

***Zahra Shirmohammadi***

Ph. D.

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## SHORT BIOGRAPHY:

I am Assistance prof at Shahid Rajaei University. I received my Ph.D. from Sharif University, I joined Dependable Systems Laboratory (DSL) where I had been working toward my master's degree, supervised by Prof. Seyed Ghassem Miremadi, in Department of Computer Engineering at Sharif University of Technology, Tehran, Iran. I've been working for about 1 years on my master thesis that was about reliability improvement in Network-on-Chip (NoC) based on switch reconfiguration. My objective was to propose a reconfigurable switch architecture which is capable to provide different levels of reliability depending on the running application and working condition. The reconfiguration policy was designed in a way which minimizes the overall performance loss and power consumption overhead. In January 2011, I got a chance to continue my Ph.D in DSL. My Ph.D. dissertation focused on crosstalk fault treatment in NoCs using data manipulation, which is an important area in designing of fault-tolerant NoCs. In this regard, we have papers that are listed in this CV. In DSL, I am the head of Dependability in Network on Chip (DNoC) group in DSL where we have been working on the Dependability of 2D and 3D NoCs. During the year 2016, I had been a six months visiting research program, supervised by prof. Metra in DEIS-ARCES–University of Bologna, Italy,

Currently, we are continuing the work toward providing efficient methods to omit or reduce crosstalk fault in 2D and 3D NoCs. In this regard, we are working on providing Crosstalk Avoidance Codes for worst case delay in NoC's links. As a case, we provide different Fibonacci-based numerical systems that can omit the crosstalk fault in links and compare them from power and area perspectives.

Also I worked on following research topics:

- Reliability Improvement in IOT
- Cypher Physical Systems
- Storage Systems
- Reliability Improvement in 2D NoCs against Soft Errors
- Crosstalk Fault Treatments in 3D NoCs
- Considering 5-Wire Models in Crosstalk Avoidance Codes
- Aging-aware Routing Algorithms in 2D NoCs
- Thermal Management Mechanisms in 3D NoCs

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## RESEARCH INTERESTS:

- Reliability Improvement in IOT
- Cypher Physical Systems
- Storage Systems
- Hardware Architecture
- VLSI Design
- System-on-Chip (SoC) & Network-on-Chip (NoC)
- Load Balancing and Routing in 2D/3D NoCs
- Crosstalk Mitigation Coding Mechanisms in Network on Chips
- Soft Error Rate Estimation & SEU Tolerance in Embedded System
- Dependable Embedded Systems
- Stochastic Modeling and Performance
- Evaluation Stochastic Network Calculus
- Wireless Network on Chip

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## EDUCATION:

- **Post Doc**, IPM, 2017-2018
- **Visiting Ph.D. Student**: Bologna University, Italy, 2016
- **Ph.D**: Sharif University of Technology (Computer Engineering) February 2011-March 2017.  
**GPA: 18.25/20**
  - **Dissertation Topic**: Crosstalk Fault Treatment in NoCs Using Data Manipulation
  - **Under Supervision of**: Prof. Seyed Ghassem Miremadi, Department of Computer Engineering Sharif University of Technology
- **Master of Science**, Sharif University of Technology: (Computer Engineering) September 2008-November 2010. **GPA: 17.34/20**
  - **Thesis Topic**: Reliability Improvement in Network-on-Chip Based on Switch Reconfiguration
  - **Under Supervision of**: Prof. Seyed Ghassem Miremadi, Department of Computer Engineering Sharif University of Technology

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## RESEARCH EXPERIENCES:

- **Visiting Ph. D Student**, DEIS-ARCES–University of Bologna, September 2016-March 2017.
- **Graduate Research Assistantship** with Prof. Seyed Ghassem Miremadi, Dependable Systems Laboratory (DSL), Department of Computing Engineering, Sharif University of Technology, 2009-Now

