Masoumeh Safkhani

Associate Professor
Shahid Rajaee University

Place of Birth: Tehran

Faculty of Computer Engineering, Shahid Rajaee University, Lavizan, Tehran, Iran

+982122970117

Safkhani[at]sru[dot]ac[dot]ir

Scopus: M.Safkhani

ORCID:0000-0002-1897-0828

Languages

Persian

English

Interests

- Design and Cryptanalysis of Security Protocols
- Design and Cryptanalysis of Cryptography Primitives
- Network Security
- Internet of Things (IoT) Security
- Searchable Encryption Schemes Security

Profiles

Working Experience

Sep, 2020 – ongoing — **Associate Professor** — **Faculty of Computer Engineering, Shahid Rajaee Teacher Training University(SRTTU)**
Major research area includes Design and Analysis of Security Protocols

Sep, 2018 – ongoing — Software Department Head — **Faculty of Computer Engineering**

Nov, 2017 – ongoing — **Managing Editor** in the Journal of Electrical and Computer Engineering Innovations(JECEI) — **Shahid Rajaee Teacher Training University(SRTTU)**

Sep, 2014 – Sep, 2020 — **Assistant Professor** — **Faculty of Computer Engineering, Shahid Rajaee Teacher Training University(SRTTU)**
Major research area includes Design and Analysis of Security Protocols

Fall, 2015 – Nov, 2017 — Hardware Department Head — **Faculty of Computer Engineering.**

Education

Postgraduate Studies

2008 – 2013 — **Ph.D. in Electrical Engineering** — IUST

Title: Design and Security Analysis of RFID protocols.
Supervisor: Prof. Majid Naderi

In PhD thesis, we investigate the security of a variety of RFID protocols and demonstrate several practical attacks against 13 RFID protocols which have recently been proposed in literature. We apply various attacks, e.g., desynchronization attack, ID disclosure attack, tag impersonation attack, reader impersonation attack or traceability attack, on those RFID protocols. In addition, in this thesis, to improve patients' safety and to decrease medications errors in e-health systems with RFID infrastructure, we proposed an RFID access control protocol and an RFID grouping proof protocol, based on symmetric cryptography. In the proposed access control protocol, not only the authentication mechanism but also the access right authorization mechanism is designed so that only the specific doctor, usually the patient's doctor, can access the patient's tag. The proposed grouping proof protocol guarantees that a collection of tags (e.g., patient's tag, nurse's tag and drug's tag) are read at the same time. The security of proposed protocols against possible kinds of active and passive attacks is proved using both informal method and BAN logic as a formal method.

RFID | E-Health | Security | Authentication | Confidentiality | Availability | Traceability | Anonymity

2005 – 2007 — **M.Sc. in Electrical Engineering** — IUST

Title: Securing Documents using Hash Functions.
Supervisor: Prof. Majid Naderi

In MSc thesis, we introduced a new hash structure, called IMD. IMD is a general approach for strengthening standard iterative hash structure against multi-collision attack. We showed how to strengthen some vulnerable structures with this improvement. We proved that the modified structures are at least as strong against other attacks as the non-modified structures. In my thesis, we also have presented a new approach for distinguishing the iterative structure of hash function from a prefect hash function. Then we showed that some structures that previously seem to be strong against multi-collision attack, e.g. WPH, are vulnerable to this attack. We also showed that our proposed structure has a suitable security against this attack too.

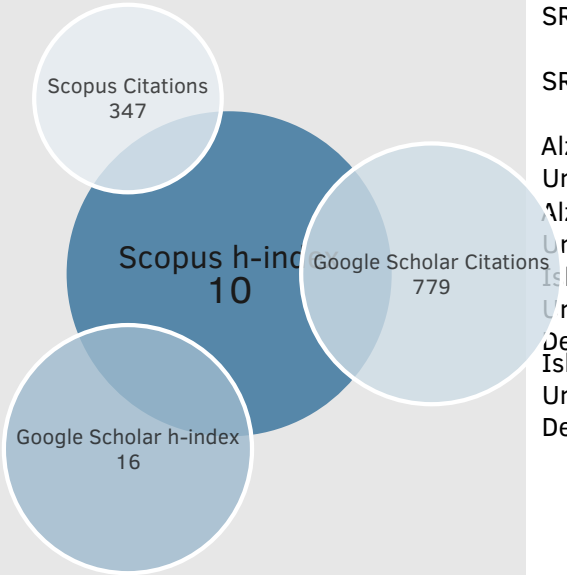
Hash Function | Collision Resistance | Random Oracle | Iterative Structure | Pre-image Resistance

