Ronghua Xu, Ph.D.

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Biographical Sketch

About me

Ronghua Xu is an Tenure-Track Assistant Professor of Applied Computing at Michigan Technological University. He earned a Ph.D. and an M.S. in Electrical and Computer Engineering at the Binghamton University - State University of New York (SUNY) in 2023 and 2018 respectively. He also received an M.S. in Mechanical and Electrical Engineering from Nanjing University of Aeronautics & Astronautics in 2010 and a B.S. in Mechanical Engineering from Nanjing University of Science & Technology, China in 2007. Before joining Binghamton University, he worked at Siemens on software development, system integration, and test automation from June 2010 to June 2016.

Research Interests

- ♦ Blockchain and Distributed Ledger Technology, Internet-of-Things (IoT), Machine Learning (ML), Cloud/Fog/Edge Computing Paradigm.
- ♦ Blockchain and smart contract enabled security solutions to Internet of Things (IoTs)
- ♦ Intelligence, assurance and resilience of next generation network.

Education

Dissertation title: A Secure-by-Design Federated Microchain Fabric for Internet-of-

Things(IoT) System
Advisor: Prof. Yu Chen

USA.

Thesis title: Capability Based Access Control Strategies to Deter DDoS Attacks Ex-

ploiting IoT Devices Advisor: Prof. Yu Chen

Sep 2007 – Mar 2010 \diamond MS, Mechanical and Electrical Engineering, Nanjing University of Aeronau-

tics & Astronautics, Nanjing, China.

Thesis title: Research on Form-to-function Mapping and Re-creative Design Method

Based on Function Ontology Advisor: Prof. Dunbing Tang

Employment History

August 2018 – August 2023 ♦ Graduate Researcher. Binghamton University-SUNY, NY, USA.

Employment History (continued)

June 2010 – June 2016

♦ **Software Engineer.** Department of Software Development, Research & Development Division, Siemens Numerical Control Ltd., Nanjing, China.

Teaching Experience

Instructor

- ♦ Internet of Medical Things (IoMT) and Remote Patient Monitoring (RPM) (SAT5317), Spring 2025
- ♦ Blockchain Fundamentals and Applications (SAT5980), Spring 2024
- ♦ Digital Forensics (SAT4816-5816), Fall 2023/2024.

Teaching Assistant

- ♦ Digital Logic Design (EECE-251), Fall 2018, 2019.
- ♦ Sophomore Design (EECE-287), Spring 2019, 2020.

Guest Lecturer

- ♦ Senior Design I (EECE 487), Fall 2022.
- ♦ Computer Network Architecture (EECE-453/553), Fall 2018 2022.
- ♦ Network Security (EECE-658), Spring 2018 2019.

Skills

Languages

- ♦ Strong reading, writing and speaking competencies for English, Mandarin Chinese.
- Coding \diamond C/C++, Java, Python, C#, VB, tclsh, bash, powershell, sql, xml/xsl, Lagex, ...
- Databases \diamond Mysql, Postgresql, sqlite.
- Web Dev 💛 Нтмг, css, JavaScript, Flask Web Server, Figma UI Design.

Misc. \diamond Academic research, teaching, training, consultation.

