

Research Interests: security and performance of cloud and distributed systems. I will graduate in June 2021.

EDUCATION

2019.10 – 2020.12	Visiting Ph.D. student in Computer Science	Northwestern University (USA) <i>Advisor: Han Liu Area: Security of microservices, service mesh, serverless</i>
2016.09 – Present	Ph.D. student in Cyber Security	Zhejiang University <i>Advisor: Yan Chen Area: Security and reliability of SDN, microservice</i>
2012.09 – 2016.06	B.E. in Software Engineering	Shandong University

RESEARCHES AND PROJECTS

2020 – Present	<ul style="list-style-type: none">➤ A Survey of the Security Concerns and Solutions in Serverless Computing<ul style="list-style-type: none">– Introducing the security concerns of serverless computing– Illuminating the academic security research and the security measures adopted in commercial/open source serverless platforms.– Providing potential research opportunities and gap analysis.<p>Survey Serverless Computing Security Analysis</p><p>Current Status: Paper [6] - Under Major Revision</p>
2019 – Present	<ul style="list-style-type: none">➤ Automatic Inter-Service Access Control Policies Generation for Microservices<ul style="list-style-type: none">– Extracting the invocation logic among microservices from their code by static analysis.– Generating access control policies with least privileges automatically and keep them updated as microservices evolve.– Seamless integrating with current CI/CD pipeline and microservice infrastructures.– Minimizing redundant strategies to optimize policy enforcement at runtime.– Supporting microservices developed in multiple programming languages.<p>Istio Kubernetes Static Analysis Access Control</p><p>Related Publication: Paper [3], [1]</p>
2018 – 2019	<ul style="list-style-type: none">➤ Diagnosing Faults in the Control Plane of Software-Defined Networking<ul style="list-style-type: none">– Using bytecode instrumentation to record the invocations in control plane and the interactions between planes.– Building system behavior model in real time.– When a fault occurs, localizing the root cause via conducting differential checking with the normal system behavior model obtained by training.<p>SDN OpenDaylight Java Bytecode Operation Fault Localization Differential Checking</p><p>Related Publication: Paper [4], [9], Patent [1]</p>
2017 – 2018	<ul style="list-style-type: none">➤ A Survey of Fault Management in Software-Defined Networking<ul style="list-style-type: none">– Investigating SDN reliability issues and corresponding solutions.– Conducting the survey in multiple dimensions such as fault analysis, fault detection, fault diagnosis, fault repair, and fault tolerance.<p>Survey SDN Fault Management</p><p>Related Publication: Paper [8]</p>

2017 – 2018	<p>► Defeating Middlebox-Bypass Attacks in Software-Defined Networking</p> <ul style="list-style-type: none"> – Generating unpredictable labels for packets to confine the attacker to random guessing. – Performing real-time detection and defense at the packet level. <p>SDN Data Plane Active Defense</p> <p>Related Publication: Paper [5], [7]</p>
2016	<p>► SDN Controller Development for Cloud Data Center</p> <ul style="list-style-type: none"> – Based on Cisco Open SDN Controller (a commercial version of OpenDaylight). – Conducted network configuration test in Tencent Cloud data center. – Responsible for the design and implementation of southbound interface. <p>Intern Project SDN Controller Development Cisco Switch CLI</p>
2015	<p>► Shandong University Student Work Management System</p> <ul style="list-style-type: none"> – B/S architecture; MVC pattern; I am the leader of a 14-person development team. – Involving functionalities such as student performance assessment, scholarship application, loan application, and moral education. <p>Project Training Java MVC</p>

PUBLICATIONS

► Conference Papers

- [1] **Automatic Policy Generation for Inter-Service Access Control of Microservices** 2020
 Xing Li, Yan Chen, Zhiqiang Lin, Xiao Wang, and Jim Hao Chen
 USENIX Security 2021 CCF-A Big Four Accepted
- [2] **MeshScope: A Bottom-Up Approach for Configuration Inspection in Service Mesh** 2020
 Xing Li, Xiao Wang, and Yan Chen
 ACM SIGCOMM 2020 Conference Posters and Demos CCF-A
- [3] **Towards Automated Inter-Service Authorization for Microservice Applications** 2019
 Xing Li, Yan Chen, and Zhiqiang Lin
 ACM SIGCOMM 2019 Conference Posters and Demos CCF-A
- [4] **Thinking inside the Box: Differential Fault Localization for SDN Control Plane** 2019
 Xing Li, Yinbo Yu, Kai Bu, Yan Chen, Jianfeng Yang, and Ruijie Quan
 2019 IFIP/IEEE Symposium on Integrated Network and Service Management (IM) CCF-C
- [5] **Flowcloak: Defeating Middlebox-Bypass Attacks in Software-Defined Networking** 2018
 Kai Bu, Yutian Yang, Zixuan Guo, Yuanyuan Yang, Xing Li, and Shigeng Zhang
 IEEE INFOCOM 2018 CCF-A

► Journal Articles

- [6] **Security Review of Serverless Computing: Challenges, Solutions, and Opportunities**
 Xing Li, Xue Leng, and Yan Chen
 IEEE Communication Magazine SCI Q1 IF = 11.052 Under Major Revision

