CHUNYU CHEN

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Education Background

Northeastern University Sep. 2015-Jan. 2018

- Master in Software Engineering, Cyber Security Direction(Supervisor: Prof. Fucai Zhou)
- Qualified for matriculation exempt

Northeastern University Sep. 2011-Jun. 2015

- Bachelor in Information Security

Working Experience

Shenyang Institute of Automation, Chinese Academy of Sciences Jan. 2018-Present

Assistant Researcher, Industrial Control Systems and Network Research Office

- **Power System Edge Computing Security Protection Technology**
  - State Grid Corporation of China Science and Technology Project(No. 52110418001B, GW-2018)
  - Responsible for the preparation of documents including project declarations, budgets, etc.
  - Led the team to develop edge secure access gateway devices, which can obtain data of various protocol industrial terminal, authorize different access request, analyze the network traffic, and other crucial functions. Java and C++, respectively, were used to develop data aggregation service, etc. and network traffic monitor in backend, and VUE were used to develop frontend.
  - Communicated with cooperator, discuss requirements, and took charge of weekly summary
- **Edge Computing Security White Paper**
  - *Chief Editor*
  - Analyze the potential risks and possible solutions for edge computing from the aspects of infrastructure, network, data, application, and cloud-side collaboration
  - Published on Nov. 26, 2019
- **Industrial Control System Vulnerability Analysis**
  - Carried out technical research on public network system risk assessment and network protocol fuzzing test, use of security tools like Nessus/Wireshark.
  - Developed a prototype of Modbus TCP which can generate fuzzing test case effectively, and built corresponding test environment. Python were used to
  - Published papers and patents, project acceptance report
- **Programmable Embedded Electronic Device Security Protection Technology and Control Platform**
  - National Key Research and Development Project()
  - Developed built-in information security PLC and secure communication module based on trusted computing chip, authentication function modules based on national secret algorithm and challenge response mechanism
  - Achieved secure communication and authentication with the PLC without changing the environment of the host computer through transforming the TCP protocol stack
  - Equipment passed Achilles Level II certification
- **Key Technology of Information Security for Measurement and Control Equipment**
  - National Key Research and Development Plan(No. 2018YFB2004200)
  - Responsible for the preparation of all the contents of the project detailed declaration
  - Summarized the technical routes, key points and subject achievements based on national standard
- **Self-learning Anomaly Detection Method and Evaluation for Industrial Control Communication Protocol**
  - National Natural Science Foundation of China Project(No. 61773368)
  - Carried out technical research on IDS of Industrial Network, involving Machine Learning and Deep Learning algorithm (SVM/CNN), built CNN Model based on Keras and Tensorflow to detect abnormal behavior from network payload.
  - Provided technical guidance for students to carry out research work and results application

Publications

SCI

- Q. Wang, F. Zhou, B. Zhou, J. Xu, **Chen CY**, et al, "Privacy-Preserving Publicly Verifiable Databases," in **IEEE Transactions on Dependable and Secure Computing**, doi: 10.1109/TDSC.2020.3032961.
- Wang Q, Zhou FC, **Chen CY**, et al. Secure Collaborative Publicly Verifiable Computation, ***IEEE Access***, 2017, **5**, 2479-2488
- Shang WL, Gong TY, **Chen CY**, et al. Information Security Risk Assessment Method for Ship Control System Based on Fuzzy Sets and Attack Trees, ***Secur. Commun. Netw.***, 2019, **1**, 1-11
- He Shi, Shang WL, **Chen CY**, et al. Key Process Protection of High Dimensional Process Data in Complex Production, CMC-Comput. Mater. Con., 2019, in print

Chinese Core

- Zhou BY, **Chen CY**, Wang Q, Zhou FC. Publicly Verifiable Outsourced Database with Full Delegation. Ruan Jian Xue Bao/Journal of Software, 2016 (in Chinese). http://www.jos.org.cn/1000-9825/0000.htm
- PK Xuan, FC Zhou, Q Wang, **CY Chen**, et al. A Verifiable Outsourced Database Scheme for Multi-user Operation. Journal of Zhengzhou University (Natural Science Edition).

