

# Hideaki Takahashi

✉ ht2673@columbia.edu | 📰 Koukyosyumei | 🎓 Hideaki Takahashi

## Summary

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- Second-year Ph.D. student at Columbia University, working on **Zero Knowledge Proof**.
- Passionate about the convergence of **AI, systems, and security**.
- Multiple first-authored papers in top-tier conferences (**IEEE S&P, AAMAS, CVPR**).
- Discovered **70+ confirmed zero-day vulnerabilities** in widely used Web3 and ZKP projects.
- Skilled open-source developer of widely adopted tools (**600+ GitHub stars**), including a machine learning security risk simulator, a fuzzer, and a symbolic execution engine.
- Extensive research & development experience at leading institutions (Tsinghua University, NAIST, The University of Tokyo) and industry internships (including Apple Inc.).
- Awarded **five medals in Kaggle**, the world's largest platform for machine learning competitions.
- Committed to the community as a reviewer (IEEE TNSE, IEEE T-MI, IEEE TDSC) and active contributor to popular open-source projects (PySyft, Nebula, clean).

## Education

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### Columbia University in the City of New York

PH.D (COMPUTER SCIENCE)

New York, United States

Sep. 2024 - Present

- Supervised by Prof. Junfeng Yang
- Member of The Center for Digital Finance and Technologies

### The University of Tokyo

BACHELOR OF ARTS AND SCIENCES (INFORMATICS)

Tokyo, Japan

- Supervised by Prof. Alex Fukunaga, GPA: 3.85/4.0

Apr. 2019 - Mar. 2024

## Papers

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- [1] Hideaki Takahashi\*, Jihwan Kim, Suman Jana, and Junfeng Yang. zkFuzz: Foundation and Framework for Effective Fuzzing of Zero-Knowledge Circuits . In *2026 IEEE Symposium on Security and Privacy (SP)*, pages 919–938, Los Alamitos, CA, USA, May 2026. IEEE Computer Society. **Peer-reviewed @ IEEE S&P'26** (CORE Rank: A\*, Acceptance Rate: 13%).
- [2] Hideaki Takahashi\* and Alex Fukunaga. On the transit obfuscation problem. In *International Conference on Autonomous Agents and Multi-Agent Systems*, 2024. **Peer-reviewed @ AAMAS'24** (CORE Rank: A\*, Acceptance Rate: 20.7%).
- [3] Tianyuan Zou, Zixuan Gu, Yu He, Hideaki Takahashi, Yang Liu, Guangnan Ye, and Ya-Qin Zhang. VFLAIR: A research library and benchmark for vertical federated learning. In *The Twelfth International Conference on Learning Representations*, 2024. **Peer-reviewed @ ICLR'24** (CORE Rank: A\*, Acceptance Rate: 31.1%).
- [4] Hideaki Takahashi\*, JingJing Liu, and Yang Liu. Breaching fedMD: Image recovery via paired-logits inversion attack. In *Conference on Computer Vision and Pattern Recognition*, 2023. **Peer-reviewed @ CVPR'23** (CORE Rank: A\*, Acceptance Rate: 25.8%).
- [5] Sally Junsong Wang, Jianan Yao, Kexin Pei, Hideaki Takahashi, and Junfeng Yang. Detecting buggy contracts via smart testing. *arXiv preprint arXiv:2409.04597*, 2024.
- [6] Hideaki Takahashi\*. Aijack: Security and privacy risk simulator for machine learning. *arXiv preprint arXiv:2312.17667*, 2023.
- [7] Hideaki Takahashi\*, JingJing Liu, and Yang Liu. Eliminating label leakage in tree-based vertical federated learning. *arXiv preprint arXiv:2307.10318*, 2023.

- [8] Hideaki Takahashi<sup>\*</sup>, Kohei Ichikawa, and Keichi Takahashi. Difficulty of detecting overstated dataset size in federated learning. Technical Report 10, 2021. <http://id.nii.ac.jp/1001/00214220/>.