Short Bio

I finished my PhD on April 2012, in school of Electrical Engineering of Iran University of Science and Technology (IUST) where I did my MSc. and BSc. My research interests are in the field of protocols design, primitives design, lightweight cryptography, cryptanalysis etc.
I am currently working as an Associate Professor at Computer Engineering Department, Shahid Rajaee Teacher Training University, Tehran, Iran. Nowadays, beside previous research activities, I am working on the field of security protocols of telecommunications and the Internet of Things, symmetric cryptography primitives, and Searchable Encryption schemes. I welcome the collaboration with other researchers.

QR Code

Metrics



Undergraduate Study

2000 - 2004 **B.Sc. in Electronics Engineering** IUST
Prject Title: Design and Implementation of a Security System using Fingerprint Sensor.
Supervisor: Dr. Jamshid Fariborz. **Grade** Excellent

Fingerprint Sensor | Matlab | Security System | Biometric

Teaching Experience

Postgraduate Courses

SRTTU	**Advanced Computer Networks** 2017-2021	Fall
SRTTU	**Advanced Networks Security** 2017-2021	Spring
Alzahra University	**Advanced Computer Networks** 2017-2019	Fall
Tarbiat Modares University	**Applied Cryptography** 2017-2019	Fall

Undergradute Courses

SRTTU	**Network Security** 2018-2021	Spring
SRTTU	**VHDL Digital Design** 2015-2021	Spring
SRTTU	**Computer Architecture** 2015-2021	Fall
SRTTU	**Computer Networks** 2016-2018	Fall
SRTTU	**Computer Architecture Lab** 2014-2016	Fall
SRTTU	**Microprocessors I** 2014-2018	Fall
SRTTU	**Microprocessors Lab** 2014-2015	Fall
SRTTU	**Cryptography** 2016-2019	Spring
Alzahra University	**Digital Logic Circuits Lab** 2014-2015	Fall
Alzahra University	**Engineering Probability and Statistics** 2014-2015	Fall
Islamic Azad University Dezful Branch	**Digital Circuits** 2007-2009	Fall
Islamic Azad University Dezful Branch	**Engineering Mathematics** 2007-2009	Fall

Academic Supervision

2018–2021	**Improving Security of Data Mining from the Privacy Preserving Perspective** 2018-2021	M.Sc.
2018–2020	**Improving the Privacy Security of Telecare Medical Information Systems** 2018-2020	M.Sc.
2018–2020	**Improving Authentication Protocols in Internet of Vehicle (IoV) Networks** 2018-2020	M.Sc.
2017–2021	**Improving Security Protocols in Internet of Vehicles** 2017-2020	M.Sc.
2017–2020	**Security Improvement of IoT using Blockchain** 2017-2020	M.Sc.
2017–2019	**Security Improvement of Searchable Encryption Schemes in Databases** 2017-2019	M.Sc.
2016–2018	**Data Security Enhancing in Wireless Sensor Networks** 2016-2018	M.Sc.
2016-2018	**Improving Security Protocols in Internet of Things** 2016-2018	M.Sc.
2014-2016	**Security Analysis of SHA-3 Hash Function** 2014-2016	M.Sc.
2014-2016	**Improvement of Anti-Collision Protocols for RFID Systems Performance** 2014-2016	M.Sc.

