv Gilboa(Ben-Gurion University), Matan Hamilis (Reichman University), YuvalIshai (Technion), and Yaxin Tu (Princeton University)
Preprocessing for Life: Dishonest-Majority MPC with a Trusted or Untrusted Dealer
 MatriGear: Accelerating Authenticated Matrix Triple Generation with Scalable Prime Fields via Optimized HE Packing
 Shark: Actively Secure Inference using Function Secret Sharing

ML Attacks and Defenses

Rigging the Foundation: Manipulating Pre-training for Advanced Membership Inference Attacks
Not All Edges are Equally Robust: Evaluating the Robustness of Ranking-Based Federated Learning
Edge Unlearning is Not "on Edge"! An Adaptive Exact Unlearning System on Resource-Constrained Devices
 Towards Reliable Verification of Unauthorized Data Usage in Personalized Text-to-Image Diffusion Models
Watermarking Language Models for Many Adaptive Users
UnMarker: A Universal Attack on Defensive Image Watermarking
SoK: Watermarking for AI-Generated Content

Human Centered Security and Privacy II

 Transparency in Usable Privacy and Security Research: Scholars' Perspectives, Practices, and Recommendations	58
 Data to Infinity and Beyond: Examining Data Sharing and Reuse Practices in the Computer Security Community	78
SoK: A Framework and Guide for Human-Centered Threat Modeling in Security and Privacy Research	97
 Prevalence Overshadows Concerns? Understanding Chinese Users' Privacy Awareness and Expectations Towards LLM-based Healthcare Consultation	16
 Exploring Parent-Child Perspectives on Safety in Generative AI: Concerns, Mitigation Strategies, and Design Implications	35
 Security Perceptions of Users in Stablecoins: Advantages and Risks within the Cryptocurrency Ecosystem	53

Supporting Human Raters with the Detection of Harmful Content using Large Language Models 2772

Kurt Thomas (Google), Patrick Gage Kelley (Google), David Tao (Google), Sarah Meiklejohn (Google), Owen Vallis (Google), Shunwen Tan (Google), Blaž Bratanič (Google Deepmind), Felipe Tiengo Ferreira (Google Deepmind), Vijay Kumar Eranti (Google), and Elie Bursztein (Google)

Elisa Shioji (University of Melbourne), Ani Meliksetyan (The George Washington University), Lucy Simko (Barnard College), Ryan Watkins (The George Washington University), Adam Aviv (The George Washington University), and Shaanan Cohney (University of Melbourne)

Secure Data Processing II

Is MPC Secure? Leveraging Neural Network Classifiers to Detect Data Leakage Vulnerabilities in MPC Implementations)
 Comet: Accelerating Private Inference for Large Language Model by Predicting Activation Sparsity	•
 Highly Efficient Actively Secure Two-Party Computation with One-Bit Advantage Bound	
Hermes: Efficient and Secure Multi-Writer Encrypted Database	i
Towards Efficient and Practical Multi-party Computation under Inconsistent Trust in TEEs 2885 Xuanwei Hu (Southern University of Science and Technology, China), Rujia Li (Tsinghua University, China), Yi Liu (Jinan University, China), and Qi Wang (Southern University of Science and Technology, China)	J

Hash-Prune-Invert: Improved Differentially Private Heavy-Hitter Detection in the
Two-Server Model
Borja Balle (Google DeepMind), James Bell-Clark (Google Research),
Albert Cheu (Google Research), Adria Gascon (Google Research),
Jonathan Katz (Google), Mariana Raykova (Google), Phillipp Schoppmann
(Google), and Thomas Steinke (Google DeepMind)
Click Without Compromise: Online Advertising Measurement via Per User Differential Privacy 2919 Yingtai Xiao (TikTok Inc., USA), Jian Du (TikTok Inc, USA), Shikun Zhang (TikTok Inc., USA), Wanrong Zhang (TikTok Inc., USA), Qiang Yan (TikTok Inc., China), Danfeng Zhang (Duke University, USA), and Daniel Kifer (The Pennsylvania State University, USA)
Smaug: Modular Augmentation of LLVM for MPC

Software Analysis and Reverse Engineering

Redefining Indirect Call Analysis with KallGraph	957
 PYLINGUAL: Toward Perfect Decompilation of Evolving High-Level Languages	976
Empc: Effective Path Prioritization for Symbolic Execution with Path Cover	995
 SV-TrustEval-C: Evaluating Structure and Semantic Reasoning in Large Language Models for Source Code Vulnerability Analysis	014
Disassembly as Weighted Interval Scheduling with Learned Weights	033
 Inspecting Virtual Machine Diversification Inside Virtualization Obfuscation	051

