Mustafa Altun, Ph.D.

TITLES

Associate Professor of Electronics Engineering at Istanbul Technical University
Director of the Emerging Circuits and Computation Group (ECC) at Istanbul Technical University

CONTACT INFORMATION

Istanbul Technical University
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RESEARCH INTERESTS

Electronic design automation (EDA), circuit design for emerging technologies, new computing paradigms, reliability analysis - fault tolerance

POSITIONS

Istanbul Technical University, Istanbul, Turkey

Associate Professor, Electronics and Communication Engineering, 2018 –

- Visiting Professor, **University of California - Los Angeles**, USA, Host: Prof. Puneet Gupta, 2023 –
- Visiting Professor, **University of Massachusetts - Amherst**, USA, Host: Prof. Csaba Moritz, July–August 2018 & June–July 2019

Assistant Professor, Electronics and Communication Engineering, 2013 – 2018

- Visiting Professor, **University of Virginia**, USA, Host: Prof. Mircea Stan, June–August, 2016

Lecturer, Electronics and Communication Engineering, 2012 – 2013

University of Minnesota, Twin Cities, Minnesota, USA

Research and Teaching Assistant, Electrical Engineering, 2007 – 2012

Istanbul Technical University, Istanbul, Turkey

Research and Teaching Assistant, Electronics Engineering, 2006 – 2007

EDUCATION

University of Minnesota, Twin Cities, Minnesota, USA

Ph.D., Electrical Engineering, 2012
Ph.D. Minor, Mathematics, 2012

- Dissertation Topic: Logic Synthesis and Circuit Design Techniques for Switching Nanoarrays
- Advisor: Marc D. Riedel
- Committee Members: Keshab K. Parhi, Sachin S. Sapatnekar, and Victor Reiner

Istanbul Technical University, Istanbul, Turkey

M.Sc., Electronics Engineering, 2007

- Dissertation Topic: Design of Current-mode Operational Amplifiers and Application Areas
- Advisor: Hakan Kuntman

University at Buffalo, Buffalo, New York, USA

Exchange Student, Electrical Engineering, August–December, 2005

Istanbul Technical University, Istanbul, Turkey

B.Sc., Electronics and Communication Engineering, 2004

Honors and Awards

- Istanbul Technical University **Academic Performance Award**, ranked among 10% considering the performance in the last 5 years, 2022
- METU Prof. Dr. Mustafa N. **Parlar Foundation Research Incentive Award**, one of the two awardees in the field of electrical and electronics engineering, given to total of 14 scientists in Turkey, 2021
- The Scientific and Technological Research Council of Turkey (**TUBITAK**) **Project Performance Award** given to our TUBITAK 3501 project on "Computing with Nano-Crossbar Arrays" for its outcomes and future impacts, 2020
- **TUBITAK Project Performance Award** given to our TUBITAK 1002 project on "Reversible Computing for Fault Tolerance" for its outcomes and future impacts, 2020
- **Science Academy Young Scientist Award** (**BAGEP**), the only awardee in the field of electrical and electronics engineering, given to 40 scientists among nearly 400 applicants in Turkey, 2020
- **TUBITAK Success Story** for our TUBITAK 3501 project on "Computing with Nano-Crossbar Arrays" given for the most influential, ranked around top 1%, research projects completed between 2014-2019, 2019
- **Place first** in **graduation project competition**, as an advisor, launched by the Chamber of Electrical Engineers of Turkey (**EMO**), 2017
- Istanbul Technical University **EU H2020 project coordinator recognition**, 2015
- **TUBITAK Success Award** for being a coordinator of a EU H2020 project (one of the few coordinators from Turkey), 2015
- **TUBITAK Career Award**: a respected project support for junior faculty in Turkey, 2014
- The Council of Higher Education of the Republic of Turkey (**YOK**) international **PhD scholarship**, 2007
- **Werner von Siemens Excellence Award** for the best Master's study in the Department of Electronics and Communication Engineering at Istanbul Technical University, 2007
- **Siemens full-time scholarship** for graduate students, 2005
- **Ranked top 0.1%** in the **National University Entrance Exam** in Turkey among over 1 million participants, 1999
- **Silver Medal** at National Mathematics Olympics arranged by **TUBITAK**, 1997

Projects as a Principle Investigator (PI)

Internationally Sponsored

1. **TUBITAK** - **NSF** (The National Science Foundation of the United States) Joint Research Project:
   - Computing with Switching Lattices: Technology Development, Device Modeling, and Circuit Design, **TUBITAK** Bilateral Cooperation Program (**2501**), budget: 720.000 TL, 2019-2023 – *completed*

