Hideaki Takahashi

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Summary

- 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) and active contributor to popular open-source projects (PySyft, Nebula).

Education

Columbia University in the City of New York — *New York, United States*

PH.D (COMPUTER SCIENCE) — *Sep. 2024 - Present*

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

The University of Tokyo — *Tokyo, Japan*

BACHELOR OF ARTS AND SCIENCES (INFORMATICS) — *Apr. 2019 - Mar. 2024*

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

Papers

[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*, 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/.

Software

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

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

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 *Tokyo, Japan*

Data Science Intern *Aug. 2020 - Sep. 2020*

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

M3, Inc. *Tokyo, Japan*

Data Analysis Intern *Feb. 2020 - Jun. 2020*

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

FRONTEO,Inc. *Tokyo, Japan*

Research Intern *Sep. 2019 - Mar. 2020*

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

Awards & Funding

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

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

Programming C, C++, CUDA, Python, Rust, Lean, Assembly, LLVM, Haskell, Solidity, Circom, R, Swift
Languages English, Japanese
DevOps AWS, Docker, GCP