TypeForge: Synthesizing and Selecting Best-Fit Composite Data Types for Stripped Binaries	3070
Yanzhong Wang (Institute of Information Engineering, CAS, China),	
Ruigang Liang (Institute of Information Engineering, CAS, China),	
Yilin Li (Institute of Information Engineering, CAS, China), Peiwei Hu	
(Institute of Information Engineering, CAS, China), Kai Chen	
(Institute of Information Engineering, CAS, China), and Bolun Zhang	
(Institute of Information Engineering, CAS, China)	
CHIMERA: Fuzzing P4 Network Infrastructure for Multi-Plane Bug Detection and Vulnerability	
Discovery	3088
Jiwon Kim (Purdue University), Dave Jing Tian (Purdue University), and	
Benjamin E. Ujcich (Georgetown University)	

Systems Security and Access Control

SoK: Software Compartmentalization
COINDEF: A Comprehensive Code Injection Defense for the Electron Framework
Efficient Storage Integrity in Adversarial Settings
Growlithe: A Developer-Centric Compliance Tool for Serverless Applications
The File That Contained the Keys Has Been Removed: An Empirical Analysis of Secret Leaks in Cloud Buckets and Responsible Disclosure Outcomes
EPScan: Automated Detection of Excessive RBAC Permissions in Kubernetes Applications 3199 Yue Gu (Fudan University, China), Xin Tan (Fudan University, China), Yuan Zhang (Fudan University, China), Siyan Gao (Fudan University, China), and Min Yang (Fudan University, China)

403 Forbidden? Ethically Evaluating Broken Access Control in the Wild	8
 "It's almost like Frankenstein": Investigating the Complexities of Scientific Collaboration and Privilege Management within Research Computing Infrastructures	6
SoK: Integrity, Attestation, and Auditing of Program Execution	5
The Digital Cybersecurity Expert: How Far Have We Come?3273Dawei Wang (Zhongguancun Laboratory), Geng Zhou (Zhongguancun3273Laboratory), Xianglong Li (Zhongguancun Laboratory), Yu Bai(Zhongguancun Laboratory), Li Chen (Zhongguancun Laboratory), Ting Qin(Zhongguancun Laboratory), Jian Sun (Zhongguancun Laboratory), and DanLi (Tsinghua University)	3

Zero Knowledge

Efficient Proofs of Possession for Legacy Signatures
Volatile and Persistent Memory for zkSNARKs via Algebraic Interactive Proofs
 ZHE: Efficient Zero-Knowledge Proofs for HE Evaluations
CoBBI: Dynamic constraint generation for SNARKs
 ALPACA: Anonymous Blocklisting with Constant-Sized Updatable Proofs

 HyperPianist: Pianist with Linear-Time Prover and Logarithmic Communication Cost
JesseQ: Efficient Zero-Knowledge Proofs for Circuits over Any Field
HydraProofs: Optimally Computing All Proofs in a Vector Commitment (with applications to efficient zkSNARKs over data from multiple users)
Zero-Knowledge Location Privacy via Accurate Floating-Point SNARKs
 FairZK: A Scalable System to Prove Machine Learning Fairness in Zero-Knowledge

Hardware Sidechannels

Bradley Morgan (The University of Adelaide & Defence Science and Technology Group, Australia), Gal Horowitz (Tel-Aviv University, Israel), Sioli O'Connell (The University of Adelaide, Australia), Stephan van Schaik (University of Michigan, USA), Chitchanok Chuengsatiansup (The University of Klagenfurt, Austria), Daniel Genkin (Georgia Tech, USA), Olaf Maennel (The University of Adelaide, Australia), Paul Montague (Defence Science and Technology Group, Australia), Eyal Ronen (Tel-Aviv University, Israel), and Yuval Yarom (Ruhr University Bochum, Germany) Rapid Reversing of Non-Linear CPU Cache Slice Functions: Unlocking Physical Address Mikka Rainer (CISPA Helmholtz Center for Information Security), Lorenz Hetterich (CISPA Helmholtz Center for Information Security), Fabian Thomas (CISPA Helmholtz Center for Information Security), Tristan Hornetz (CISPA Helmholtz Center for Information Security), Leon Trampert (CISPA Helmholtz Center for Information Security), Lukas Gerlach (CISPA Helmholtz Center for Information Security), and Michael Schwarz (CISPA Helmholtz Center for Information Security)