Skills

Programming:

MATLAB, C++, C, Pascal ● ● ● ● ●

Microprocessors Programming:

MIPS, x86, AVR, ARM ● ● ● ● ●

Hardware Programming:

Verilog, VHDL ● ● ● ● ●

Tools:

OPNET, AVISPA, Scyther, Proverif, Cryptoverif ● ● ● ● ●

CAD Tools:

Quartus, Modelsim, Proteus, Hspice, Pspice ● ● ● ● ●

Network Security Tools:

Wireshark, Metasploit, Nessus, Aircrack, Snort, Cain and Abel, Netcat ● ● ● ● ●

Memberships

Member of the Scientific Committee of the Iranian Society of Cryptology

Honours and Awards

Dec 2021	Award of Research Excellence	SRTTU,Iran
Sep 2021	Award of Best M.Sc. thesis Supervision	ISCISC'18, Iran
Sep 2020	Award for Best Reviewer of ISCISC'17.	ISCISC'17, Iran
Sep 2019	Award for Best Reviewer of ISCISC'16.	ISCISC'16, Iran
Sep 2019	Award of Best M.Sc. thesis Supervision	ISCISC'16, Iran
Dec 2018	Award of Research Excellence	SRTTU,Iran
Dec 2017	Award of Best Teacher	SRTTU,Iran
Dec 2015	Award of Research Excellence	SRTTU,Iran

Invited Talks

May 2016 **On the Security of RFID Systems** Shahid Beheshti University
Gave a two hours lecture on RFID Security Protocols.

Jan. 2012 **Security Analysis of SNMP** CyberSpace Research Institute
Gave a lecture on getting started in SNMP.

Feb. 2012 **Introduction to RFID Systems** Guilan University
Gave a lecture on getting started in Security Analysis of RFID Protocols.

Oct. 2010 **Command and Control Networks'Simulation with OPNET** 4th Conference of Iran's Scientific Society of (C4I),Sharif University of Technology
Gave a lecture on how simulate C4I networks in OPNET.

Oct. 2009 **Introduction to OPNET Software** 3rd Conference of Iran's Scientific Society of (C4I), Malek Ashtar University of Technology
Gave a lecture on getting started in OPNET.

Review Duties

Journals:
IEEE Transactions on Industrial Informatics
Concurrency and Computation: Practice and Experience
Journal of Information Systems and Telecommunication
Computer Networks
Computers and Electrical Engineering
Security and Communication Networks
IEEE Access
The Journal of Super Computing
IEEE Sensors Journal
Neural Computing and Applications (NCA)
International Journal of Information Security
Wireless Personal Communications
International Journal of Communication Systems
ISC International Journal of Information Security
Journal of Electronics Industries
Journal of Electrical and Computer Engineering Innovations(JECEI)
Journal of Information Systems and Telecommunication

Conferences:	ISCISC	2010-2022
	CSICC	2017-2021

Cryptography Primitives | Security Protocols | Attacks | IoT Security | IoV | RFID | WSN | Searchable Encryption | WBAN | Privacy Preservation | TMIS

Publications

Books

- M. Naderi and M. Safkhani. *Hash Function: Principles & Applications*. Iran University of Science & Technology Publications, 2008