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## PUBLICATIONS

### Journals

1. **Shirmohammadi, Z.**, Miremadi, S. G., “On Designing an Efficient Numerical-based Forbidden Pattern Free Crosstalk Avoidance Codec for Reliable Data Transfer of NoCs,” in *Journal of Microelectronics Reliability*, vol. 43, pp. 304-313, 2016.
2. **Shirmohammadi, Z.**, Miremadi, S. G., “An Efficient Numerical-Based Crosstalk Avoidance Codec Design for NoCs,” in *Journal of Microprocessor and Microsystems*, vol. 50, pp. 127-133, 2017.
3. Rohbani, N., **Shirmohammadi, Z.**, Miremadi, S. G., “LAXY: A Location-Based Aging-Resilient Xy-Yx Routing Algorithm for Network on Chip,” in *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems*, vol. 36, no. 10, pp. 1725-1738, 2017
4. **Shirmohammadi, Z.**, Mahdavi, “An Efficient and Low Power One-Lambda Crosstalk Avoidance Code Design for Network on Chips,” in *Journal of Microprocessor and Microsystems*, vol. 78, pp. 110-117, 2019.
5. **Shirmohammadi, Z.**, “OP-Fibo: An Efficient Forbidden Pattern Free CAC Design” in *Journal of Integration, the VLSI Journal*, vol. 63, pp. 304-313, 2019.
6. **Shirmohammadi, Z.**, Ershadi, “AM3D: an Accurate Crosstalk Modeling to Predict Channel delay in 3D ICS,” in *Journal of Microelectronics Reliability*, vol. 102, pp. 117-127, 2019.
7. Mirbaha, E, **Shirmohammadi, Z.**, Rohbani, N “Increasing WSN Reliability by Increasing Transmission and Reducing Power Consumption” in *Journal of Computer Science*, 2020.
8. **Shirmohammadi, Z.**, “A Mechanism to Tackle with Crosstalk Fault Effects,” in *Journal of Electrical Engineering (TJEE)*, 2020.
9. **Shirmohammadi, Z.**, Asadina, M. On-Fly-TOD: an Efficient Mechanism for Crosstalk Fault Reduction in WNoCs, in *Journal of Supercomputing*, 2020.
10. **Shirmohammadi, Z.**, Khorrami, M, Omandi, M ST-CAC: a Low-cost Crosstalk Avoidance Coding Mechanism based on Three-valued Numerical System, in *Journal of Supercomputing*, 2021.

11. **Shirmohammadi, Z.**, Farmani, Zamani Sabzi. H. , Priority Filt: A Way to Increase Network Reliability on Chip against Soft Error by Considering Multiple Bit Upset, in *Computational Intelligence in Electrical Engineering* 2021
12. **Shirmohammadi, Z.**, Farmani, Reduce Disturbance Code: Reducing Energy Consumption in a 3D ICs by Applying Error Detecting and Correcting, in *Electronics Industry* 12 (2), 71-83, 2021
13. **Shirmohammadi, Z.**, Farmani, Zamani Sabzi. H, ForSts: Tacit Collusion in the Repeated Non-Cooperative Games Using Forwarding N-Steps Reinforcement Learning Algorithm, in *Computational Intelligence in Electrical Engineering* 2021
14. Taali, M., **Shirmohammadi, Z.**, A Numeral System Based Framework for Improved One-Lambda Crosstalk Avoidance Code Using Recursive Symmetry Formula, in *Journal of Electronic Testing* 37 (3), 2021.
15. **Shirmohammadi, Z.**, MJ Mahmoudi, M Rostamnejad, Int-TAR: An Intelligent Thermal-Aware Packet Routing Algorithm for 3D NoCs, in *J. Electr. Comput. Eng. Innovations*, 10(1): 47-56, 2022.
16. **Safari, M, Shirmohammadi, Z.** Rohbani, N, Farbeh, , LETHOR: a thermal-aware proactive routing algorithm for 3D NoCs with less entrance to hot regions, , in *Journal of Supercomputing*, 2022.