Breaking the Barrier: Post-Barrier Spectre Attacks
Peek-a-Walk: Leaking Secrets via Page Walk Side Channels
SLAP: Data Speculation Attacks via Load Address Prediction on Apple Silicon
PQ-Hammer: End-to-end Key Recovery Attacks on Post-Quantum Cryptography Using Rowhammer 3567
Samy Amer (Georgia Institute of Technology, USA), Yingchen Wang (UC Berkeley, USA), Hunter Kippen (UMD and Samsung Research, USA), Thinh Dang (NIST, USA), Daniel Genkin (Georgia Institute of Technology, USA), Andrew Kwong (UNC Chapel Hill, USA), Alexander Nelson (University of Arkansas, USA), and Arkady Yerukhimovich (George Washington University, USA)
Half Spectre, Full Exploit: Hardening Rowhammer Attacks with Half Spectre Gadgets
Training Solo: On the Limitations of Domain Isolation Against Spectre-v2 Attacks
Scheduled Disclosure: Turning Power Into Timing Without Frequency Scaling
I Know What You Sync: Covert and Side Channel Attacks on File Systems via syncfs

Embedded and Wireless Security

Adversarial Robust ViT-based Automatic Modulation Recognition in Practical Deep Learning-based Wireless Systems)
 SAECRED: A State-Aware, Over-the-Air Protocol Testing Approach for Discovering Parsing Bugs in SAE Handshake Implementations of COTS Wi-Fi Access Points	
Your Cable, My Antenna: Eavesdropping Serial Communication via Backscatter Signals)
You Can't Judge a Binary by Its Header: Data-Code Separation for Non-Standard ARM Binaries using Pseudo Labels	7
 "We can't allow IoT vendors to pass off all such liability to the consumer": Investigating the U.S. Legal Perspectives on Liability for IoT Product Security)
PEARTS: Provable Execution in Real-Time Embedded Systems	;
 FirmRCA: Towards Post-Fuzzing Analysis on ARM Embedded Firmware with Efficient Event-based Fault Localization	•
 HouseFuzz: Service-Aware Grey-Box Fuzzing for Vulnerability Detection in Linux-Based Firmware	-

Proving Faster Implementations Faster: Combining Deductive and Circuit-Based Reasoning in

Easy	Cry	ypt	 	 	 	 	 	 	20
2	2								

José Carlos Bacelar Almeida (Universidade do Minho and INESC TEC),
Gustavo Xavier Delerue Marinho Alves (Universidade do Porto and INESC
TEC and PQShield), Manuel Barbosa (Universidade do Porto (FCUP) and
INESC TEC and Max Planck Institute for Security and Privacy), Gilles
Barthe (Max Planck Institute for Security and Privacy and IMDEA
Software Institute), Luís Esquível (Universidade do Porto (FCUP) and
INESC TEC), Vincent Hwang (Max Planck Institute for Security and
Privacy), Tiago Oliveira (SandboxAQ), Hugo Pacheco (Universidade do
Porto (FCUP) and INESC TEC), Peter Schwabe (Max Planck Institute for
Security and Privacy), and Pierre-Yves Strub (PQShield)

Differential Privacy

PAC-Private Algorithms
An Attack-Agnostic Defense Framework Against Manipulation Attacks under Local Differential Privacy
From Randomized Response to Randomized Index: Answering Subset Counting Queries with Local Differential Privacy
Augmented Shuffle Protocols for Accurate and Robust Frequency Estimation under Differential Privacy
Differentially Private Release of Israel's National Registry of Live Births
Meeting Utility Constraints in Differential Privacy: A Privacy-Boosting Approach
DPolicy: Managing Privacy Risks Across Multiple Releases with Differential Privacy

Differentially Private Selection using Smooth Sensitivity	9
From Easy to Hard: Building a Shortcut for Differentially Private Image Synthesis	8
The Inadequacy of Similarity-based Privacy Metrics: Privacy Attacks against ``Truly Anonymous'' Synthetic Datasets	7

Hardware Security

)
F
;
<u>)</u>
)

