

# Zuchao Ma

## PERSONAL DATA

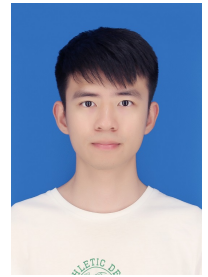
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**RESEARCH INTERESTS:** Blockchain security / IoT security

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## EDUCATION

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**2021 – Present Pursuing Doctor of Philosophy**

Department of Computing

The Hong Kong Polytechnic University, Hong Kong

Supervised by Professor. Daniel Xiapu Luo

GPA: 3.49/4.00

**2018 – 2021 Master of Computer Science and Technology**

College of Computer Science and Technology,

Nanjing University of Aeronautics and Astronautics (NUAA), China

Supervised by Associate Professor. Liang Liu and Assistant Professor. Weizhi Meng (Technical University of Denmark)

GPA: 90.4/100.0, Ranking A (Top 15%)

**2014 – 2018 Bachelor of Computer Science and Technology**

College of Computer Science and Technology,

Nanjing University of Aeronautics and Astronautics (NUAA), China

GPA: 4.0/5.0, Ranking 6/110

## SELECTED AWARDS AND HONOURS

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**Sep. 2023- Aug. 2024** The Most Appreciated Teaching Assistant Award of COMP PolyU (Recognition Award)

**Sep. 2022- Aug. 2023** The Most Appreciated Teaching Assistant Award of COMP PolyU (Merit Award, HKD 30,000)

**Sep. 2021- Aug. 2022** The Most Appreciated Teaching Assistant Award of COMP PolyU (Bronze Medal)

**Nov. 2020** **Postgraduate National Scholarship (2020) (CNY 20,000)**

**Oct. 2019- Nov. 2020** Advanced individual in research and innovation of NUAA (2018-2020)

**Oct. 2019- Nov. 2020** Advanced postgraduate award of NUAA (2018-2020)

**Sep. 2018- Sep. 2020** First Class Scholarship for Graduate Students of NUAA (2018-2020) (CNY 10,000/year)

**Dec. 2016- Dec. 2018** Second Class Scholarship for Undergraduates of NUAA (2015-2018) (CNY 2,500/year)

**May. 2018** Third Class Study Scholarship for Undergraduates of NUAA (2017-2018)

**Apr. 2017** First Class Study Scholarship for Undergraduates of NUAA (2016-2017)

**Nov. 2015** Third Class Scholarship for Undergraduates of NUAA (2014-2015) (CNY 1,500/year)

## PUBLICATIONS

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**Journal Paper:**

- **Zuchao Ma**, Muhui Jiang, Xiapu Luo, Haoyu Wang and Yajin Zhou, "Uncovering NFT Domain-Specific Defects on Smart Contract Bytecode" in **IEEE Transactions on Dependable and Secure Computing (TDSC)**. DOI 10.1109/TDSC.2025.3556285. [CCF-A, SCI-Q2, IF 7]

- **Zuchao Ma**, Liang Liu and Weizhi Meng, "Towards Multiple-Mix-Attack Detection via Consensus-based Trust Management in IoT Networks" in **Computer & Security (COSE)**, ELSEVIER. Volume 96, September 2020, 101898. [CCF-B, SCI-Q2, IF 3.579]
- **Zuchao Ma**, Liang Liu, Weizhi Meng, Xiapu Luo, Lisong Wang and Wenjuan Li, "ADCL: Towards An Adaptive Network Intrusion Detection System Using Collaborative Learning in IoT Networks" in **IEEE Internet of Things Journal (IOTJ)**. [CCF-C, SCI-Q1, IF 8.2]
- Liang Liu, **Zuchao Ma** and Weizhi Meng, "Detection of multiple-mix-attack malicious nodes using perceptron-based trust in IoT networks" in **Future Generation Computer Systems (FGCS)**, ELSEVIER. Volume 101, December 2019, Pages 865-879. [CCF-C, SCI-Q1, IF 6.125]
- Lei Yang, Liang Liu, **Zuchao Ma** and Youwei Ding, "Detection of selective-edge packet attack based on edge reputation in IoT networks" in **Computer Networks (CN)**. [CCF-B, SCI-Q3, IF 3.111]
- Muhui Jiang, Jinan Jiang, Tao Wu, **Zuchao Ma**, Xiapu Luo and Yajin Zhou, "Understanding Vulnerability Inducing Commits of the Linux Kernel" in **ACM Transactions on Software Engineering and Methodology (TOSEM)**. [CCF-A, SCI-Q1, IF 5.5].
- Liang Liu, Xiangyu Xu, Yulei Liu, **Zuchao Ma**, Jianfei Peng, "A detection framework against CPMA attack based on trust evaluation and machine learning in IoT network" in **IEEE Internet of Things Journal (IOTJ)**. [CCF-C, SCI-Q1, IF 8.2]