Research Publications

Journal Articles

- Liu, X., **Xu**, **R.**, & Chen, Y. (2024). A decentralized digital watermarking framework for secure and auditable video data in smart vehicular networks. *Future Internet*, 16(11), 390. Odi:10.3390/fi16110390
- Liu, X., Xu, R., & Zhao, C. (2024). Agfi-gan: An attention-guided and feature-integrated watermarking model based on generative adversarial network framework for secure and auditable medical imaging application. *Electronics*, 14(1), 86. Odoi:10.3390/electronics14010086
- Qu, Q., Hatami, M., Xu, R., Nagothu, D., Chen, Y., Li, X., ... Chen, G. (2024). The microverse: A task-oriented edge-scale metaverse. Future Internet, 16(2), 60. 60 doi:10.3390/fi16020060
- **Xu, R.,** Nagothu, D., Chen, Y., Aved, A., Ardiles-Cruz, E., & Blasch, E. (2024). A secure interconnected autonomous system architecture for multi-domain iot ecosystems. *IEEE Communications Magazine*, 62(7), 52–57. Odo::10.1109/MCOM.001.2300354
- Nagothu, D., **Xu**, **R.**, Chen, Y., Blasch, E., & Aved, A. (2022). Deterring deepfake attacks with an electrical network frequency fingerprints approach. *Future Internet*, 14(5), 125. Odoi:10.3390/fi14050125
- **Xu**, **R.**, & Chen, Y. (2022a). μ Dfl: A secure microchained decentralized federated learning fabric atop iot networks. *IEEE Transactions on Network and Service Management*. *Θ* doi:10.1109/TNSM.2022.3179892
- Xu, R., Chen, Y., Chen, G., & Blasch, E. (2022). Sausa: Securing access, usage, and storage of 3d point cloud data by a blockchain-based authentication network. Future Internet, 14(12), 354. 6 doi:10.3390/fi14120354

- **Xu**, **R.**, Wei, S., Chen, Y., Chen, G., & Pham, K. (2022). Lightman: A lightweight microchained fabric for assurance-and resilience-oriented urban air mobility networks. *Drones*, *6*(12), 421. *Θ* doi:10.3390/drones6120421
- Qu, Q., Xu, R., Chen, Y., Blasch, E., & Aved, A. (2021). Enable fair proof-of-work (pow) consensus for blockchains in iot by miner twins (mint). *Future Internet*, 13(11), 291. Odoi:10.3390/fi13110291
- Xu, R., Nagothu, D., & Chen, Y. (2021a). Decentralized video input authentication as an edge service for smart cities. *IEEE Consumer Electronics Magazine*, 10(6), 76–82. Odo::10.1109/MCE.2021.3062564
- Xu, R., Nagothu, D., & Chen, Y. (2021b). Econledger: A proof-of-enf consensus based lightweight distributed ledger for iovt networks. *Future Internet*, 13(10), 248. Odi:10.3390/fi13100248
- Xu, R., Nikouei, S. Y., Nagothu, D., Fitwi, A., & Chen, Y. (2020). Blendsps: A blockchain-enabled decentralized smart public safety system. *Smart Cities*, 3(3), 928–951. Ø doi:10.3390/smartcities3030047
- Xu, R., Chen, Y., Blasch, E., & Chen, G. (2019). Exploration of blockchain-enabled decentralized capability-based access control strategy for space situation awareness. *Optical Engineering*, *58*(4), 041609. *❸* doi:10. 1117/1.0E.58.4.041609
- **Xu**, **R.**, Chen, Y., Blasch, E., & Chen, G. (2018c). Blendcac: A smart contract enabled decentralized capability-based access control mechanism for the iot. *Computers*, 7(3), 39. **⊘** doi:10.3390/computers7030039

