RUI SHU

rshu@ncsu.edu – Raleigh, NC – 919-986-0975

EDUCATION

North Carolina State University – *Ph.D. candidate in Computer Science* – Raleigh, NC 2014 – Expected Dec, 2020

- Research interests: Search-based Optimization, Sampling, Data Mining.
- Advisor: Dr. Tim Menzies.

Peking University – *M.S. in Software Engineering* – Beijing, China 2011 – 2014

- Major: System and network security.

Beijing Jiaotong University – *B.S. in Software Engineering* – Beijing, China 2006 – 2010

- Major: Software Engineering.

RESEARCH AND COURSE PROJECTS

Hyperparameter Optimization in Security Bug Report Classification – *Research* 2018 August - Present

- Apply differential evolution algorithm in searching for optimal configurations of machine learning learners in python.
- Apply data oversampling technique named SMOTE to address class imbalanced issue in datasets.
- Apply epsilon-based techniques to optimize both data pre-processors and machine learning learners.

DevOps – *Course* 2019 January - 2019 April

- Automate application configurations with ansible in AWS.
- Leverage fuzzing test, test case prioritization and static analysis to improve the quality of applications.
- Implement a continuous deployment pipeline that provisions and configures the production environment with Jenkins server and Nomad cluster.

Anomaly Detection of Applications in Docker Containers – *Research* 2016 September - 2018 May

- Detect application anomalies in Docker Containers using system metrics and system call traces with clustering algorithm named Self-organizing Map (SOM).

Study of Security Vulnerabilities on Docker Hub – *Research* 2015 July - 2016 August

- Build Docker Images Vulnerabilities Analysis (DIVA) system framework to automatically discover, download and analyze Docker images.
- Analyze Docker images dependency relationship and vulnerability propagation pattern on Docker Hub.

Study of Smart Isolation Techniques – *Research* 2014 September - 2016 August

- Perform a systematic survey of existing security isolation techniques, classifying and analyzing the properties.

Automated Learning and Data Analysis – *Course* 2017 Fall

- Implement a spam email prediction system with Enron email dataset using Support Vector Machine (SVM) and K-Means in python.

Network Security – *Course* 2016 Fall

- Implement the Port Knocking attack in C language, i.e., when server receives right sequence of packets from client, it fetches remote script and runs locally.

Database Management – *Course* 2015 Fall

- Implement a library management system with MySQL and a buffer management system of SimpleDB in Java.

Operating System Security – *Course* 2014 Fall

- Implement a Linux Security Module (Safe-Open LSM module) to prevent link traversal attack based on safe-open concept in C language.

Wireless Security – *Research* 2011 Fall - 2012 Fall

- Combine and simulate DAA and PBA protocol of Trusted Computing with AODV routing protocol in Opnet.

WORK EXPERIENCE

North Carolina State University – *Research Assistant* – Raleigh, NC 2018.8 - Present

- Member of RAISE Research Group, Software Engineering Lab.

North Carolina State University – *Teaching Assistant* – Raleigh, NC 2018.8 - 2018.12

- CSC 501: Operating System Principles, Graduate Course.

Insightfinder Inc. – *Software Engineer Intern* – Raleigh, NC 2018.5 - 2018.7
- Build log-based anomaly detection engine to monitor Hadoop clusters.

North Carolina State University – *Research Assistant* – Raleigh, NC 2015.3 - 2018.5
- Researcher of NSA Science of Security Lablet at NCSU.
- Member of DANCE Research Group, System Research Lab.

North Carolina State University – *Teaching Assistant* – Raleigh, NC 2017.8 - 2017.12
- CSC 236: Computer Organization and Assembly Language, Undergraduate Course.

North Carolina State University – *Teaching Assistant* – Raleigh, NC 2015.1 - 2015.2
- CSC 505: Design and Analysis of Algorithms, Graduate Course.
- CSC 226: Discrete Mathematics for Computer Scientists, Undergraduate Course.

North Carolina State University – *Teaching Assistant* – Raleigh, NC 2014.8 - 2014.12
- CSC 216: Programming Concept - Java, Undergraduate Course.

Peking University – *Research Assistant* – Beijing, China 2012.9 - 2014.7
- Researcher in Ministry of Education, Key Lab of Network and Software Assurance.
- Participate in project Wireless Security cooperating with Tsinghua University.

Peking University – *Security Curriculum Project Assistant* – Beijing, China 2012.8 - 2013.8
- Design course in Security Curriculum Program of Intel UPO Security Curriculum Project.
- Participate in writing and reviewing book chapters of "Design for Operating System Security (Chinese Edition)".

Peking University – *Teaching Assistant* – Beijing, China 2012.9 -2012.12
- Introduction to Information Technology, Graduate Course.

Kingdee Software Company Beijing Research Center – *Software Developer* – Beijing, China 2010.3 -2010.6
- Develop database of Hotel ERP Management System with KSQL.

PUBLICATIONS

1. **Better Security Bug Reports Classification via Hyperparameter Optimization**
Rui Shu, Tianpei Xia, Laurie Williams, Tim Menzies, *Empirical Software Engineering (EMSE)*, (Under submission)
2. **Sequential Model Optimization for Software Process Control**
Tianpei Xia, Jianfeng Chen, **Rui Shu**, Tim Menzies, *The 42nd International Conference on Software Engineering (ICSE 2020)*, Seoul, South Korea, 23-29 May 2020. (Under submission)
3. **A Study of Security Vulnerabilities on Docker Hub**
Rui Shu, Xiaohui Gu, William Enck, *Proceedings of the 7th ACM Conference on Data and Application Security and Privacy (CODASPY 2017)*, Scottsdale, Arizona, March 2017.
4. **A Study of Security Isolation Techniques**
Rui Shu, Peipei Wang, Sigmund A. Gorski III, Benjamin Andow, Adwait Nadkarni, Luke Deshotels, Jason Gionta, William Enck and Xiaohui Gu, *ACM Computing Surveys (CSUR)*, 49.3 (October 2016): 50

TALKS

- "A study of Security Vulnerabilities on Docker Hub", CODASPY'17, March, 2017
- "A study of Security Vulnerabilities on Docker Hub", NSA Science of Security Annual Community Day, October, 2016

SKILLS AND PERSONAL INFORMATION

- Programming languages: Java, C, Python, R, shell script, SQL, C++, Groovy, Node.js
- DevOps: Vagrant, Baker, Git, Jenkins, Docker, Ansible, Maven, MySQL, Mocha/Mockito framework, opunit
- Tools: LTTNG, Sysdig, Origin, Latex, Oracle, Opnet, mongodb, JMeter, PM2, Nginx
- Security tools: Metasploit, Burpsuite, Aircrack-ng, Wireshark, IDA Pro
- Languages: Native Chinese speaker, fluent in English