





# Aravind Machiry

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AFFILIATION	Assistant Professor, Department of Electrical and Computer Engineering, Purdue University.		
CONTACT INFORMATION	Purdue University EE 333, School of Electrical and Computer Engineering S465 Northwestern Ave. West Lafayette, IN 47907. United States of America	<a href="mailto:amachiry@purdue.edu">amachiry@purdue.edu</a> <a href="https://machiry.github.io">machiry.github.io</a> <a href="#">machiry</a> <a href="#">Google Scholar</a>	   
RESEARCH INTERESTS	My research focuses on various aspects of system security, such as vulnerability detection, mobile security, trusted execution environments, static and dynamic analysis of source code, and binaries. I am also interested in developing novel static/dynamic program analysis techniques for system security problems. My research resulted in various Open-source security tools and several Common Vulnerability Exposures (CVEs) in critical system software such as kernel drivers and bootloaders.		
POSITIONS & EDUCATION	<b>Assistant Professor (PurS3 Lab)</b> Department of Electrical and Computer Engineering Purdue University, West Lafayette, USA	Jan 2021-Present	
	<b>Postdoctoral Researcher</b> University of Pennsylvania, Philadelphia, PA, USA Advisor: Mayur Naik	Aug 2020-Dec 2020	
	<b>Ph.D in Computer Science</b> University of California, Santa Barbara, USA Advisors: Christopher Kruegel and Giovanni Vigna <b>Thesis: Securing smart devices from the bottom-up</b> Supported by: <b>Symantec Research Labs Graduate Fellowship</b> <b>UCSB Graduate Division Dissertation Fellowship</b>	Sep 2014- Aug 2020	
PUBLICATIONS	<p>[41] P. Amusuo, R. Méndez, Z. Xu, <b>Aravind Machiry</b>, J. Davis. “Systematically Detecting Packet Validation Vulnerabilities in Embedded Network Stacks.” <i>Proceedings of the 38th ACM International Conference on Automated Software Engineering (ASE)</i>, 2023</p> <p>[40] J. Srinivasan, R. Tanksalkar, P. Amusuo, J. Davis, <b>Aravind Machiry</b>. “Towards rehosting embedded applications as Linux applications.” <i>53rd Annual IEEE/IFIP International Conference on Dependable Systems and Networks-Supplemental Volume (DSN-Disrupt)</i>, 2023</p> <p>[39] M. Shen, J. Davis, <b>Aravind Machiry</b>. “Towards Automated Identification of Layering Violations in Embedded Applications.” <i>Proceedings of the 24th ACM SIGPLAN/SIGBED International Conference on Languages, Compilers, and Tools for Embedded Systems (LCTES)</i>, 2023</p> <p>[38] S. Muralee, I. Koishybayev, A. Nahapetyan, G. Tystahl, B. Reaves, A. Bianchi, W. Enck, A. Kapravelos, <b>Aravind Machiry</b>. “ARGUS: A Framework for Staged Static Taint Analysis of GitHub Workflows and Actions.” <i>Proceedings of the 31st USENIX Security Symposium (USENIX Security)</i>, 2023</p> <p>[37] J. Majors, E. Barsallo Yi, A. Maji, D. Wu, S. Bagchi, <b>Aravind Machiry</b>. “Security Properties of Virtual Remotes and SPOOKing their violations.” <i>Proceedings of the ACM ASIA Conference on Computer and Communications Security (AsiaCCS)</i>, 2023</p> <p>[36] M. Busch, M. Payer, <b>Aravind Machiry</b>, C. Kruegel, G. Vigna, C. Spensky. “TEEzz: Fuzzing Trusted Applications on COTS Android Devices.” <i>Proceedings of the 44nd IEEE Symposium on Security and Privacy (S&amp;P)</i>, 2023</p> <p>[35] V. Singhal, A. Pillai, C. Saumya, M. Kulkarni, <b>Aravind Machiry</b>. “Cornucopia: A Framework for Feed-back Guided Generation of Binaries.” <i>Proceedings of the 37th ACM International Conference on Automated Software Engineering (ASE)</i>, 2022</p>		

