

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

## EDUCATION

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

## RESEARCHES AND PROJECTS

2020 – Present	<p>➤ <b>A Survey of the Security Concerns and Solutions in Serverless Computing</b></p> <ul style="list-style-type: none"> <li>– Introducing the security concerns of serverless computing</li> <li>– Illuminating the academic security research and the security measures adopted in commercial/open source serverless platforms.</li> <li>– Providing potential research opportunities and gap analysis.</li> </ul> <p> <span>Survey</span> <span>Serverless Computing</span> <span>Security Analysis</span> </p> <p>Current Status: Paper [6] - Under Major Revision</p>
2019 – Present	<p>➤ <b>Automatic Inter-Service Access Control Policies Generation for Microservices</b></p> <ul style="list-style-type: none"> <li>– Extracting the invocation logic among microservices from their code by static analysis.</li> <li>– Generating access control policies with least privileges automatically and keep them updated as microservices evolve.</li> <li>– Seamless integrating with current CI/CD pipeline and microservice infrastructures.</li> <li>– Minimizing redundant strategies to optimize policy enforcement at runtime.</li> <li>– Supporting microservices developed in multiple programming languages.</li> </ul> <p> <span>Istio</span> <span>Kubernetes</span> <span>Static Analysis</span> <span>Access Control</span> </p> <p>Related Publication: Paper [3], [1]</p>
2018 – 2019	<p>➤ <b>Diagnosing Faults in the Control Plane of Software-Defined Networking</b></p> <ul style="list-style-type: none"> <li>– Using bytecode instrumentation to record the invocations in control plane and the interactions between planes.</li> <li>– Building system behavior model in real time.</li> <li>– When a fault occurs, localizing the root cause via conducting differential checking with the normal system behavior model obtained by training.</li> </ul> <p> <span>SDN</span> <span>OpenDaylight</span> <span>Java Bytecode Operation</span> <span>Fault Localization</span> <span>Differential Checking</span> </p> <p>Related Publication: Paper [4], [8], Patent [1]</p>
2017 – 2018	<p>➤ <b>A Survey of Fault Management in Software-Defined Networking</b></p> <ul style="list-style-type: none"> <li>– Investigating SDN reliability issues and corresponding solutions.</li> <li>– Conducting the survey in multiple dimensions such as fault analysis, fault detection, fault diagnosis, fault repair, and fault tolerance.</li> </ul> <p> <span>Survey</span> <span>SDN</span> <span>Fault Management</span> </p> <p>Related Publication: Paper [7]</p>

2017 – 2018	<p>➤ <b>Defeating Middlebox-Bypass Attacks in Software-Defined Networking</b></p> <ul style="list-style-type: none"> <li>– Generating unpredictable labels for packets to confine the attacker to random guessing.</li> <li>– Performing real-time detection and defense at the packet level.</li> </ul> <p>SDN Data Plane Active Defense</p> <p>Related Publication: Paper [5], IEEE/ACM Transactions on Networking - Under Major Revision</p>
2016	<p>➤ <b>SDN Controller Development for Cloud Data Center</b></p> <ul style="list-style-type: none"> <li>– Based on Cisco Open SDN Controller (a commercial version of OpenDaylight).</li> <li>– Conducted network configuration test in Tencent Cloud data center.</li> <li>– Responsible for the design and implementation of southbound interface.</li> </ul> <p>Intern Project SDN Controller Development Cisco Switch CLI</p>
2015	<p>➤ <b>Shandong University Student Work Management System</b></p> <ul style="list-style-type: none"> <li>– B/S architecture; MVC pattern; I am the leader of a 14-person development team.</li> <li>– Involving functionalities such as student performance assessment, scholarship application, loan application, and moral education.</li> </ul> <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” Conditionally 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] **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
- [8] **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
- [9] **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 (201910204272.6)** Granted 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 (201810159706.0)** Granted 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: Cyberspace Security Project 2017.06 - 2021.06  
*Responsible for SDN control plane fault diagnosis research, as well as project application and report.*
- Key Research and Development Program of Zhejiang Province 2017.06 - 2021.06  
*Responsible for SDN control plane fault diagnosis research, as well as project application and report.*

## HONOR AND AWARDS

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›	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

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

## HOBBY

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<b>Soccer</b>	College Soccer team of Computer Science at ZJU	2016 – Present
	College Soccer team of Software Engineering at SDU	2012 – 2016