## Conferences

1. M. HajilooVakil, M. Javad Khani and **Z. Shirmohammadi**, "An Efficient Compression Method to Improve Energy Consumption in WBANs," *2021 7th International Conference on Web Research (ICWR)*, 2021, pp. 301-305, doi: 10.1109/ICWR51868.2021.9443125.
2. Zamani, H. , **Z. Shirmohammadi** and A. Jahanshahi, "Deflection-Aware Routing Algorithm in Network on Chip against Soft Errors and Crosstalk Faults," *2021 IEEE International Conference on Networking, Architecture and Storage (NAS)*, 2021, pp. 1-6,
3. Farmani, M, Nazeri, S, **Shirmohammadi, Z.**, "Mutated Fibonacci Coding Mechanism: Providing a Method to Increase Reliability in 3D Chip Networks," in *Proceedings of 29th Conference on Electrical Engineering (ICEE 2021)*, pp. 293-297, pp. 24-3, Iran, May 2021
4. **Shirmohammadi, Z.**, Taali, M., Zamani, H, "InduM: An Accurate Probability Inductance-based Model to Predict Delay in Chips," in *Proceedings of 9th IEEE International Conference on Computer and Knowledge Engineering, (ICCKE '19)*, pp. 293-297, pp. 24-30 Mashhad, Iran, October 2019.
5. **Shirmohammadi, Z.**, "An Efficient Floating Crosstalk Avoidance," in *Proceedings of Annual International CSI Computer Conference (CSICC'19)*, pp. 24-30, Tehran, Iran, March 2019.
6. **H. Osooli, A. H. Nikoofard,** "Game Theory for Eye Robot Movement: Approach and Hardware Implementation," in *Proceedings of the IEEE Iranian Conference on Computer Engineering (ICCE'19)*, Yazd, Iran, May 2019.
7. M. Safari, **Z. Shirmohammadi**, N. Rohbani, and H. Farbeh "Floating XY-YX: An Efficient Thermal Management Routing Algorithm for 3D NoCs," in *Proceedings of the IEEE International Conference on Dependable, Autonomic and Secure Computing (DASC'18)*, Athens, Greece, August 2018.
8. **Shirmohammadi, Z.**, " DR: Overhead Efficient RLC Crosstalk Avoidance Codec" in *Proceedings of 8th IEEE International Conference on Computer and Knowledge Engineering, (ICCKE '18)*, pp. 293-297, pp. 24-30 Mashhad, Iran, October 2018.
9. **Shirmohammadi, Z.**, "An Efficient Crosstalk Avoidance Code Considering Inductance Effects," in *Proceedings of Annual International CSI Computer Conference (CSICC'18)*, pp. 24-30, Tehran, Iran, March 2018.
10. **Shirmohammadi, Z.**, Zamani, H., Miremadi, S. G., "3D-DyCAC: Dynamic Numerical-based Crosstalk Avoidance Mechanism for Reducing Crosstalk Faults in NoCs," in *Proceedings of IEEE International High Level Design Validation and Test Workshop (HLDVT '17)*, pp. 87-90, Santa Cruz, CA, USA, October, 2017.
11. **Shirmohammadi, Z.**, Miremadi, S. G., "SDT-free: An Efficient Crosstalk Avoidance Coding Mechanism Considering Inductance Effects" in *Proceedings of 7th IEEE International Conference on Computer and Knowledge Engineering, (ICCKE '17)*, pp. 293-297, pp. 24-30 Mashhad, Iran, October 2017.
12. Safari, M., **Shirmohammadi, Z.**, Miremadi, "Increasing the Reliability of 3D-NoCs by Reducing Hot Reigns," to appear in *Proceedings of the International Conference on Computer Engineering, Computer Science and Information Technology (ICCE'17)*, Hamadan, Iran, July 2017.
13. Tanhaee, E., **Shirmohammadi, Z.**, Miremadi, "A Mechanism for Reliability Improvement of Wireless NoCs," to appear in *Proceedings of the International Conference on Computer Engineering, Computer Science and Information Technology (ICCE'17)*, Hamadan, Iran, July 2017.
14. **Shirmohammadi, Z.**, Miremadi, S. G., "An Efficient FOC Crosstalk Avoidance Code for Reliable Data Transfer of NoCs," in *Proceedings of Annual International CSI Computer Conference (CSICC'17)*, pp. 33-39,