- GY Zhang, WL Shang, BW Zhang, CY Chen, et al. Fuzzy test method for industrial control protocol combining genetic algorithm[J]. Application Research of Computers: https://doi.org/10.19734/j.issn.1001-3695.2020.03.0048.
- L. Yang, W. Shang, **C. Chen**, T. Wang and Z. Liu, "Authentication Technology in Industrial Control System Based on Identity Password," 2020 39th Chinese Control Conference (CCC), Shenyang, China, 2020, pp. 7677-7684, doi: 10.23919/CCC50068.2020.9188372.
- Gong TY, Shang WL, Hong J, **Chen CY**, Yin L. Vulnerability Quantitative Evaluation Method for Industrial Control System based on Fuzzy Attack and Defense Tree and Entropy Weight Method, ***Application Research of Computers***, 2019, **8**, 1-6
- Shang WL, Yang LY, **Chen CY**, Yin L, Zeng P, Liu ZB. Lightweight Group Authentication Mechanism for Industrial Control System Terminals, ***Information & Control***, 2019**, 3,** 344-353
- **Chen CY**, Shang WL, Zhao JM, Liu ZB, Wang ZX, Edge Computing Identity Authentication and Privacy Protection Technology, ***Automation Panorama***, 2018, **S2**, 88-91
- Shang WL, Tong GY, Yin L, **Chen CY**, Information System Status and Technology Development Trend of CNC System, ***Automation Panorama***, 2019, **6**, 50-53
- Shang WL, Li WX, **Chen CY**, et al. Fuzzy Control Method for Industrial Control Protocol based on Feature Matrix, ***Information & Control***, 2019, accepted
- Li WX, Shang WL, He XJ, **Chen CY**, Zeng P, Industrial Control Protocol Fuzzy Test Case Generation Method based on Improved Mutation Tree, ***Application Research of Computers***, accepted

Patents

- Lightweight Authentication Method for Supporting Anonymous Access of Heterogeneous Terminals in Edge Computing Scenarios, 201811598108.X
- PLC Security Processing Unit and Bus Arbitration Method Thereof, WO2019104988A1
- Industrial Embedded System-oriented Network Information Security Protection Unit and Protection Method, WO2019100691A1
- Lightweight Authentication Method for Supporting Anonymous Access of Heterogeneous Terminals in Edge Computing Scenarios, 201811598108.X
- Lightweight End-to-end Secure Communication Authentication Method based on Identification Password, 201910543544.5
- SDN-based Wireless Secure Routing Method in Edge Scenarios, 201910525497.1

Published GB

- Robotic Manufacturing Digital Workshop Information Security, in review

School Research Experience

Research on Verifiable Computation (M.S. Topic) Jul. 2015-Jan. 2018

Description: The objective is to design secure and efficient schemes to enhance its trustworthiness in cloud computing.

Verifiable Outsourcing Polynomial Evaluation System Oct. 2016-Dec. 2016

- Project principal, completed the overall plan design and the implementation of the functional modules
- Implemented basic prototype system involved in KeyGen, doCompute and Verify based on PBC library.

Verifiable Function Secret Sharing Scheme Prototype System Implementation Jan. 2016-Mar. 2016

- Implemented basic prototype system, realized functional modules such as fragmentation and verification of the point functions
- Applied C++, called the DLL file NTL

Verifiable Computing System for Specific C Language Programs Sep. 2015-Dec. 2015

- Responsible for the implementation of each module including mathematical operation function in finite field, encryption and decryption algorithm
- Applied C++, called the DLL files NTL, PBC, OpenSSL

Practice Experience

API Gateway Jul. 2017-Aug. 2017

- Developed the implementation of user login authorization, access control and log processing
- Realized the sharing of sessions in the cluster
- Showed the users' service invocation information

Scholarship and Awards

Scholarship

- First Prize Academic Scholarship, Sep. 2015 & Sep. 2016
- Yantai Governance Scholarship, Nov. 2016
- Second Prize Scholarship, Software School of Northeastern University, Sep. 2014

Awards

- Excellent Award in 2019 New Staff Tutor System Level Assessment, Shenyang Institute of Automation, Chinese Academy of Sciences
- 7th National Student Information Security Competition, Second Prize, Jul. 2014
- Mathematical Contest In Modeling, Meritorious Winner, Apr. 2014
- China Undergraduate Mathematical Contest in Modeling, Second Prize, Oct. 2013
- Science and Technology Innovation Activity Award, Jun. 2013