     PI: **Mustafa Altun**
   - Architecting 3D Integrated Circuit Fabrics at Nanoscale, **NSF** Software and Hardware Foundations Program, budget: 725.000 DOLLAR, 2014-2021 – *completed*

     PI: Prof. Csaba Moritz
2. Synthesis and Performance Optimization of a Switching Nano-Crossbar Computer, **EU H2020** MSCA Research and Innovation Staff Exchange Program (**RISE**), budget: 724.500 EURO, 2015-2019 – *completed*

   PI/Coordinator: **Mustafa Altun**

   Co-PIs: Dr. Dan Alexandrescu, IROC Techonogies, France

Prof. Lorena Anghel, Grenoble Institute of Technology, France

Prof. Valentina Ciriani, University of Milan, Italy

Prof. Csaba Moritz, University of Massachusetts, USA

Prof. Kaushik Roy, Purdue University, USA

Prof. Georgios Sirakoulis, Democritus University of Thrace, Greece

Prof. Mircea Stan, University of Virginia, USA

Prof. Mehdi Tahoori, Karlsruhe Institute of Technology, Germany

Nationally Sponsored (university-external)

1. Energy-Efficient Hardware Design of Artificial Neural Networks (ANNs) for Mobile Platforms, **TUBITAK** Scientific and Technological Research Projects Funding Program (**1001**), budget: 400.000 TL, 2020-2023 – *completed*

   PI: **Mustafa Altun**

2. Design of Reconfigurable Circuits and Systems that can Perform Approximate Computation and their Use in Image Processing Applications Involving Learning, **TUBITAK** Scientific and Technological Research Projects Funding Program (**1001**), budget: 230.000 TL, 2017-2020 – *completed*

   PI: **Mustafa Altun**

3. Implementation of Accurate Stochastic Circuit Blocks and their Applications for Printed/Flexible Electronic Systems, **TUBITAK** Scientific and Technological Research Projects Funding Program (**1001**), budget: 260.000 TL, 2017-2020 – *completed*

   PI: **Mustafa Altun**

4. Implementation of a Defect-aware 8-bit Reversible Microprocessor, **TUBITAK** Short Term R&D Funding Program (**1002**), budget: 30.000 TL, 2016-2017 – *completed*

   PI: **Mustafa Altun**

5. Synthesis and Reliability Analysis of Nano Switching Arrays, **TUBITAK** Career Program (**3501**), budget: 190.000 TL, 2014-2017 – **selected as a success story by TUBITAK** – *completed*

   PI: **Mustafa Altun**

6. A Reliability Methodology for Appliance Electronic Cards, **TUBITAK** University-Industry Collaboration Grant Program (**1505**), cooperated with Arcelik A.S., budget: 210.000 TL, 2013-2015 – *completed*

   PI: **Mustafa Altun**

   Co-PI: Ahmet Ferit Cosan, Arcelik A.S., Turkey

Nationally Sponsored (university-internal)

1. Energy Efficient Hardware Implementations of Artificial Neural Networks, Istanbul Technical University Research Support Program (**ITU-BAP**), budget: 50.000 TL, 2019-2022

   PI: **Mustafa Altun**

2. Production and Modeling of Printable Organic-Inorganic Field Effect Transistors with Carbon Materials, Istanbul Technical University Research Support Program (**ITU-BAP**), budget: 50.000 TL, 2018-2020 – *completed*

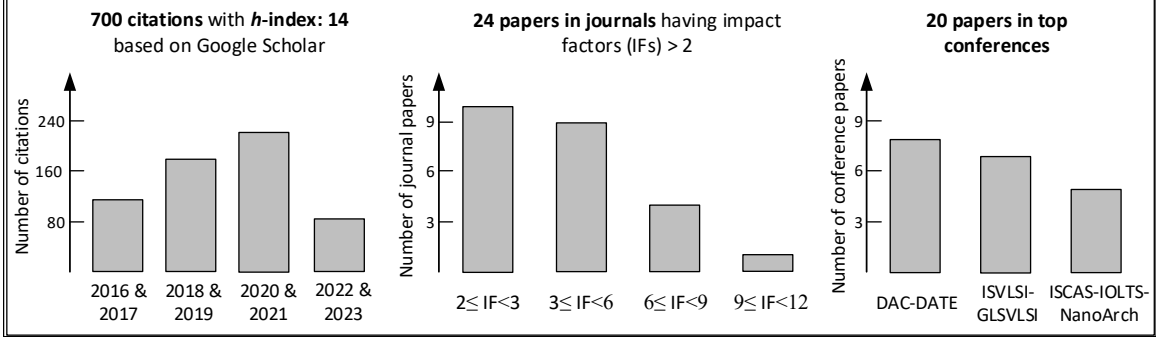
   PI: **Mustafa Altun**

   Co-PIs: Prof. Esra Zayim Ozkan and Prof. Nilgun Yavuz, ITU, Turkey

PUBLICATIONS

Summary

35 International Journal Papers	**2** International Book Chapters	**5** Patents	**40** International Conference Papers	**9** National Conference Papers