Conference Proceedings

- Xu, R., Liu, X., Nagothu, D., Qu, Q., & Chen, Y. (2025). Detecting manipulated digital entities through real-world anchors. In *International conference on advanced information networking and applications* (pp. 450–461). Springer.
- Nagothu, D., **Xu**, **R.**, & Chen, Y. (2023). Dema: Decentralized electrical network frequency map for social media authentication. In *Disruptive technologies in information sciences vii* (Vol. 12542, pp. 57–72). SPIE.
- Nagothu, D., **Xu**, **R.**, Chen, Y., Blasch, E., & Ardiles-Cruz, E. (2023). Application of electrical network frequency as an entropy generator in distributed systems. In *Naecon 2023-ieee national aerospace and electronics conference* (pp. 233–238). IEEE.
- Ogunbunmi, S., Hatmai, M., **Xu**, **R.**, Chen, Y., Blasch, E., Ardiles-Cruz, E., ... Chen, G. (2023). A lightweight reputation system for uav networks. In *International conference on security and privacy in cyber-physical systems and smart vehicles* (pp. 114–129). Springer.
- Qu, Q., Xu, R., Sun, H., Chen, Y., Sarkar, S., & Ray, I. (2023). A digital healthcare service architecture for seniors safety monitoring in metaverse. In 2023 ieee international conference on metaverse computing, networking and applications (metacom) (pp. 86–93). IEEE.
- Wei, S., Huang, H., Chen, G., Blasch, E., Chen, Y., **Xu**, **R.**, & Pham, K. (2023). Rodad: Resilience oriented decentralized anomaly detection for urban air mobility networks. In 2023 integrated communication, navigation and surveillance conference (icns) (pp. 1–11). IEEE.
- Xu, R., & Chen, Y. (2022b). Fairledger: A fair proof-of-sequential-work based lightweight distributed ledger for iot networks. In 2022 ieee international conference on blockchain (blockchain) (pp. 348–355). IEEE.
 doi:10.1109/Blockchain55522.2022.00055
- 8 **Xu**, **R.**, Chen, Y., Li, X., & Blasch, E. (2022). A secure dynamic edge resource federation architecture for cross-domain iot systems. In 2022 international conference on computer communications and networks (icccn) (pp. 1–7). IEEE. Odi:10.1109/ICCCN54977.2022.9868843
- 9 Nagothu, D., Xu, R., Chen, Y., Blasch, E., & Aved, A. (2021a). Defake: Decentralized enf-consensus based deepfake detection in video conferencing. In 2021 ieee 23rd international workshop on multimedia signal processing (mmsp) (pp. 1–6). IEEE. 6 doi:10.1109/MMSP53017.2021.9733503