Journals

- C. Camara, P. Peris-Lopez, M. Safkhani, and N. Bagheri. Ecgsound for human identification. *Biomed. Signal Process. Control.*, 72(Part):103335, 2022
- J. Lansky, A. M. Rahmani, S. Ali, N. Bagheri, M. Safkhani, O. Hassan Ahmed, and M. Hosseinzadeh. Bcmecc: A lightweight blockchain-based authentication and key agreement protocol for internet of things. *Mathematics*, 9(24):3241, 2021
- F. Moazami and M. Safkhani. Tbgodp^{+}: improvement of tbgodp, a time bound group ownership delegation protocol. *Journal of Ambient Intelligence and Humanized Computing*, pages 1–20, 2021
- A. M. Rahmani, M. Mohammadi, J. Lansky, S. Mildeová, M. Safkhani, S. Kumari, S. H. T. Karim, and M. Hosseinzadeh. AMAPG: advanced mobile authentication protocol for GLOMONET. *IEEE Access*, 9:88256–88271, 2021
- A. M. Rahmani, M. Mohammadi, S. Rashidi, J. Lansky, S. Mildeová, M. Safkhani, S. Kumari, and M. Hosseinzadeh. Questioning the security of three recent authentication and key agreement protocols. *IEEE Access*, 9:98204–98217, 2021
- F. Nikkhah and M. Safkhani. LAPCHS: A lightweight authentication protocol for cloud-based health-care systems. *Comput. Networks*, 187:107833, 2021
- M. Safkhani, C. Camara, P. Peris-Lopez, and N. Bagheri. RSEAP2: an enhanced version of rseap, an RFID based authentication protocol for vehicular cloud computing. *Veh. Commun.*, 28:100311, 2021
- M. Zamani, M. Safkhani, N. Daneshpour, and A. Abbasian. A new searchable encryption scheme with integrity preservation property. *Wirel. Pers. Commun.*, 116(4):3119–3142, 2021
- M. Hosseinzadeh, J. Lansky, A. M. Rahmani, C. Trinh, M. Safkhani, N. Bagheri, and B. Huynh. A new strong adversary model for RFID authentication protocols. *IEEE Access*, 8:125029–125045, 2020
- C. Trinh, B. Huynh, J. Lansky, S. Mildeová, M. Safkhani, N. Bagheri, S. Kumari, and M. Hosseinzadeh. A novel lightweight block cipher-based mutual authentication protocol for constrained environments. *IEEE Access*, 8:165536–165550, 2020
- M. Safkhani, N. Bagheri, S. Kumari, H. Tavakoli, S. Kumar, and J. Chen. RESEAP: an ecc-based authentication and key agreement scheme for iot applications. *IEEE Access*, 8:200851–200862, 2020
- M. Safkhani, S. Rostampour, Y. Bendavid, and N. Bagheri. Iot in medical & pharmaceutical: Designing lightweight RFID security protocols for ensuring supply chain integrity. *Comput. Networks*, 181:107558, 2020
- S. Rostampour, M. Safkhani, Y. Bendavid, and N. Bagheri. Eccbap: A secure ecc-based authentication protocol for iot edge devices. *Pervasive Mob. Comput.*, 67:101194, 2020
- M. Yavari, M. Safkhani, S. Kumari, S. Kumar, and C. Chen. An improved blockchain-based authentication protocol for iot network management. *Secur. Commun. Networks*, 2020:8836214:1–8836214:16, 2020
- F. Moazami and M. Safkhani. SEOTP: a new secure and efficient ownership transfer protocol based on quadric residue and homomorphic encryption. *Wirel. Networks*, 26(7):5285–5306, 2020
- F. G. Darbandeh and M. Safkhani. A new lightweight user authentication and key agreement scheme for WSN. *Wirel. Pers. Commun.*, 114(4):3247–3269, 2020
- A. Abbasian and M. Safkhani. CNCAA: A new anti-collision algorithm using both collided and non-collided parts of information. *Comput. Networks*, 172:107159, 2020
- M. Safkhani and A. V. Vasilakos. A new secure authentication protocol for telecare medicine information system and smart campus. *IEEE Access*, 7:23514–23526, 2019
- M. Safkhani. Full secret disclosure attack against an epc-c1 g2 compliant authentication protocol. *Journal of Computing and Security*, 6(1):13–23, 2019
- S. Hosiny Nezhad, M. Safkhani, and N. Bagheri. Relaxed differential fault analysis of sha-3. *The ISC International Journal of Information Security*, 11(2):129–143, 2019

