

## **Experience Summary**

- 10+ years industry experience in Silicon Valley in software design and development
- 5+ years of research and teaching experience in systems and software security
- Research experience in Android application security, obfuscation, trusted execution environment
- Proficiency in reverse-engineering Java and Android applications
- Experience setting up and managing an (Offshore) Software Team
- Proficiency in various programming languages, scripting languages and build environments
- Familiarity with PCI/PCIe devices and Linux Kernel Service Drivers
- Industry awards for excellence in performance and commitment, Award for excellence in academic year 2014-2015

## **Education**

PhD Student, Dept. of Computer Science, University of Michigan, Ann Arbor (On going)

MS, Dept. of Electrical Engineering, Computer Networks, University of Southern California, 2003

BS in Computer Science, Amrita Institute of Technology and Science, Affiliated with Bharatiar University, Tamil Nadu, India, June 2000.

## **Technical Achievements**

1. (Co-)Principal Investigator - Funded projects
2. Obtained the following CVEs for disclosure of authentication vulnerabilities and privacy leaks. The CVEs were obtained as a part of a research on the security of widely adopted financial applications in the Indian market: CVE-2017-9818, CVE-2017-9819, CVE-2017-9820, CVE-2017-982, CVE-2018-15660, CVE-2018-15661, CVE-2018-17401, CVE-2018-17402, CVE-2018-17403, CVE-2018-17403. Disclosures posted at <https://github.com/magicj3lly/appexploits>.
3. Publications:
  - a. *Security Analysis of Unified Payment Interface and Payment Apps in India*, Renuka Kumar, Sreesh K., Hao Lu, Atul Prakash, USENIX Security, August 2020, <https://www.usenix.org/conference/usenixsecurity20/presentation/kumar>

- b. *Towards Accuracy in Similarity Analysis of Android Applications*, Sreesh K., Renuka Kumar, Sreeranga Rajan, 14<sup>th</sup> International Conference on Information Systems Security, 2018
  - c. *A Systematic Study on Static Control Flow Obfuscation Techniques*, Renuka Kumar, Anjana Mariam Kurian, arXiv.org
  - d. *On the Efficacy of Ransomware Detection Techniques: A Survey*, Jithin Chandra Mohan, Renuka Kumar, International Journal of Pure and Applied Mathematics, 2017
  - e. *Detection of Obfuscation in Java Malware*, Renuka Kumar, Anand Raj Essar Vaisakh, Ist International Conference on Information Security & Privacy, 2015
  - f. *Securing User Input as a Defense Against MitB*, Radhesh Krishnan K., Renuka Kumar, Proceedings of the 2014 International Conference on Inter-Disciplinary Advances in Applied Computing.
4. Contributor to the *eelo (/e/) foundation* (<https://e.foundation/about-e/>), a non-profit group that advocates privacy, to develop a privacy tracker for Android applications

## **Work Experience**

### **➤ Research Faculty, Center for Cybersecurity Systems & Networks, Amrita University**

**August 2013 – Present**

Center for Cybersecurity is a center of relevance and excellence (CORE) designated by the Government of India, that fosters collaborative research in the area of Cybersecurity.

#### **Projects:**

1. Hybrid Analysis Framework for Backdoor Detection in Android Applications (Funded): The objective of this research is to perform a combination of static and dynamic analysis to detect backdoors in Android applications.
2. Security Analysis of Financial Applications in Android in India (Collaboration with University of Michigan, Ann Arbor): This research explored the vulnerabilities in widely adopted payment applications in India and demonstrated the impact of the vulnerabilities by demonstrating real attacks on these applications.

3. Intel SGX-based Botnet (Collaboration with VU, Amsterdam): This research explores the possibility of exploiting Intel SGX's features to develop a P2P botnet application that is potent and difficult to take-down.
4. Malware profiling using similarity analysis: This research conducts a study on the similarity of Android applications to find common (malicious) components across different applications.

➤ **Senior Software Engineer, PLX Technology Inc. (now Broadcom), California**

**July 2007 – July 2013**

PLX Technology Inc. was the technology and market share leader in PCI Express switches and bridges with additional leadership in USB Controllers, legacy PCI devices and consumer storage controllers. PLX offers a host of products involving a software SDK that can work with RDKS, operating system ports, firmware, etc.

**Lead Engineer for DMA-Based Networking Application (2012-2013)**

TCP/IP layer being a heavy protocol adds a lot of overhead in terms of packet construction thereby reducing the effective bandwidth available for transfers and increasing system latency. PLX's GEN3 chips have a built in DMA Engine that can be used to transfer data to remote hosts. PLX's network driver eliminates the overhead of TCP and also bypasses intensive CPU processing by using simple DMA transfers.

- Worked with hardware design engineers to test proof of concept on simulation environment.
- Developed an interactive software utility demonstrating multiple push and pull transfers.
- Developed a sample app for customers demonstrating the efficiency of the DMA-based networking feature with performance stats showing bandwidth utilization.
- Customer demo and engineering support.