- Tehran, Iran, March, 2017.
15. **Shirmohammadi, Z.**, Miremadi, S. G., “3D-DPS: An Efficient 3D-CAC for Reliable Data Transfer in 3D ICs” in *Proceedings of the IEEE International European Dependable Computing Conference (EDCC'16)*, pp. 409-413, Sweden, September 2016.
  16. **Shirmohammadi, Z.**, Miremadi, S. G., Allivand, Y., Mozafari, F., “OmPe-Fibo: An Efficient Forbidden Pattern Free CAC Design for NoCs,” in *Proceedings of the IEEE International Conference on Dependable, Autonomic and Secure Computing (DASC'16)*, pp. 409-413, Auckland, New Zealand, August 2016.
  17. **Shirmohammadi, Z.**, Mahdavi, Z., Miremadi, S. G., “ACM: Accurate Crosstalk Modeling to Predict Channel Delay in Network-on-Chips,” in *Proceedings of the IEEE International Symposium on On-Line Testing and Robust System Design (IOLTS'16)*, pp. 7-8, Catalonia, Spain, July 2016.
  18. **Shirmohammadi, Z.**, Rohbani, N., Miremadi, S. G., “On The Effects of Aging on the Reliable routing in NoCs,”
  19. in *Proceedings of the International Conference on Applications of intelligence systems in Electrical Engineering, Computer and Information Technology, (ELECOM'16)*, Tabriz, Iran, March 2016.
  20. **Shirmohammadi, Z.**, Miremadi, S. G., “Inspecting the Fault Tolerance Routings in 3D-NoC,” in *Proceedings of the International Conference on Applications of intelligence systems in Electrical Engineering, Computer and Information Technology, (ELECOM'16)*, pp. 30-36, Tabriz, Iran, March 2016.
  21. **Shirmohammadi, Z.**, Miremadi, S. G., “Inspecting the Fault Tolerance Routings in 3D-NoC” in *Proceedings of the International Conference on Computer and Knowledge Engineering, (ICCKE'16)*, pp. 51-58, Hamadan, Iran, September 2016.
  22. **Shirmohammadi, Z.**, Rohbani, N., Miremadi, S. G., “Mitigating Crosstalk Effect by Considering Coefficient of Tracks Inductance,” in *Proceedings of the International Conference on Recent Innovations in Electrical & Computer Engineering*, pp. 43-53, Tehran, Iran, September 2016
  23. Nazari, R., Rohbani, N., Farbeh, H., **Shirmohammadi, Z.**, and Miremadi, S.G., “A2CM2: Aging-Aware Cache Memory Management Technique”, in *Proceedings of the CSI Symposium on Real-Time and Embedded Systems and Technologies (RTEST'15)*, pp. 1-8, Tehran, Iran, October 2015.
  24. **Shirmohammadi, Z.**, Ansari, M., Kazemian Abhari, S., Safari, S., Miremadi, S. G., “PAM: a Packet Manipulation Mechanism for Mitigating the Crosstalk Faults in NoCs,” in *Proceedings of The IEEE International Conference on Dependable, Autonomic and Secure Computing (DASC-2015)*, pp. 1895-1902, England, UK, October 2015.
  25. Mirosanlou, R., Taram, M. K., **Shirmohammadi, Z.**, and Miremadi, S.G., “3DCAM: a Low Overhead Crosstalk Avoidance Mechanism for TSV-based 3D ICs,” in *proceedings of IEEE International Conference on Computer Design (ICCD'15)*, pp. 711-717, New York City, USA, October 2015.
  26. **Shirmohammadi, Z.**, Miremadi, S. G., “Addressing NoC Reliability Through an Efficient Fibonacci-Based Crosstalk Avoidance Codec Design,” in *Proceedings of The International Conference on Algorithms and Architectures for Parallel Processing (ICA3PP 2015)*, pp. 756-770, China, November 18-20, 2015.
  27. **Shirmohammadi, Z.**, Miremadi, S. G., “S2AP: An Efficient Numerical-based Crosstalk Avoidance Code For Reliable Data Transfer of NoCs,” in *Proceedings of the International Symposium on Reconfigurable Communication-centric Systems-on-Chip (ReCoSoC'15)*, pp.1-6, Bremen, Germany, July 2015.
  28. Hezaveh, M. **Shirmohammadi, Z.**, Rohbani, N., Miremadi, S. G. “A Fault-Tolerant and Energy-Aware Mechanism for Cluster-based Routing Algorithm of WSNs”, in *Proceedings of the IFIP/IEEE Symposium on Integrated Network and Service Management (IM'15)*, pp.11-15, Ottawa, Canada, May 2015
  29. Ebrahimi, Z., **Shirmohammadi, Z.**, Miremadi, S. G., “Inspecting The Scalability of Optical-NoCs in The Present of Crosstalk Faults,” in *Proceedings of Iranian Student Conference on Electrical Engineering (ISCEE'15)*, pp. 55-62, Mashhad, Iran, November 2015.
  30. Mahdavi, Z., **Shirmohammadi, Z.**, Miremadi, S. G., “Increasing the Reliability of NoCs Using Crosstalk Classification Mechanisms,” in *Proceedings of Iranian Student Conference on Electrical Engineering (ISCEE'15)*, pp. 12-19, Mashhad, Iran, November 2015.
  31. Mahdavi, Z., **Shirmohammadi, Z.**, Miremadi, S. G., “An Efficient Tri-Value Crosstalk Avoidance Code for Reliable Data Transfer of NoCs,” in *Proceedings of Annual International CSI Computer Conference (CSICC'16)*, pp. 22-29, Tehran, Iran, January 2016.
  32. Safari, S., Ansari, M., **Shirmohammadi, Z.**, S., Miremadi, S. G., “On The Effects of Error Correction and Detection Codes on The Reliability Improvement of NoCs against Crosstalk Faults,” In *Proceedings of the International Conference on Computer and Knowledge Engineering, (ICCKE'15)*, pp.18-24, Urmia, Iran, October 2015.
  33. **Shirmohammadi, Z.**, Miremadi, S. G., “Crosstalk Avoidance Coding for Reliable Data Transmission of Network on Chips,” in *Proceedings of the International Symposium on System-on-Chip 2013 (SoC'13)*, pp. 1-4, Tampere, Finland, October 2013
  34. **Shirmohammadi, Z.**, Miremadi, S. G., “Using Binary-Reflected Gray Coding for Crosstalk Mitigation of Network on Chip,” in *Proceedings of the CSI International Symposium on Computer Architecture & Digital Systems (CADS'13)*, pp. 81-86, Tehran, Iran, October 2013
  35. **Shirmohammadi, Z.**, Jalal, M., Patooghy, A., Miremadi, S. G., “A Reconfigurable Switch Architecture to