- [7] **Securing Middlebox Policy Enforcement in SDN** 2021
 Kai Bu, Yutian Yang, Zixuan Guo, Yuanyuan Yang, **Xing Li**, and Shigeng Zhang
 Computer Networks CCF-B SCI Q1 IF = 3.111
- [8] **Fault Management in Software-Defined Networking: A Survey** 2018
 Yinbo Yu, **Xing Li**, Xue Leng, Libin Song, Kai Bu, Yan Chen, Jianfeng Yang, Liang Zhang, Kang Cheng, and Xin Xiao
 IEEE Communications Surveys & Tutorials SCI Q1 IF = 23.7
- [9] **Falcon: Differential Fault Localization for SDN Control Plane** 2019
 Yinbo Yu, **Xing Li**, Kai Bu, Yan Chen, and Jianfeng Yang
 Computer Networks CCF-B SCI Q1 IF = 3.111
- [10] **State of the Art and Research Challenges in the Security Technologies of Network Function Virtualization** 2019
 Xiaochun Wu, Kaiyu Hou, Xue Leng, **Xing Li**, YinBo Yu, Bo Wu, and Yan Chen
 IEEE Internet Computing SCI Q1 IF = 4.231

► Patents

- [1] **A Differential Checking Based Fault Diagnosis System and Implementation for SDN Control Plane (CN201910204272.6)** Granted on September 1, 2020 2019
 Yan Chen, Yinbo Yu, **Xing Li**, Kai Bu, Jianfeng Yang, Xue Leng
- [2] **A Policy Based Cloud Network Resource Management and Control System for Software-Defined Networking (CN201810159706.0)** Granted on October 13, 2020 2018
 Xue Leng, Yan Chen, Kaiyu Hou, Kai Bu, **Xing Li**

EXPERIENCES

► Reviewer/Sub-reviewer of

- International Conference on Applied Cryptography and Network Security (ACNS) 2020
- ACM Conference on Computer and Communications Security (CCS) 2018, 2019
- IEEE Communication Surveys & Tutorials (COMST) 2019
- IEEE International Conference on Distributed Computing Systems (ICDCS) 2018
- IEEE/ACM Transactions on Networking (ToN) 2018

► Conference Attendance

- ACM SIGCOMM 2020 Virtual Event, USA 2020.08
 Poster Presentation: MeshScope: A Bottom-Up Approach for Configuration Inspection in Service Mesh
- ACM SIGCOMM 2019 Beijing, China 2019.08
 Poster Presentation: Towards Automated Inter-Service Authorization for Microservice Applications
- IFIP/IEEE IM 2019 Washington DC, USA 2019.04
 Paper Presentation: Thinking inside the Box: Differential Fault Localization for SDN Control Plane

► Internship

- Cisco (China) Hangzhou R&D Center 2016.04 - 2016.09
Developed an OpenDaylight-based SDN Controller for Tencent Cloud Data Center; was responsible for the design and implementation of southbound interface.

► Programs

- National Key R&D Program of China (2017YFB0801703) 2017.06 - 2021.06
Cyberspace Security Project: SDN/NFV and NDN Security
- Key Research and Development Program of Zhejiang Province (2018C01088) 2017.06 - 2021.06
Research and Application on Active Defense Technology in Cloud Computing
- Huawei Innovation Research Program (HIRP) (HO2016050002CH) 2017.12 - 2018.11
Research on SDN&NFV Network Maintenance System Architecture and Technology
- ZTE Industry-University-Research Cooperation Project 2020.10 - 2021.06
Research on Key Technologies of ServiceMesh Security Plug-in and Microservice Dependency

HONOR AND AWARDS

› Graduate with Honor	Zhejiang University	2021
› Most Academic Value Award (Doctoral Innovation Forum)	ZJU CS Department	2021
› Excellent Doctoral Scholarship	Zhejiang University	2020
› National Scholarship	China	2017
› Award of Honor for Graduate	Zhejiang University	2017
› Graduate with Honor	Shandong Province	2016
› Graduate with Honor	Shandong University	2016
› Excellent Student Leader Award	Shandong University	2014, 2015
› Excellent Student Scholarship	Shandong University	2014, 2015
› 8th Place in the Sanhao Cup (Soccer)	Zhejiang University	2019
› Big 4 in the CC98 Cup (Soccer)	Zhejiang University	2018
› 1st Place in the Campus Cup (Soccer)	Shandong University	2015
› 5th Place in the Shanda Cup (Soccer)	Shandong University	2014
› 7th Place in the “Dreamer of Shanda” Soccer League	Shandong University	2013

SKILLS

Second Language	English CET6: 507
Programming Ability	PAT Advanced level: 100
Programming Languages	Python: ★★★ Java: ★★★ Go: ★★ C/C++: ★
Platforms	Kubernetes, Istio, Docker, OpenDaylight, Mininet

HOBBY

Soccer	College Soccer team of Computer Science at ZJU	2016 – Present
	College Soccer team of Software Engineering at SDU	2012 – 2016