- Y. Bendavid, N. Bagheri, M. Safkhani, and S. Rostampour. Iot device security: Challenging "a lightweight RFID mutual authentication protocol based on physical unclonable function". *Sensors*, 18(12):4444, 2018
- N. Bagheri, M. Safkhani, M. E. Namin, and S. Rostampour. An improved low-cost yoking proof protocol based on kazahaya's flaws. *J. Supercomput.*, 74(5):1934–1948, 2018
- M. Safkhani and M. Shariat. Implementation of secret disclosure attack against two iot lightweight authentication protocols. *J. Supercomput.*, 74(11):6220–6235, 2018
- M. Safkhani, N. Bagheri, and M. Shariat. On the security of rotation operation based ultra-lightweight authentication protocols for RFID systems. *Future Internet*, 10(9):82, 2018
- A. Abbasian and M. Safkhani. A new EPC-C1G2 based anti-collision algorithm to address tags'starvation in RFID systems. *NASHRIYYAH-I MUHANDISI-I BARQ VA MUHANDISI-I KAMPYUTAR-I*, 2018
- M. Safkhani. Cryptanalysis of R2AP an ultralightweight authentication protocol for RFID. *Journal of Electrical and Computer Engineering Innovations*, 6(1):107–114, 2018
- M. Safkhani and N. Bagheri. Passive secret disclosure attack on an ultralightweight authentication protocol for internet of things. *J. Supercomput.*, 73(8):3579–3585, 2017
- M. Safkhani, M. Hosseinzadeh, M. E. Namin, S. Rostampour, and N. Bagheri. On the (im)possibility of receiving security beyond 2 l using an l-bit PRNG. *Wirel. Pers. Commun.*, 92(4):1591–1597, 2017
- M. Safkhani and A. Abbasian. On the security of the revised SRP+ RFID authentication protocol. *Electronics Industrials*, 8(3):145–149, 2017
- M. Safkhani and M. Arghavani. A survey of cube, differential fault analysis attacks and linear structures on keccak hash function (sha-3). *Biannual Journal Monadi for Cyberspace Security (AFTA)*, 5(2):3–14, 2017
- M. Safkhani and N. Bagheri. A note on the security of two improved RFID protocols. *ISC Int. J. Inf. Secur.*, 8(2):155–160, 2016
- N. Bagheri, F. Baghernejhad, and M. Safkhani. On the designing of EPC C1 G2 authentication protocol using AKARI-1 and AKARI-2 prngs. *Inf. Technol. Control.*, 44(1):41–53, 2015
- M. Safkhani, N. Bagheri, and A. Mahani. On the security of RFID anti-counting security protocol (ACSP). *J. Comput. Appl. Math.*, 259:512–521, 2014
- M. Safkhani, P. Peris-Lopez, J. C. H. Castro, and N. Bagheri. Cryptanalysis of the cho et al. protocol: A hash-based RFID tag mutual authentication protocol. *J. Comput. Appl. Math.*, 259:571–577, 2014
- N. Bagheri, M. Safkhani, and M. Naderi. Cryptanalysis of a new EPC class-1 generation-2 standard compliant RFID protocol. *Neural Comput. Appl.*, 24(3-4):799–805, 2014
- N. Bagheri, M. Safkhani, P. Peris-Lopez, and J. E. Tapiador. Weaknesses in a new ultralightweight RFID authentication protocol with permutation - RAPP. *Secur. Commun. Networks*, 7(6):945–949, 2014
- M. Safkhani, N. Bagheri, and M. Naderi. Strengthening the security of EPC C-1 G-2 RFID standard. *Wirel. Pers. Commun.*, 72(2):1295–1308, 2013

- M. Safkhani and N. Bagheri. For an EPC-C1 G2 RFID compliant protocol, CRC with concatenation : No; PRNG with concatenation : Yes. *IACR Cryptol. ePrint Arch.*, page 490, 2013
- M. Safkhani, N. Bagheri, and M. Naderi. On the designing of a tamper resistant prescription RFID access control system. *J. Medical Syst.*, 36(6):3995–4004, 2012