BadRAM: Practical Memory Aliasing Attacks on Trusted Execution Environments
CipherSteal: Stealing Input Data from TEE-Shielded Neural Networks with Ciphertext Side
Channels
Yuanyuan Yuan (The Hong Kong University of Science and Technology,
Hong Kong SAR, China), Zhibo Liu (The Hong Kong University of Science
and Technology, Hong Kong SAR, China), Sen Deng (The Hong Kong
University of Science and Technology, Hong Kong SAR, China), Yanzuo
Chen (The Hong Kong University of Science and Technology, Hong Kong
SAR, China), Shuai Wang (The Hong Kong University of Science and
Technology, Hong Kong SAR, China), Yinqian Zhang (Southern University
of Science and Technology, China), and Zhendong Su (ETH Zurich, Switzerland)
GuardAIn: Protecting Emerging Generative AI Workloads on Heterogeneous NPU
TokenWeaver: Privacy Preserving and Post-Compromise Secure Attestation
Horowitz (Tel Aviv University), Charlie Jacomme (Inria Nancy
Grand-Est, Université de Lorraine, LORIA), and Eyal Ronen (Tel Aviv University)
IncognitOS: A Practical Unikernel Design for Full-System Obfuscation in Confidential Virtual Machines
Kha Dinh Duy (Sungkyunkwan University, South Korea), Jaeyoon Kim
(Sungkyunkwan University, South Korea), Hajeong Lim (Sungkyunkwan
University, South Korea), and Hojoon Lee (Sungkyunkwan University,
South Korea)

Mobile and Smarthome Security

A Big Step Forward? A User-Centric Examination of iOS App Privacy Report and Enhancements 4210 Liu Wang (Beijing University of Posts and Telecommunications, China), Dong Wang (Beijing University of Posts and Telecommunications, China), Shidong Pan (Columbia University), Zheng Jiang (Beijing University of Posts and Telecommunications, China), Haoyu Wang (Huazhong University of Science and Technology, China), and Yi Wang (Beijing University of Posts and Telecommunications, China)
Analyzing the iOS Local Network Permission from a Technical and User Perspective

 WireWatch: Measuring the security of proprietary network encryption in the global Android ecosystem
Born with a Silver Spoon: On the (In)Security of Native Granted App Privileges in Custom Android ROMs
Code Speaks Louder: Exploring Security and Privacy Relevant Regional Variations in Mobile Applications
Lombard-VLD: Voice Liveness Detection based on Human Auditory Feedback
 Analyzing Ad Prevalence, Characteristics, and Compliance in Alexa Skills
Eyes on Your Typing: Snooping Finger Motions on Virtual Keyboards

BPSniff: Continuously Surveilling Private Blood Pressure Information in the Metaverse via Unrestricted Inbuilt Motion Sensors
Private and Secure Communication
TreeKEM: A Modular Machine-Checked Symbolic Security Analysis of Group Key Agreement in Messaging Layer Security 4375 Théophile Wallez (Inria Paris), Jonathan Protzenko (Microsoft Azure 4375 Research), and Karthikeyan Bhargavan (Cryspen) 6
Impossibility Results for Post-Compromise Security in Real-World Communication Systems4391 Cas Cremers (CISPA Helmholtz Center for Information Security), Niklas Medinger (CISPA Helmholtz Center for Information Security), and Aurora Naska (CISPA Helmholtz Center for Information Security)
Extended Diffie-Hellman Encryption for Secure and Efficient Real-Time Beacon Notifications 4406 Liron David (Weizmann Institute of Science and Google), Omer Berkman (The Academic College of Tel Aviv-Yaffo and Google), Avinatan Hassidim (Bar Ilan University and Google), David Lazarov (Google), Yossi Matias (Tel-Aviv University and Google), and Moti Yung (Columbia University and Google)
Myco: Unlocking Polylogarithmic Accesses in Metadata-Private Messaging
Peer2PIR: Private Queries for IPFS
 Mixnets on a tightrope: Quantifying the leakage of mix networks using a provably optimal heuristic adversary
TreePIR: Efficient Private Retrieval of Merkle Proofs via Tree Colorings with Fast Indexing and Zero Storage Overhead

SoK: Self-Generated Nudes over Private Chats: How Can Technology Contribute to a Safer	
Sexting?	. 4495
Joel Samper (LASIGE, Faculdade de Ciências, Universidade de Lisboa,	
Portugal) and Bernardo Ferreira (LASIGE, Faculdade de Ciências,	
Universidade de Lisboa, Portugal)	
"You Have to Ignore the Dangers": User Perceptions of the Security and Privacy Benefits of	
WhatsApp Mods	. 4515
Collins W. Munyendo (The George Washington University), Kentrell Owens	
(University of Washington), Faith Strong (Austin College), Shaoqi Wang	
(University of Washington), Adam J. Aviv (The George Washington	
University), Tadayoshi Kohno (University of Washington), and Franziska	
Roesner (University of Washington)	