#### Conference Paper:

- **Zuchao Ma**, Muhui Jiang, Feng Luo, Xiapu Luo and Yajin Zhou, "Surviving in Dark Forest: Towards Evading the Attacks from Front-Running Bots in Application Layer" in **34th Usenix Security Symposium (USENIX SEC 2025)**. [CCF-A]
- **Zuchao Ma**, Liang Liu and Weizhi Meng, "ELD: Adaptive Detection of Malicious Nodes under Mix-Energy-Depleting-Attacks Using Edge Learning in IoT Networks" in **23rd Information Security Conference (ISC 2020)**. Grand Mirage Resort & Thalasso, Bali, Indonesia, 16-20 Dec 2020. **Best Paper Award**. [CCF-C, Accept Rate 23%]
- **Zuchao Ma**, Liang Liu and Weizhi Meng, "DCONST: Detection of Multiple-Mix-Attack Malicious Nodes Using Consensus-based Trust in IoT Networks" in **25th Australasian Conference on Information Security and Privacy (ACISP 2020)**. Perth, Australia, 15-17 July 2020. **Best Student Paper Award**. [CCF-C, Accept Rate 20%]
- Kunsong Zhao, Yunpeng Tian, **Zuchao Ma**, Xiapu Luo, "Soleker: Uncovering Vulnerabilities in Solana Smart Contracts" in **40th IEEE/ACM International Conference on Automated Software Engineering (ASE 2025)**. [CCF-A]
- Xinghao Peng, Zhiyuan Sun, Kunsong Zhao, **Zuchao Ma**, Zihao Li, Jinan Jiang, Xiapu Luo and Yinqian Zhang, "Automated Soundness and Completeness Vetting of Polygon zkEVM" in **34th Usenix Security Symposium (USENIX SEC 2025)**. [CCF-A]
- Shanshan Sun, **Zuchao Ma** and Liang Liu, "Detection of malicious nodes in drone ad-hoc network based on supervised learning and clustering algorithms" in **16th International Conference on Mobility, Sensing and Networking (MSN 2020)**. Tokyo, Japan, 17–19 December 2020. [CCF-C]

#### RESEARCH EXPERIENCE

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Oct 2023 – **Doctor of Philosophy Research**

Oct 2024 The Hong Kong Polytechnic University, Hong Kong  
Supervisor: Professor. Daniel Xiapu Luo

- **Topic: Security Analysis of Defending Front-Running Attacks in Blockchain Applications**
- Designing **EVScope**, the first binary framework to detect strategies adopted by blockchain applications to defend front-running attacks, by leveraging dynamic taint analysis to collect defense trace for supporting datalog and machine learning analysis. (2023-2024, published in conference **USENIX SEC 2025** [CCF-A])

- Dec 2021 – Jan 2023**      **Doctor of Philosophy Research**  
The Hong Kong Polytechnic University, Hong Kong  
Supervisor: Professor. Daniel Xiapu Luo
- **Topic: Security Analysis of Non-Fungible-Token Smart Contracts**
  - Proposing **Emerium**, the first binary framework to uncover **NFT-domain-specific defects** in smart contract bytecode, by recovering NFT-domain-specific data in bytecode and leveraging path reachability to inspect real semantics of contracts. (2021-2023, published in journal **IEEE Transactions on Dependable and Secure Computing (TDSC)** [CCF-A])
- Oct 2018 – Sep 2021**      **Master Research**  
Applied Security and Cryptography Research Laboratory (ASC)  
Nanjing University of Aeronautics and Astronautics (NUAA)  
Supervisor: Associate Professor. Liang Liu and Assistant Professor. Weizhi Meng
- **Topic: Malicious Nodes Detection Schemes in IoT networks**
  - Proposing **perceptron-based model** to detect **multiple-mix-attack** consisting of tamper attack, drop attack and replay attack with uncertain probabilities, by tracking the **routes** for conducting **the regression of attack nodes**. (2018-2019, published in journal **Future Generation Computer Systems (FGCS)** [CCF-C])
  - Conducting **consensus-based model (DCONST)** to detect **multiple-mix-attack**, which enables IoT nodes to evaluate node **trustworthiness** by sharing **cognition information** in networks. DCONST is equipped with the ability to detect malicious nodes as well as **identify their concrete attack behaviours**. (2019-2020, published in journal **Computer & Security (COSE)** [CCF-B] and conference **ACISP 2020** [CCF-C, Best Student Paper Award])
  - Proposing **edge-based model (ELD)** to detect **energy-exhausting-attack** consisting of carousel attack, flooding attack and replay attack with uncertain probabilities, by collecting **traffic logs** to build **intrusion graphs** to locate malicious nodes. (2020, published in conference **ISC 2020** [CCF-C, Best Paper Award])
  - Designing an **adaptive network intrusion detection framework** to detect existing **IoT network attacks**, by combining the capabilities of various models trained under different networks, which enables the framework to adaptively detect unknown attacks. (2021, published in journal **IEEE Internet of Things Journal** [CCF-C])
- Jun 2018 – Sep 2018**      **Bachelor Project**  
Institute of Data Management and Knowledge Engineering  
Nanjing University of Aeronautics and Astronautics (NUAA)  
Supervisor: Associate Professor. Liang Liu
- **Topic: The Application of Cloud Platform in Computer Teaching Experiments of College**
  - Developing **Teaching Experiment Cloud (TEC)**, for providing virtual machines (VM) for students/lecturers to conduct experiments.
  - Proposing a scheduling scheme **EGAPT** for the planned cloud task of TEC, which utilizes teaching plans to optimize the schedule of virtual machines, maintaining the load balance of physical machines and reducing the energy consumption.

## ADDITIONAL SKILLS

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- Solid programming skills in android application development (Second Prize of Training Camp of App Development of NUAA) and J2EE development.
- Full stack development skills: Front-end [Vue.js, React.js] + Server [Vert.x, Java servlet] + Database [MySQL, SQL Server].