- [34] I. Koishybayev, A. Nahapetyan, R. Zachariah, S. Muralee, B. Reaves, A. Kapravelos, **Aravind Machiry**. “Characterizing the Security of Github CI Workflows.” *Proceedings of the 31st USENIX Security Symposium (USENIX Security)*, 2022
- [33] D. Das, P. Bose, **Aravind Machiry**, S. Mariani, Y. Shoshitaishvili, C. Kruegel and G. Vigna. “Hybrid Pruning: Towards A Precise Static Analysis.” *Proceedings of the 16th International Conference on Detection of Intrusions and Malware, and Vulnerability Assessment (DIMVA)*, 2022
- [32] P. Pashakhanloo, **Aravind Machiry**, H. Choi, A. Canino, K. Heo, I. Lee, M. Naik. “PacJam: Securing Dependencies Continuously via Package-Oriented Debloating.” *Proceedings of the ACM ASIA Conference on Computer and Communications Security (AsiaCCS)*, 2022
- [31] **Aravind Machiry**, J. Kastner, M. McCutchen, A. Eline, K. Headley, M. Hicks. “C to Checked C by 3C.” *Proceedings of the Object-oriented Programming, Systems, Languages, and Applications (OOPSLA)*, 2022. Won **Distinguished Paper Award**.
- [30] D. Quarta, M. Ianni, **Aravind Machiry**, Y. Fratantonio, E. Gustafson, D. Balzarotti, M. Lindorfer, C. Kruegel, and G. Vigna. “Tarnhelm: Isolated, Transparent and Confidential Execution of Arbitrary Code in ARM’s TrustZone.” *Proceedings of the ACM Workshop on Research on Offensive and Defensive Techniques in the Context of Man At The End Attacks (CheckMate)*, 2021
- [29] C. Garg, **Aravind Machiry**, A. Continella, C. Kruegel, and G. Vigna. “Toward a Secure Crowdsourced Location Tracking System.” *Proceedings of the ACM Conference on Security and Privacy in Wireless and Mobile Networks (WiSec)*, 2021
- [28] Z. Li, **Aravind Machiry**, B. Chen, M. Naik, K. Wang, and L. Song. “ARBITRAR: User-Guided API Misuse Detection.” *Proceedings of the 42nd IEEE Symposium on Security and Privacy (S&P)*, 2021
- [27] C. Spensky, **Aravind Machiry**, N. Burow, H. Okhravi, R. Housley, Z. Gu, H. Jamjoom, C. Kruegel, and G. Vigna. “Glitching Demystified: Analyzing Control-flow-based Glitching Attacks and Defenses.” *Proceedings of the 51st International Conference on Dependable Systems and Networks (DSN)*, 2021
- [26] N. Redini, A. Continella, D. Das, G. De Pasquale, N. Spahn, **Aravind Machiry**, A. Bianchi, C. Kruegel, and G. Vigna. “DIANE: Identifying Fuzzing Triggers in Apps to Generate Under-constrained Inputs for IoT Devices.” *Proceedings of the 42nd IEEE Symposium on Security and Privacy (S&P)*, 2021
- [25] D. Meng, M. Guerriero, **Aravind Machiry**, H. Aghakhani, P. Bose, A. Continella, C. Kruegel and G. Vigna. “Bran: Reduce Vulnerability Search Space in Large Open Source Repositories by Learning Bug Symptoms.” *Proceedings of the ACM ASIA Conference on Computer and Communications Security (AsiaCCS)*, 2021
- [24] C. Spensky, **Aravind Machiry**, N. Redini, C. Unger, G. Foster, E. Balsband, H. Okhravi, C. Kruegel and G. Vigna. “Conware: Automated Modeling of Hardware Peripherals.” *Proceedings of the ACM ASIA Conference on Computer and Communications Security (AsiaCCS)*, 2021
- [23] C. Salls, **Aravind Machiry**, A. Doupe, Y. Shoshitaishvili, C. Kruegel, and G. Vigna. “Exploring Abstraction Functions in Fuzzing.” *Proceedings of the 2020 IEEE Conference on Communications and Network Security (CNS)*, 2020
- [22] C. Spensky, **Aravind Machiry**, M. Busch, K. Leach, R. Housley, C. Kruegel, and G. Vigna. “TRUST.IO: Protecting Physical Interfaces on Cyber-physical Systems.” *Proceedings of the 2020 IEEE Conference on Communications and Network Security (CNS)*, 2020
- [21] **Aravind Machiry**, N. Redini, E. Cammellini, C. Kruegel and G. Vigna. “SPIDER: Enabling Fast Patch Propagation in Related Software Repositories.” *Proceedings of the 41st IEEE Symposium on Security and Privacy (S&P)*, 2020
- [20] N. Redini, **Aravind Machiry**, R. Wang, C. Spensky, A. Continella, Y. Shoshitaishvili, C. Kruegel and G. Vigna. “KARONTE: Detecting Insecure Multi-binary Interactions in Embedded Firmware.” *Proceedings of the 41st IEEE Symposium on Security and Privacy (S&P)*, 2020
- [19] **Aravind Machiry**, H. Touma, R. Chen, M. Hicks. “(POSTER) Automated conversion of legacy code to Checked C.” *Proceedings of the IEEE Secure Development Conference (SecDev)*, 2019