**Software Lead for SDK (2007 – 2012)**

Designed, developed and managed PLX's SDK GUI that includes a broad range of technologies including client-server programming, C#/Java, .NET, Perl & Shell Scripting, HTML, Objected Oriented Design, C++. The GUI is the first of its kind in the industry for the market that PLX is in. Instrumental in moving all development to Linux and also ported an extensive C# based GUI into Java for support across multiple platforms. Led an offshore development team.

- Developed all data abstractions, object hierarchies and workflow for the GUI
- Actively programmed both in C#/NET & Java for the GUI client.
- Created a Java RMI Server that interfaces with a C++ library using JNI.
- Implemented a fully automated make based build environment, which also includes extensive pre-processing using Shell & Perl scripts. Support in windows also involved using DOS batch files.
- Developed software for Serdes Eye testing that includes elaborate plotting using JFreeCharts.
- Designed and developed software that uses the PLX chips internal debug features for ease of monitoring and debugging.
- Developed a Perl engine to breakup huge HTML files into smaller files to be integrated with the GUI.
- As a part of team growth, recruited and trained software engineers for the Offshore Team in India for development and QA
- Created project timelines and deliverables and ensured on-time delivery of software.
- Guided in developing software test plans.
- Documentation and Field application engineer/Customer support.

#### **Software Development Kit (SDK) API, Driver, Support (2007 - 2012)**

- Implementation of User API library in C/C++ for SDK.
- Developed an interactive tool in C++ that uses the API for testing and debugging PLX's chips.
- Worked closely with software team for the development of PLX's drivers – including developing algorithms for device scanning and enumeration, I2C support e.t.c.
- Co-author for user manuals for the API.
- Worked with Marketing in defining the new features/look-and-feel of the SDK.
- Debugged various customer issues and responded with results in a time critical manner.
- Actively involved and contributed to all technical design and architecture discussions in the team

#### **Technical Achievements**

Training in PCI/PCIe Devices (company sponsored)

Training in Linux/Windows Driver Development (company sponsored)

Linux Systems Programming – Course from UCSC Silicon Valley Extension (company sponsored), secured A grade.

## **Awards**

Company appreciation for excellent contribution and people award for demonstrating commitment

### ➤ **Member of Technical Staff, Kasenna Inc, California** **2007**

**June 2003 – July**

Kasenna Inc., a spin off of SGI's Broadband Media Software division, is a software technology company building a standards-based video delivery platform for acquiring, managing, distributing and delivering audio and video content over IP, ATM and HFC networks.

- Developing and testing MediaBase XMP SE integration API in Java. MediaBase XMP SE is an award winning software platform that provides the core for building and deploying video delivery (on-demand, live, distribution) applications on open computing platforms and storage systems. MediaBase XMP services are developed in C++ and the API in JAVA. CORBA IDL specifies the interfaces for communication between the client and server.
- Played a pivotal role in designing the basic paradigms for workflow management of large video networks (using Java, C++ & CORBA). As an opening into workflow management, single handedly developed a cache propagation algorithm for propagation of content from a library server to cache servers.
- Key architect of a Java Swing based client application that is a centralized control for a network of MediaBase servers. The only one of its kind, the tool is a powerful UI that enables server monitoring, content management and usage monitoring, reporting and so forth.
- Other associated experience:
  - Internationalization of the UI (Java).
  - Using Jasper Reports and JfreeCharts to generate reports and charts.
  - Basic knowledge of jBPM (java Business Process Mgmt) as a means to develop a rules engine.
  - Working with the Customer Experience Manager to resolve usability issues with UI.
- Enhancing and maintaining the web services interface for integration with MediaBase XMP SE. The interface enables a soap client, which may be a .NET client, to access MediaBase's services. Tomcat is the HTTP server that receives the XML/SOAP requests and Apache Axis is the SOAP engine.
- Extending and supporting the server side interface to MediaBase XMP SE (in C++).
- Assisting QA in unit testing of MediaBase's services and product documentation

- Identifying critical action items for the road map and orchestrating its completion.
- Resolving any relevant customer/partner issues and rendering support for integration with MediaBaseXMP API via Java or SOAP interfaces.

#### **Awards**

- Twice awarded letter of appreciation for 101% commitment and performance

**Software Engineer, Patni Computer Systems, Bombay, India**

**Jun. 2000 – Jul.**

**2001**

**For General Electric Corporation (US):** Developed business critical application to monitor Service Level Agreements (SLAs) called e-SLA. The e-SLA tool was developed using Java and JSP, with an Oracle database backend connected using JDBC. The success of the project helped capture the bulk of the business from GE and personally received acclaim from the company management.

- Designed the look and feel of the site
- Designed and implemented project modules.
- Led the team in design and code reviews and orchestrated integration cycle testing.
- Assisted client personnel in inputting baseline data for tool.
- Conducted project presentations and prototype demonstrations.
- Authored main user manuals
- Product support
- Advised other teams in the design of specific project modules.