Audio and Video Security

 Spoofing Eavesdroppers with Audio Misinformation	Perturbations Jung-Woo Chang (University of Mi Urbana-Champaig	ng Vibration-based Side-Channel Eaves (University of California, San Diego), Ke ichigan, Ann Arbor), David Xia (Universi gn), Xinyu Zhang (University of Californi shanfar (University of California, San Dieg	Sun ty of Illinois ia, San Diego),
Xuejing Yuan (School of Cyberspace Security, Beijing University of Posts and Telecommunications, Beijing, China; State Key Laboralory of Cyberspace Security Defense, Instiute of Information Engineering, CAS, Beijing, China), Jiangshan Zhang (State Key Laboralory of Cyberspace	Zhambyl Shaikhar Mahmoud Al-Ma National Laborato Laboratory, USA) USA), Daniel M.	nov (University of Maryland - College Par adi (Rice University, USA), Hou-Tong Cha ory, USA), Chun-Chieh Chang (Los Alama), Sadhvikas Addamane (Sandia National I . Mittleman (Brown University, USA), an	rk, USA), en (Los Alamos os National Laboratories,
China; School of Cyber Security, University of Chinese Academy of Sciences, Beijing, China), Feng Guo (School of Cyber Science and Technology, Shandong University, Qingdao, China), Kai Chen (State Key Laboralory of Cyberspace Security Defense, Institute of Information Engineering, CAS, Beijing, China; School of Cyber Security, University of Chinese Academy of Sciences, Beijing, China), XiaoFeng Wang (Indiana University Bloomington, USA), Shengzhi Zhang (Metropolitan College, Boston University, Boston, USA), Yuxuan Chen (School of Cyber Science and Technology, Shandong University, Qingdao, China; Quancheng Laboratory, Jinan, China), Dun Liu (Metropolitan College, Boston University, Boston, USA), Pan Li (State Key Laboralory of Cyberspace Security Defense, Institute of Information Engineering, CAS, Beijing, China; School of Cyber Security, University of Chinese Academy of Sciences, Beijing, China), Zihao Wang (Indiana University Bloomington, USA), and Runnan Zhu (School of Cyberspace Security, Bing, University of Posts and Telecommunications, Beijing, China)	Xuejing Yuan (Sc Posts and Telecon Cyberspace Secur, Beijing, China), Ji Security Defense, China; School of C Sciences, Beijing, Technology, Shan Laboralory of Cyb Engineering, CAS of Chinese Acader (Indiana Universi College, Boston U Science and Techr Laboratory, Jinan, University, Bosto Security Defense, China; School of C Sciences, Beijing, USA), and Runnu	chool of Cyberspace Security, Beijing Univ nmunications, Beijing, China; State Key L ity Defense, Instiute of Information Engin iangshan Zhang (State Key Laboralory of G Instiute of Information Engineering, CAS Cyber Security, University of Chinese Aca China), Feng Guo (School of Cyber Science adong University, Qingdao, China), Kai Ch berspace Security Defense, Instiute of Infor S, Beijing, China; School of Cyber Security my of Sciences, Beijing, China), XiaoFeng ity Bloomington, USA), Shengzhi Zhang (Iniversity, Boston, USA), Yuxuan Chen (S nology, Shandong University, Qingdao, C nology, Shandong University, Qingdao, C n, USA), Pan Li (State Key Laboralory of Instiute of Information Engineering, CAS Cyber Security, University of Chinese Aca China), Zihao Wang (Indiana University an Zhu (School of Cyberspace Security, Be	persity of aboralory of aboralory of peering, CAS, Cyberspace 5, Beijing, demy of ce and hen (State Key mation J, University Wang (Metropolitan School of Cyber hina; Quancheng Boston Cyberspace 5, Beijing, demy of Bloomington, eijing

Investigating Physical Latency Attacks against Camera-based Perception
VerITAS: Verifying Image Transformations at Scale
Trust Nobody: Privacy-Preserving Proofs for Edited Photos with Your Laptop
Eva: Efficient Privacy-Preserving Proof of Authenticity for Lossily Encoded Videos
 From One Stolen Utterance: Assessing the Risks of Voice Cloning in the AIGC Era
Sniffing Location Privacy of Video Conference Users Using Free Audio Channels

Author Index