Conferences

- M. Shariat and M. Safkhani. How the control over smart meters is lost in the yan et al. lightweight aka scheme for smart grids. In *2017 9th International Conference on Information and Knowledge Technology (IKT)*, pages 82–84. IEEE, 2017
- H. Jannati, N. Bagheri, and M. Safkhani. Analysis of a distance bounding protocol for verifying the proximity of two-hop neighbors. In *14th International ISC (Iranian Society of Cryptology) Conference on Information Security and Cryptology, ISCISC 2017, Shiraz, Iran, September 6-7, 2017*, pages 31–36. IEEE, 2017
- M. Safkhani, H. Jannati, and N. Bagheri. Security analysis of niu et al. authentication and ownership management protocol. In G. P. Hancke and K. Markantonakis, editors, *Radio Frequency Identification and IoT Security - 12th International Workshop, RFIDSec 2016, Hong Kong, China, November 30 - December 2, 2016, Revised Selected Papers*, volume 10155 of *Lecture Notes in Computer Science*, pages 3–16. Springer, 2016
- S. F. Aghili, N. Bagheri, P. Gauravaram, M. Safkhani, and S. K. Sanadhya. On the security of two RFID mutual authentication protocols. In M. Hutter and J. Schmidt, editors, *Radio Frequency Identification - Security and Privacy Issues 9th International Workshop, RFIDsec 2013, Graz, Austria, July 9-11, 2013, Revised Selected Papers*, volume 8262 of *Lecture Notes in Computer Science*, pages 86–99. Springer, 2013
- N. Bagheri, P. Gauravaram, M. Safkhani, and S. K. Sanadhya. Desynchronization and traceability attacks on RIPTA-DA protocol. In M. Hutter and J. Schmidt, editors, *Radio Frequency Identification - Security and Privacy Issues 9th International Workshop, RFIDsec 2013, Graz, Austria, July 9-11, 2013, Revised Selected Papers*, volume 8262 of *Lecture Notes in Computer Science*, pages 57–68. Springer, 2013
- M. Safkhani, P. Peris-Lopez, N. Bagheri, M. Naderi, and J. C. H. Castro. On the security of tan et al. serverless RFID authentication and search protocols. In J. Hoepman and I. Verbauwhede, editors, *Radio Frequency Identification. Security and Privacy Issues - 8th International Workshop, RFIDSec 2012, Nijmegen, The Netherlands, July 2-3, 2012, Revised Selected Papers*, volume 7739 of *Lecture Notes in Computer Science*, pages 1–19. Springer, 2012
- M. Safkhani, N. Bagheri, S. K. Sanadhya, M. Naderi, and H. Behnam. On the security of mutual authentication protocols for RFID systems: The case of wei et al.'s protocol. In J. García-Alfaro, G. Navarro-Arribas, N. Cuppens-Boulahia, and S. D. C. di Vimercati, editors, *Data Privacy Management and Autonomous Spontaneus Security - 6th International Workshop, DPM 2011, and 4th International Workshop, SETOP 2011, Leuven, Belgium, September 15-16, 2011, Revised Selected Papers*, volume 7122 of *Lecture Notes in Computer Science*, pages 90–103. Springer, 2011
- M. Safkhani, N. Bagheri, and M. Naderi. Vulnerabilities in a new RFID access control protocol. In *6th International Conference for Internet Technology and Secured Transactions, ICITST 2011, Abu Dhabi, UAE, December 11-14, 2011*, pages 500–503. IEEE, 2011
- M. Safkhani, N. Bagheri, M. Naderi, and S. K. Sanadhya. Security analysis of lmap^{++}, an RFID authentication protocol. In *6th International Conference for Internet Technology and Secured Transactions, ICITST 2011, Abu Dhabi, UAE, December 11-14, 2011*, pages 689–694. IEEE, 2011
- M. Safkhani, N. Bagheri, M. Naderi, Y. Luo, and Q. Chai. Tag impersonation attack on two RFID mutual authentication protocols. In *Sixth International Conference on Availability, Reliability and Security, ARES 2011, Vienna, Austria, August 22-26, 2011*, pages 581–584. IEEE Computer Society, 2011
- A. Kumar, S. K. Sanadhya, P. Gauravaram, M. Safkhani, and M. Naderi. Cryptanalysis of tav-128 hash function. In G. Gong and K. C. Gupta, editors, *Progress in Cryptology - INDOCRYPT 2010 - 11th International Conference on Cryptology in India, Hyderabad, India, December 12-15, 2010. Proceedings*, volume 6498 of *Lecture Notes in Computer Science*, pages 118–130. Springer, 2010