- [18] E. Gustafson, M. Muench, C. Spensky, N. Redini, **Aravind Machiry**, Y. Fratantonio, D. Balzarotti, A. Francillon, Y. E. Choe, C. Kruegel, G. Vigna. "Toward the Analysis of Embedded Firmware through Automated Re-hosting." *Proceedings of the 22nd International Symposium on Research in Attacks, Intrusions and Defenses (RAID)*, 2019
- [17] N. Redini, R. Wang, **Aravind Machiry**, Y. Shoshitaishvili, C. Kruegel and G. Vigna. "BinTrimmer: Towards Static Binary Debloating Through Abstract Interpretation." *Proceedings of the 16th International Conference on Detection of Intrusions and Malware, and Vulnerability Assessment (DIMVA)*, 2019
- [16] **Aravind Machiry**, N. Redini, E. Gustafson, H. Aghakhani, C. Kruegel and G. Vigna. "Detecting Deceptive Reviews using Generative Adversarial Networks." *Proceedings of the 2nd Binary Analysis Research Workshop (BAR)*, 2019.
- [15] **Aravind Machiry**, N. Redini, E. Gustafson, Y. Fratantonio, Y. E. Choe, C. Kruegel and G. Vigna. "Using Loops For Malware Classification Resilient to Feature-unaware Perturbations." *Proceedings of the 34th Annual Application Security Application Conference (ACSAC)*, 2018
- [14] H. Aghakhani, **Aravind Machiry**, S. Nilizadeh, C. Kruegel and G. Vigna. "Detecting Deceptive Reviews using Generative Adversarial Networks." *Proceedings of the 1st Deep Learning and Security Workshop (DLS)*, 2018.
- [13] A. Bianchi, Y. Fratantonio, **Aravind Machiry**, C. Kruegel, G. Vigna, S. Chung, W. Lee. "Broken Fingers: On the Usage of the Fingerprint API in Android." *Proceedings of the ISOC Network and Distributed System Security Symposium (NDSS)*, 2018.
- [12] A. Bianchi, K. Borgolte, J. Corbetta, F. Disperati, A. Dutcher, J. Grosen, P. Grosen, **Aravind Machiry**, C. Salls, N. Stephens, G. Vigna, R. Wang (Authors listed alphabetically). "Mechanical Phish: Resilient Autonomous Hacking." *IEEE Security & Privacy Magazine - SPSI: Hacking without Humans* 2018.
- [11] N. Redini, **Aravind Machiry**, D. Das, Y. Fratantonio, A. Bianchi, E. Gustafson, Y. Shoshitaishvili, C. Kruegel, G. Vigna. "BootStomp: On the Security of Bootloaders in Mobile Devices." *Chaos Communication Congress (34C3)*, 2017.
- [10] J. Corina, **Aravind Machiry**, C. Salls, Y. Shoshitaishvili, Shuang Hao, C. Kruegel, and G. Vigna. "DI-FUZZING Android Kernel Drivers." *Black Hat Europe London, UK December (BH EU)*, 2017.
- [9] J. Corina, **Aravind Machiry**, C. Salls, Y. Shoshitaishvili, Shuang Hao, C. Kruegel, and G. Vigna. "DI-FUZE: Interface Aware Fuzzing for Kernel Drivers." *Proceedings of the 24th ACM Conference on Computer and Communications Security (CCS)*, 2017. Finalist for **CSAW Applied Research Competition**.
- [8] **Aravind Machiry**, C. Spensky, J. Corina, N. Stephens, C. Kruegel, G. Vigna. "DR.CHECKER: A Soundy Analysis for Linux Kernel Drivers." *Proceedings of the 26th USENIX Security Symposium (USENIX Security)*, 2017. Runner up for **Facebook Internet Defense Prize**
- [7] N. Redini, **Aravind Machiry**, D. Das, Y. Fratantonio, A. Bianchi, E. Gustafson, Y. Shoshitaishvili, C. Kruegel, G. Vigna. "BootStomp: On the Security of Bootloaders in Mobile Devices." *Proceedings of the 26th USENIX Security Symposium (USENIX Security)*, 2017.
- [6] **Aravind Machiry**, E. Gustafson, C. Spensky, C. Salls, N. D. Stephens, R. Wang, A. Bianchi, Y. E. Choe, C. Kruegel, G. Vigna. "BOOMERANG: Exploiting the Semantic Gap in Trusted Execution Environments." *Proceedings of the ISOC Network and Distributed System Security Symposium (NDSS)*, 2017.
- [5] R. Wang, Y. Shoshitaishvili, A. Bianchi, **Aravind Machiry**, J. Grosen, P. Grosen, C. Kruegel, G. Vigna. "Ramblr: Making Reassembly Great Again." *Proceedings of the ISOC Network and Distributed System Security Symposium (NDSS)*, 2017. Won **Distinguished Paper Award**.
- [4] A. Bianchi, K. Borgolte, J. Corbetta, F. Disperati, A. Dutcher, J. Grosen, P. Grosen, **Aravind Machiry**, C. Salls, N. Stephens, G. Vigna, R. Wang (Authors listed alphabetically). "Cyber Grand Shellphish." *Phrack*, 2017.
- [3] Y. Fratantonio, **Aravind Machiry**, A. Bianchi, C. Kruegel, G. Vigna. "CLAPP: Characterizing Loops in Android Applications." *Proceedings of the ACM Symposium on Foundations of Software Engineering (FSE)*, 2015.