Enhance Reliability of Network-on-Chips,” in *Proceedings of the International Conference on Real-Time and Embedded Systems (RTES’10)*, pp. 35-41, Singapore, November 2010.

36. Jalal, M., **Shirmohammadi, Z.**, Patooghy, A., Miremadi, S. G., “Evaluation of Application Mapping for Network-on-Chips,” in *Proceedings of the International Conference on Real-Time and Embedded Systems (RTES’10)*, pp. 42-59, Singapore, November 2010.

## ADVISED STUDENTS:

### • M.Sc. Students:

- Masoumeh Taali, Department of Computer Engineering, Shahid Rajaee University
- Maedeh Khalifavi, , Department of Computer Engineering, Shahid Rajaee University , Department of Computer Engineering, Shahid Rajaee University
- Mojtaba Ahmadi, , Department of Computer Engineering, Shahid Rajaee University
- **Hadi Zamani:** DSL Member, Department of Computer Engineering, Sharif University of Technology, Tehran, Iran.
- **Reza Miroshanlu:** DSL Member, Department of Computer Engineering, Sharif University of Technology, Tehran, Iran.
- **Zeynab Mahdavi:** DSL Member, Department of Computer Engineering, Sharif University of Technology, Tehran, Iran.
- **Maryam Hezaveh:** DSL Member, Department of Computer Engineering, Sharif University of Technology, Tehran, Iran.
- **Maede Safari:** DSL Member, Department of Computer Engineering, Sharif University of Technology, Tehran, Iran.
- **Zahra Ebrahimi:** Department of Computer Engineering, Sharif University of Technology, Tehran, Iran.

