

# Chenkai Weng

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## RESEARCH INTERESTS

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My research interest lies in cryptography, with a focus on secure multi-party computation and zero-knowledge proofs. I have participated in projects related to the security of garbled circuits protocol, efficient generation of correlated oblivious transfer, private data analysis in healthcare systems and scalable interactive zero-knowledge proofs.

## EDUCATION

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**Northwestern University** Evanston, IL  
*PhD in Computer Science; Advisor: Xiao Wang* Sept. 2019 – present

**Xidian University** Xi'an, China  
*BSc in Information Security* Sept. 2015 – June 2019

## EXPERIENCE

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**Research Intern** Remote  
*Microsoft Research* May. 2021 – Jul. 2021

- Designing and Developing secure multi-party computation and differential privacy applications for online conversion measurement.

**Research Assistant** Evanston, IL  
*Northwestern University* Sept. 2020 – May. 2021

- Designing zero-knowledge protocols for boolean and arithmetic circuits
- Protocol implementation and evaluation

**Teaching Assistant** Evanston, IL  
*Northwestern University* Sept. 2020 – Dec. 2020

- Introduction to Cryptography

**Security Engineering Intern** Beijing, China  
*Alibaba Group* July 2018 – Jan. 2019

- Survey on secure multi-party computation techniques
- Implementing threshold encryption and digital signature schemes based on MPC
- Implementing private set intersection protocol and order-preserving encryption scheme

## PUBLICATIONS

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- Constant-Overhead Zero-Knowledge for RAM Programs**  
Nicholas Franzese, Jonathan Katz, Steve Lu, Rafail Ostrovsky, Xiao Wang, Chenkai Weng  
ACM Conference on Computer and Communications Security (CCS), 2021
- Efficient Conversions for Zero-Knowledge Proofs with Applications to Machine Learning**  
Chenkai Weng, Kang Yang, Xiang Xie, Jonathan Katz, Xiao Wang  
USENIX Security Symposium, 2021
- Efficient and Affordable Zero-Knowledge Proofs for Circuits and Polynomials over Any Field**  
Kang Yang, Pratik Sarkar, Chenkai Weng, Xiao Wang  
ACM Conference on Computer and Communications Security (CCS), 2021
- Fast, Scalable, and Communication-Efficient Zero-Knowledge Proofs for Boolean and Arithmetic Circuits**  
Chenkai Weng, Kang Yang, Jonathan Katz, Xiao Wang  
IEEE Symposium on Security and Privacy (Oakland), 2021
- Developing High Performance Secure Multi-Party Computation Protocols in Healthcare: A Case Study of Patient Risk Stratification**  
Xiao Dong, David Randolph, Chenkai Weng, Abel Kho, Jennie Rogers, Xiao Wang  
AMIA Informatics Summit, 2021

## 6. **Ferret: Fast Extension for coRRElated oT with small communication**

Kang Yang, Chenkai Weng, Xiao Lan, Jiang Zhang, Xiao Wang  
ACM Conference on Computer and Communications Security (CCS), 2020

## 7. **Better Concrete Security for Half-Gates Garbling (in the Multi-Instance Setting)**

Chun Guo, Jonathan Katz, Xiao Wang, Chenkai Weng, Yu Yu  
International Cryptology Conference (CRYPTO), 2020

## TALKS

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1. Jul. 2021 - "Efficient Conversions for Zero-Knowledge Proofs with Applications to Machine Learning", USENIX Security Symposium, 2021.
2. May. 2021 - "Wolverine: Fast, Scalable, and Communication-Efficient Zero-Knowledge Proofs for Boolean and Arithmetic Circuits", IEEE Security & privacy (Oakland), 2021.
3. Mar. 2021 - "Fast, Scalable, and Communication-Efficient Zero-Knowledge Proofs", Security and privacy seminar at Duke University.
4. Nov. 2020 - "Ferret: Fast Extension for coRRElated oT with small communication", ACM Conference on Computer and Communications Security (CCS), 2020.
5. Aug. 2020 - "Better Concrete Security for Half-Gates Garbling (in the Multi-Instance Setting)", International Cryptology Conference (CRYPTO), 2020.

## SOFTWARE

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### **EMP library**

1. [EMP-TOOL] Float-point circuits, utility functions
2. [EMP-OT] Correlated-OT based on VOLE (The Ferret protocol)
3. [EMP-ZK] Implementation of zero-knowledge proof protocols for boolean and arithmetic circuits