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Vaibhav Hemant Dixit

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EDUCATION

Arizona State University, Tempe, AZ Master of Science, Computer Science ***May 2018, GPA 3.67***

Courses - Software Security, Automated Binary Analysis, Foundation of Algorithms, Embedded Operating System Internals

Vellore Institute of Technology, Tamil Nadu, India Bachelor of Technology, Information Technology ***May 2013, GPA 3.6***

SKILLS

Languages - *Proficient* - C, Java; *Familiar* - Python, JavaScript, Shell, Yang. **Tools:** Gdb, Wireshark, Objdump, IDA, Scapy.

Others - Pentesting, SDN, Openflow, TCP/IP, WLAN, ELK, Linux, Android, Git, Docker, Jenkins, Eclipse, Linux, Windows.

PROFESSIONAL EXPERIENCE

Graduate Research Assistant, *Center for Cybersecurity and Digital Forensics, ASU* ***Dec 2016 to present***

- Designed a **novel** SDN-based **adaptive security** mechanism on ASU's Science-DMZ network. Continuous behavioral analysis of the attacker by propagating the attack to a quarantined research zone.
- **Devising countermeasure** generation algorithm on Elastic Search Cluster using attack graph with CVSS scores of compromised services. Results of **research proved useful** in blacklisting IPs and for hardening campus network servers.

Senior Software Engineer, *Samsung Electronics, India* ***Jul 2013 to Jun 2016***

- **Built advanced features** like 802.11w, secret SSID and multiband support by making control path handlers at kernel space and patching Google's Android supplicant at user space. Contributions are included in Samsung mid-tier phones.
- **Owned, implemented and unit-tested** WEP, WPA, WPA2 secured connection procedures for Wi-Fi softAP driver. Identified critical kernel bugs like memory leaks and race conditions in the driver and features not owned directly.
- **Automated the process** of build generation, sanity and stress testing by creating unit testing, Jenkin's scripts linked with git server to catch the development bugs including regressions, kernel crashes before transferring to testing team. This **reduced overall time** for teams and had a direct impact in winning agile deadlines by a minimum profit of 3-6 days

RECENT PROJECTS

- **Evolutionary mutational fuzzer**: A Python based automatic binary fuzzer to find the vulnerabilities in the executable programs. Used Gdb and Valgrind to trace the basic blocks inside the assembly version of the binary. Mutating the input seed using bit manipulation techniques to cover infinite branches of the code and make it crash.
- **Fingerprinting and attacking SDN controllers**: Threat modelling and security framework in python. Discovered vulnerabilities: dictionary attack from north-bound API (**CVE-2017-1000406**) and a DoS attack (**CVE-2017-1000411**).
- **Advanced software firewall for SDN:** A policy conflict detection and dynamic resolution tool. Single handedly designed a centralized Java application which pulled topology information using OpenFlow APIs and created **complex logical graph of flow rules** and links. Propagation of dummy packets validated reachability and **security compliance**.
- **Framework for exploit detection and patching in Capture the Flag competition**: Participated in a project based CTF game. Developed a Python based network attack reflector using Scapy. Contributed to defense framework to reverse engineer the binaries, patch the application/web vulnerabilities in real time. Team won the iCTF competition.
- **Embedded programming in Intel Quark based Galileo board**: Project aimed to provide an understanding of internals of Linux and RTOS kernel architecture by implementing device drivers. Investigated Linux kernel source code including memory management, kernel synchronization, device driver design and trace, debug support. Programmed **ioctls**, **syscall** interface, **static and dynamic probes, MISC drivers**, etc.
- **Android application for distributed image reconstruction**: A volunteer computing service where a master phone distributes the work among slaves considering slave's attributes like processing power, battery, signal strength, etc.

PUBLICATIONS

- **Challenges and Preparedness of SDN-based Firewalls** at ACM CODASPY SDNNFV Workshop 2018, Tempe, Arizona
  Vaibhav Hemant Dixit, S. Kyung, Z. Zhao, A. Doupé, Y. Shoshitaishvili and G-J. Ahn
- Science DMZ: **Software Defined Networking based Secured Cloud Testbed** at IEEE NFV-SDN 2017, Berlin
  A. Chowdhary, **Vaibhav Hemant Dixit**, N. Tiwari, S. Kyung, D. Huang and G-J. Ahn
- HONEYPROXY: **Design and Implementation of Next-Generation Honeynet via SDN** at IEEE CNS 2017, Vegas
  S. Kyung, W. Han, N. Tiwari, **Vaibhav Hemant Dixit**, L. Srinivas, Z. Zhao, A. Doupe´, and G-J. Ahn