### Teaching

دروس کارشناسی ارشد و دکتری
سیتم‌های کم توان
ارزیابی کارایی سیستم‌های کامپیوتری
کدگذاری
آزمون نرم افزار
طراحی سیستم‌های مطمئن (Fault Tolerant System Design)
طراحی نرم افزارهای مطمئن (Reliable Software Design)
طراحی پیشرفته سیستم‌های مطمئن (Advanced Design of Dependable Systems)
سامانه پیشرفته ذخیره‌سازی داده (Advanced Storage System Design)
شبکه‌های میان ارتباطی (Interconnection Networks)
طراحی سیستم‌های بر تراشه (System on Chip Design)
سیستم‌های بی درنگ و نهفته (Embedded and Real-time Systems)
طراحی پیشرفته مدارات مجتمع (Advanced VLSI)
آزمون پذیری (Testability)
معماری پیشرفته (Advanced Computer Architecture)

ریزپردازنده پیشرفته (Advanced Microprocessor)
شبکه پیشرفته (Advanced Network)
<b>دروس کارشناسی</b>
انتقال داده (Data Communication)
سیستم نهفته و بی درنگ (Embedded System Design)
مدار واسط (Interface Circuits)
هم طراحی سخت افزار نرم افزار (Hardware/Software Codesign)
طراحی کامپیوتری سیستم‌های دیجیتال (Computer Aided Digital System Design)
طراحی مدارات بسیار پیچیده (VLSI Design)
ریز پردازنده (Microprocessor)
معماری کامپیوتر (Computer Architecture)
مدار منطقی (Digital Design)
سامانه ذخیره سازی داده (Storage System Design)
ساختمان گسسته (Discreet Mathematics)
مبانی برنامه نویسی (Fundamental of Computer Programming)
برنامه نویسی پیشرفته (Advanced Computer Programming)

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## HONORS AND AWARDS:

- Ranked first in total GPA among Central Tehran Branch University Computer Engineering, B.Sc. class of 2008
- Member of young club of researchers

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## PROFESSIONAL SKILLS:

- Programming Languages: Java, C++, C, Pascal
- Web Design Languages: HTML5, CSS3, Java Script, J query
- Assembly Languages for Microprocessors: MIPS, 8085, 8086, AVR
- Hardware Design Language: Verilog, Implementing with FPGAs
- CAD tools: Quartus, Proteus, Hspice, Pspice, Modelsim, Altium Designer

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## LANGUAGE SKILLS:

- Persian: Native
- English : Fluent (Attending Advanced Level Classes in Iran Language Institute (ILI) English Classes)
- Azari: Fluent
- GRE
- IELTS=6.5
- Tolimo=620

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## PROJECTS:

- Design and implementation of hardware systems by Verilog HDL and FPGAs
  - Design and implementation of automatic Traffic Light system using 8085 microprocessor and its simulators
  - Design and improving calculator using MIPS microprocessors assembly language
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## **MEMBERSHIPS:**

- IEEE Student Member
  - Computer Society of Iran Student Member
  - Member of Linux User Group (LUG)
  - Member of Young Club of Researchers
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## **WORKSHOPS:**

- “How to publish a scientific journal article?” conducted by Springer at Sharif university, November 2011.
  - “Workshop on thinking in GPU” conducted by School of Computer Science, IPM, July 2011.
  - “Workshop on cloud computing” conducted by School of Computer Science, IPM, March 2011.
  - “Knowledge and teaching skills” January 2015.
-