[2] Y. Fratantonio, **Aravind Machiry**, A. Bianchi, C. Kruegel, G. Vigna. “CLAPP: Characterizing Loops in Android Applications (Invited Talk).” *Proceedings of the International Workshop on Software Development Lifecycle for Mobile (DeMobile)*, 2015.

[1] **Aravind Machiry**, R. Tahiliani, M. Naik. “Dynodroid: An Input Generation System for Android Apps.” *Proceedings of the ACM Symposium on Foundations of Software Engineering (FSE)*, 2013. Won **Distinguished Artifact Award**.

TALKS	• Unleashing D on Android Kernel Drivers	Nullcon 2018
	• Piston: Uncooperative Remote Runtime Patching	ACSAC 2018
	• Cyber Grand Shellphish	DEFCON, USA, 2016
	• Million Dollar Baby: Towards ANGRly conquering DARPA CGC	Nullcon 2016

HONORS & AWARDS	• <b>Test of Time Award</b> for Dynodroid	FSE 2023
	• <b>Amazon Research Award</b> for Securing CI Workflows	2023
	• <b>Distinguished Paper Award</b> for 3c	OOPSLA 2022
	• <b>CS Outstanding Dissertation Award</b>	UCSB 2020
	• <b>CSAW Applied Research</b> Finalist for DIFUZE	CSAW 2017
	• <b>Internet Defense Prize</b> Runner up for DR.CHECKER	USENIX Security 2017
	• <b>Distinguished Paper Award</b> for Ramblr	NDSS 2017
	• <b>Best Paper Award</b> for CLAPP	Grad Workshop 2016
	• <b>Distinguished Artifact Award</b> for Dynodroid	FSE 2013
• <b>College of Computing MS Research award</b>	2013	

PROFESSIONAL ACTIVITIES	Technical Program Committee Member
	Conferences (recent 3 years):
	• <b>2024:</b> IEEE S&P, ACM CCS, USENIX Security, USENIX ATC, ACM ACSAC, ISOC NDSS, DIMVA, RAID, USENIX WOOT
	• <b>2023:</b> ACM CCS, ACSAC, SecDev, AsiaCCS, WOOT, EuroSec, ESORICS
	• <b>2022:</b> AsiaCCS, Middleware, RAID, WOOT, EuroSec
	Organizing Member (Chair)
	Workshops:
	<b>BAR Workshop (Co-located with NDSS) (2023, 2022)</b>

TEACHING	ECE 26400 - <b>Advanced C Programming</b> , Purdue University	Sp'2023
	ECE 46900 - <b>Operating Systems Engineering</b> , Purdue University	Sp'2022, Sp'2021
	ECE 69500 - <b>Holistic Software Security</b> , Purdue University	Fa'2022, Fa'2021

REFERENCES	<b>Christopher Kruegel</b> Professor at University of California, Santa Barbara <a href="mailto:chris@cs.ucsb.edu">chris@cs.ucsb.edu</a> ✉	<b>Giovanni Vigna</b> Professor at University of California, Santa Barbara <a href="mailto:vigna@cs.ucsb.edu">vigna@cs.ucsb.edu</a> ✉
	<b>Mayur Naik</b> Associate Professor at University of Pennsylvania <a href="mailto:mhnaik@cis.upenn.edu">mhnaik@cis.upenn.edu</a> ✉	<b>Michael Hicks</b> Professor at University of Maryland, College Park <a href="mailto:mwh@cs.umd.edu">mwh@cs.umd.edu</a> ✉
	<b>Antonio Bianchi</b> Assistant Professor at Purdue University <a href="mailto:antonio@purdue.edu">antonio@purdue.edu</a> ✉	<b>Yan Shoshitaishvili</b> Assistant Professor at Arizona State University <a href="mailto:yans@yancomm.net">yans@yancomm.net</a> ✉