- Nagothu, D., **Xu**, **R.**, Chen, Y., Blasch, E., & Aved, A. (2021b). Detecting compromised edge smart cameras using lightweight environmental fingerprint consensus. In *Proceedings of the 19th acm conference on embedded networked sensor systems* (pp. 505–510). ACM. doi:10.1145/3485730.3493684
- 11 **Xu, R.**, & Chen, Y. (2021). Fed-ddm: A federated ledgers based framework for hierarchical decentralized data marketplaces. In 2021 international conference on computer communications and networks (icccn) (pp. 1–8). IEEE. 6 doi:10.1109/ICCCN52240.2021.9522359
- Qu, Q., Xu, R., Nikouei, S. Y., & Chen, Y. (2020). An experimental study on microservices based edge computing platforms. In *Ieee infocom 2020-ieee conference on computer communications workshops* (infocom wkshps) (pp. 836–841). IEEE. doi:10.1109/INFOCOMWKSHPS50562.2020.9163068
- Xu, R., Chen, Y., Blasch, E., Aved, A., Chen, G., & Shen, D. (2020). Hybrid blockchain-enabled secure microservices fabric for decentralized multi-domain avionics systems. In *Sensors and systems for space applications xiii* (Vol. 11422, 114220J). International Society for Optics and Photonics. Odoi:10.1117/12. 2559036
- Xu, R., Chen, Y., & Li, J. (2020). Poster: Microfl: A lightweight, secure-by-design edge network fabric for decentralized iot systems. In *The network and distributed system security symposium* (ndss). Retrieved from <code>%</code> https://www.ndss-symposium.org/wp-content/uploads/2020/02/NDSS2020posters_paper_19.pdf
- 15 Xu, R., Zhai, Z., Chen, Y., & Lum, J. K. (2020). Bit: A blockchain integrated time banking system for community exchange economy. In 2020 ieee international smart cities conference (isc2) (pp. 1–8). IEEE.
 6 doi:10.1109/ISC251055.2020.9239045
- Blasch, E., **Xu**, **R.**, Nikouei, S. Y., & Chen, Y. (2019). A study of lightweight dddas architecture for real-time public safety applications through hybrid simulation. In *2019 winter simulation conference* (wsc) (pp. 762–773). IEEE. 6 doi:10.1109/WSC40007.2019.9004727
- Nikouei, S. Y., **Xu**, **R.**, Chen, Y., Aved, A., & Blasch, E. (2019). Decentralized smart surveillance through microservices platform. In *Sensors and systems for space applications xii* (Vol. 11017, 110170K). International Society for Optics and Photonics. 6 doi:10.1117/12.2518999
- Yu, R., Chen, S., Yang, L., Chen, Y., & Chen, G. (2019). Decentralized autonomous imaging data processing using blockchain. In *Multimodal biomedical imaging xiv* (Vol. 10871, pp. 72−82). SPIE. odi:10.1117/12. 2513243
- Xu, R., Nikouei, S. Y., Chen, Y., Blasch, E., & Aved, A. (2019). Blendmas: A blockchain-enabled decentralized microservices architecture for smart public safety. In 2019 ieee international conference on blockchain (blockchain) (pp. 564–571). IEEE. Odi:10.1109/Blockchain.2019.00082
- Xu, R., Ramachandran, G. S., Chen, Y., & Krishnamachari, B. (2019). Blendsm-ddm: Blockchain-enabled secure microservices for decentralized data marketplaces. In 2019 ieee international smart cities conference (isc2) (pp. 14–17). IEEE. Odoi:10.1109/ISC246665.2019.9071766
- Nagothu, D., **Xu**, **R.**, Nikouei, S. Y., & Chen, Y. (2018). A microservice-enabled architecture for smart surveillance using blockchain technology. In 2018 ieee international smart cities conference (isc2) (pp. 1–4). IEEE. 60 doi:10.1109/ISC2.2018.8656968
- Nikouei, S. Y., Chen, Y., Song, S., **Xu**, **R.**, Choi, B.-Y., & Faughnan, T. (2018). Smart surveillance as an edge network service: From harr-cascade, svm to a lightweight cnn. In 2018 ieee 4th international conference on collaboration and internet computing (cic) (pp. 256–265). IEEE. doi:10.1109/CIC.2018.00042
- Nikouei, S. Y., Chen, Y., Song, S., **Xu**, **R.**, Choi, B.-Y., & Faughnan, T. R. (2018). Real-time human detection as an edge service enabled by a lightweight cnn. In *2018 ieee international conference on edge computing* (*edge*) (pp. 125–129). IEEE. doi:10.1109/EDGE.2018.00025

- Nikouei, S. Y., **Xu**, **R.**, Nagothu, D., Chen, Y., Aved, A., & Blasch, E. (2018). Real-time index authentication for event-oriented surveillance video query using blockchain. In 2018 ieee international smart cities conference (isc2) (pp. 1–8). IEEE. od doi:10.1109/ISC2.2018.8656668
- Xu, R., Chen, Y., Blasch, E., & Chen, G. (2018a). A federated capability-based access control mechanism for internet of things (iots). In *Sensors and systems for space applications xi* (Vol. 10641, 106410U). International Society for Optics and Photonics. 6 doi:10.1117/12.2305619
- Xu, R., Chen, Y., Blasch, E., & Chen, G. (2018b). Blendcac: A blockchain-enabled decentralized capability-based access control for iots. In 2018 ieee international conference on internet of things (ithings) and ieee green computing and communications (greencom) and ieee cyber, physical and social computing (cpscom) and ieee smart data (smartdata) (pp. 1027–1034). IEEE. Odoi:10.1109/Cybermatics_2018.2018.00191
- **Xu**, **R.**, Lin, X., Dong, Q., & Chen, Y. (2018). Constructing trustworthy and safe communities on a blockchainenabled social credits system. In *Proceedings of the 15th eai international conference on mobile and ubiquitous* systems: Computing, networking and services (pp. 449–453). Odo:10.1145/3286978.3287022
- Xu, R., Nikouei, S. Y., Chen, Y., Polunchenko, A., Song, S., Deng, C., & Faughnan, T. R. (2018). Real-time human objects tracking for smart surveillance at the edge. In 2018 ieee international conference on communications (icc) (pp. 1–6). IEEE. Odoi:10.1109/ICC.2018.8422970