## Talks

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### Zero Knowledge Frontier Japan: vol.2

Japan

INVITED SPEAKER

Nov. 29 2025

- Title: Typical Bugs and Detection Methods in Implementing Zero-Knowledge Proof Constraints

## Software

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### AIJack (<https://github.com/Koukyosyumei/AIJack>)

OWNER

- Security risk simulator for machine learning (400+ stars on GitHub, 10K+ downloads, referenced in 8+ papers)

### zkFuzz (<https://github.com/Koukyosyumei/zkFuzz>)

OWNER

- Fuzzer for zero-knowledge (ZK) circuits (60+ confirmed zero-day bugs, thousands of dollars in bug bounties).

### MyZKP (<https://github.com/Koukyosyumei/MyZKP>)

OWNER

- From-scratch implementation and textbook of ZK protocols in Rust

### rhoevm (<https://github.com/Koukyosyumei/rhoevm>)

OWNER

- Symbolic EVM execution engine written in Rust to find vulnerabilities within Ethereum smart contracts

### Runwai (<https://github.com/Koukyosyumei/Runwai>)

LEADER

- Refinement-typed DSL for certified AIR constraints and lookups build on top of Lean4

## Research Experience

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### Columbia University

New York, United States

PH.D STUDENT

Sep. 2024 - Present

- Conducted research on the software testing [1, 5] under the supervision of Prof. Junfeng Yang.

### Fukunaga Lab, The University of Tokyo

Tokyo, Japan

UNDERGRADUATE STUDENT

Apr. 2023 - Mar. 2024

- Conducted research on the transit obfuscation problem [2], a new task of privacy-preserving AI planning, under the supervision of Prof. Alex Fukunaga.

### Institute for AI Industry Research, Tsinghua University

Beijing, China

FEDERATED LEARNING & PRIVACY COMPUTING INTERNS

Jan. 2022 - Feb. 2023

- Conducted research on federated learning and privacy computing [3, 4] under the supervision of Prof. Yang Liu and Prof. Jingjing Liu.

### Nara Institute of Science and Technology

Nara, Japan

VISITING STUDENT

Aug. 2021 - Sep. 2021

- Conducted research on the free-rider problem of federated learning [8] under the supervision of Prof. Kohei Ichikawa and Prof. Keichi Takahashi.

## Industry Experience

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### Apple Inc.

Yokohama, Japan

TECHNICAL INTERNSHIP: AIML/SOFTWARE ENGINEER

Feb. 2024 - Jul. 2024

- Worked on AIML/software engineering.

### UTokyo Economic Consulting Inc.

Tokyo, Japan

RESEARCH ASSISTANT

Oct. 2020 - Mar. 2024

- Worked on social implementations of econometrics and machine learning.

## RECRUIT

### DATA SCIENCE INTERN

- Worked on a location-based restaurant recommendation iOS app.

Tokyo, Japan

Aug. 2020 - Sep. 2020

### M3, Inc.

### DATA ANALYSIS INTERN

- Worked on a data analysis project in the field of medical surveys.

Tokyo, Japan

Feb. 2020 - Jun. 2020

### FRONTEO,Inc.

### RESEARCH INTERN

- Worked on the detection of anomaly documents with NLP and network analysis.

Tokyo, Japan

Sep. 2019 - Mar. 2020

## Awards & Fundings

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### FUNDINGS

2024 - 2026 **Funai Overseas Scholarship**, Granted 2 years of tuition and stipend.

### COMPETITIONS

2023 **45th / 616 teams (Silver Medal)**, Kaggle: Google - Fast or Slow? Predict AI Model Runtime

2021 **67th / 875 teams (Bronze Medal)**, Kaggle: Hungry Geese

2021 **52nd / 788 teams (Bronze Medal)**, Kaggle: Santa 2020 - The Candy Cane Contest

2020 **51st / 1138 teams (Silver Medal)**, Kaggle: Google Research Football with Manchester City F.C.

2020 **88th / 1390 teams (Bronze Medal)**, Kaggle: Cornell Birdcall Identification

## Service

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### REVIEWER

**IEEE Transactions on Network Science and Engineering (Impact Factor: 6.7)**

**IEEE Transactions on Medical Imaging (Impact Factor: 10.0)**

**IEEE Transactions on Dependable and Secure Computing (Impact Factor: 7.5)**

## Skills

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**Programming** C, C++, CUDA, Python, Rust, Lean, Assembly, LLVM, Haskell, Solidity, Circom, R, Swift

**Languages** English, Japanese

**DevOps** AWS, Docker, GCP