Book Chapters

- Chen, Y., & **Xu**, **R.** (2024b). Introductory chapter: Edge computing in the evolution of smart cities. In *Edge computing architecture-architecture and applications for smart cities* (pp. 1–11). **6** doi:10.5772/intechopen. 1007810
- Xu, R., Nagothu, D., & Chen, Y. (2024). Ar-edge: Autonomous and resilient edge computing architecture for smart cities. (pp. 1−21). Ø doi:10.5772/intechopen.1005876
- Xu, R., Nagothu, D., & Chen, Y. (2023). Ecom: Epoch randomness-based consensus committee configuration for iot blockchains. In *Principles and practice of blockchains* (pp. 135–154). 6 doi:10.1007/978-3-031-10507-4_7
- **Xu**, **R.**, Chen, Y., & Blasch, E. (2021). Microchain: A light hierarchical consensus protocol for iot systems. In *Blockchain applications in iot ecosystem* (pp. 129–149). Springer.
- Nagothu, D., **Xu**, **R.**, Nikouei, S. Y., Zhao, X., & Chen, Y. (2020). Smart surveillance for public safety enabled by edge computing. In *Edge computing: Models, technologies and applications* (pp. 409–433). **6** doi:10. 1049/PBPC033E_ch19
- **Xu**, **R.**, Chen, Y., & Blasch, E. (2020). Decentralized access control for iot based on blockchain and smart contract. In *Modeling and design of secure internet of things* (pp. 505–528). Odi:10.1002/9781119593386. ch22
- Nikouei, S. Y., **Xu**, **R.**, & Chen, Y. (2019). Smart surveillance video stream processing at the edge for real-time human objects tracking. In *Fog and edge computing: Principles and paradigms* (pp. 319–346). Odoi:10.1002/9781119525080.ch13

Books

- 1 Chen, Y., & **Xu**, **R.** (2024a). *Edge computing architecture-architecture and applications for smart cities.* doi:10. 5772/intechopen.1002562
- Xu, R., Chen, Y., & Blasch, E. (2023). Lightweight blockchain for internet of things: Rationale and a case study. Bellingham, Washington 98227-0010 USA: SPIE Press.

Professional Services

Editorial Community

♦ Springer Nature Editorial Board - Discover Internet of Things (Jan 2025 - Now)

Conference Technical Program Committee (TPC)

- ♦ The 6th ACM International Workshop on BLockchain-enabled Networked Sensor Systems (BlockSys-24) (in conjunction with SenSys-20234.
- ♦ IEEE Fourth Intelligent Cybersecurity Conference (ICSC2024/2025).
- ♦ IEEE/ACM International Conference on Connected Health: Applications, Systems and Engineering Technologies (CHASE 2024/2025).
- ♦ The 2nd International Workshop on Decentralized Physical Infrastructure Network (DePIN 2024/2025).
- ♦ The 29th IEEE Symposium on Computers and Communications (ISCC 2024).
- ♦ The 2024 EAI International Conference on Security and Privacy in Cyber-Physical Systems and Smart Vehicles (SmartSP 2024)
- ♦ The 7th IEEE International Conference on Blockchain (Blockchain-2024).
- ♦ The 6th IFIP International Internet of Things (IoT) Conference (IFIP-IoT 2023)
- ♦ The 5th ACM International Workshop on BLockchain-enabled Networked Sensor Systems (BlockSys-23) (in conjunction with SenSys-2023).
- The 2023 EAI International Conference on Security and Privacy in Cyber-Physical Systems and Smart Vehicles (SmartSP 2023)
- ♦ The 6th IEEE International Conference on Blockchain (Blockchain-2023).
- ♦ Artificial Intelligence and Machine Learning Technologies for IoT (AMT) (IEEE WiMob-SPPDT'2023).
- ♦ The 6th International Workshop on BLockchain Enabled Sustainable Smart Cities (BLESS 2023) (in conjunction with ICCCN 2023 Conference).
- ♦ The 4th ACM International Workshop on BLockchain-enabled Networked Sensor Systems (BlockSys-22) (in conjunction with SenSys-2022).
- ♦ The 5th IEEE International Conference on Blockchain (Blockchain-2022).
- ♦ The 5th International Workshop on BLockchain Enabled Sustainable Smart Cities (BLESS 2022) (in conjunction with ICCCN 2022 Conference).
- ♦ WiMob Short Papers, Posters and Demos Track (IEEE WiMob-SPPDT'2022).
- ♦ The 4th IEEE International Conference on Blockchain (Blockchain-2021).
- ♦ The 4th International Workshop on BLockchain Enabled Sustainable Smart Cities (BLESS 2021) (in conjunction with ICCCN 2021 Conference).
- ♦ The 3rd IEEE International Conference on Blockchain (Blockchain-2020).
- ♦ The 3rd International Workshop on BLockchain Enabled Sustainable Smart Cities (BLESS 2020) (in conjunction with ISC2 2020 Conference).
- ♦ The 2nd International Workshop on BLockchain Enabled Sustainable Smart Cities (BLESS 2019) (in conjunction with ISC2 2019 Conference).
- ♦ The 1st International Workshop on Lightweight Blockchain for Edge Intelligence and Security (LightChain 2019).

Reviewer for Journals

- Elsevier Computer Communications
- Elsevier Computer Networks
- Elsevier Computers & Security
- Elsevier Pervasive and Mobile Computing

Professional Services (continued)

- ♦ Elsevier Blockchain: Research and Applications
- Elsevier Sustainable Cities and Society
- ♦ Elsevier International Journal of Intelligent Networks
- ♦ IEEE Access
- ♦ IEEE Internet-of-Things Journal (IoT-J)
- ♦ IEEE Transactions on Big Data (TBD)
- ♦ IEEE Transactions on Industrial Informatics (TII)
- ♦ IEEE Transactions on Dependable and Secure Computing (TDSC)
- ♦ IEEE Transactions on Network Science and Engineering (TNSE)
- MDPI Applied Sciences
- MDPI Sensor and Actuator Networks
- Hindawi Wireless Communications and Mobile Computing

Reviewer for Conferences

- ♦ IEEE International Conference on Computer Communications (INFOCOM)
- ♦ IEEE International Conference on Blockchain (Blockchain)
- ♦ IEEE Global Communications Conference (GLOBECOM)
- ♦ IEEE International Conference on Wireless and Mobile Computing, Networking And Communications (WiMob)
- ♦ IEEE International Performance Computing and Communications Conference (IPCCC)
- ♦ IEEE International Conference on Consumer Electronics (ICCE)
- ♦ IEEE International Conference on Communications (ICC)
- ♦ IEEE International Smart Cities Conference (ISC2)
- ♦ IEEE International Conference on Cloud Networking (CloudNet)
- ♦ ACM Conference on Embedded Networked Sensor Systems (SenSys)
- ♦ EALSECURECOMM

Miscellaneous Experience

Awards and Achievements

- 2019 **2019 Computers Best Paper Award**, Multidisciplinary Digital Publishing Institute (MDPI).
- outstanding MS Research, Department of Electrical and Computer Engineering, Binghamton University.

On campus Services

♦ Fall 2018 Leadership Volunteers, International Student and Scholar Services (ISSS), Binghamton University.

Membership

- ♦ IEEE
- ♦ ACM