Refereed International Journal Papers

Publications co-authored only by Mustafa Altun's students/scholars and co-advisors marked with *

1. * M. Nojehdeh and **M. Altun**, Energy Efficient Hardware Implementation of Fully-Connected Artificial Neural Networks Using Approximate Arithmetic Blocks, *Circuits, Systems, and Signal Processing*, accepted for publication, 2023. (Scopus **Q1** 82% Percentile)
2. * N. Akkan, **M. Altun**, and H. Sedef, Behavioral modeling for low-voltage pentacene-based OTFTs and their implementations for organic logic circuits, *Engineering Science and Technology, an International Journal*, Vol. 37, Article 101317, 2023. (Scopus **Q1** 97% Percentile)
3. I. Sohel, T. Ozturk, U. Aydemir, S. Peighambardoust, O. Duygulu, I. Gulsac, **M. Altun**, and M. Ates, Deciphering the Effect of the Heat Treatment on the Electrodeposited Silicon Anode for Li-ion Batteries, *Journal of Energy Storage*, Vol. 35, Article 105817, 2022. (Scopus **Q1** 87% Percentile)
4. * B. Karadeniz and **M. Altun**, TALIPOT: Energy Efficient DNN Booster Employing Hybrid Bit Parallel-Serial Processing in MSB-First Fashion, *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems*, Vol. 41, Issue 8, pp. 2714–2727, 2022. (Scopus **Q1** 79% Percentile)
5. N. Akkan, S. Safaltin, L. Aksoy, I. Cevik, H. Sedef, C. Moritz, and **M. Altun**, Technology Development and Modeling of Switching Lattices Using Square and H Shaped Four-Terminal Switches, *IEEE Transactions on Emerging Topics in Computing*, Vol. 10, Issue 1, pp. 351–360, 2022. (Scopus **Q1** 92% Percentile)
6. B. Karadeniz, I. Cevik, and **M. Altun**, STAMP: A Real-Time and Low-Power Sampling Error Based Stochastic Number Generator, *IEEE Access*, Vol. 9, pp. 151363–151372, 2021. (Scopus **Q1** 90% Percentile)
7. F. Ordokhani, B. Yedikardes, E. Kurt, N. Akkan, N. Yavuz, E. Zayim, and **M. Altun**, Improving Threshold Voltage and ON/OFF Current Ratio of Single-Walled Carbon Nanotube Field-Effect Transistor by Post-Sonication Treatments, *Thin Solid Films*, Vol. 727, Article 138677, 2021. (Scopus **Q1** 79% Percentile)
8. B. Yedikardes, F. Ordokhani, N. Akkan, E. Kurt, N. Yavuz, E. Zayim, and **M. Altun**, Enhanced Electrical Properties of P3HT:WO3 Hybrid Thin Film Transistors, *Journal of Electronic Materials*, Vol. 50, Issue 4, pp. 2466–2475, 2021. (Scopus **Q2** 60% Percentile)
9. * L. Aksoy, N. Akkan, H. Sedef, and **M. Altun**, Realization of Logic Functions Using Switching Lattices Under a Delay Constraint, *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems*, Vol. 40, Issue 10, pp. 2036–2048, 2021. (Scopus **Q1** 79% Percentile)

10. M.C. Morgul, L. Frontini, O. Tunali, L. Anghel, V. Ciriani, I. Vatajelu, C. Moritz, M. Stan, D. Alexandrescu, and **M. Altun**, Circuit Design Steps for Nano-Crossbar Arrays: Area-Delay-Power Optimization with Fault Tolerance, *IEEE Transactions on Nanotechnology*, Vol. 20, pp. 39–53, 2021. (Scopus **Q1** 75% Percentile)
11. * L. Aksoy and **M. Altun**, Novel Methods for Efficient Realization of Logic Functions Using Switching Lattices, *IEEE Transactions on Computers*, Vol. 69, Issue 3, pp. 427–440, 2020. (Scopus **Q1** 85% Percentile)
12. * M. Nojehdeh and **M. Altun**, Systematic Synthesis of Approximate Adders and Multipliers with Accurate Error Calculations, *Integration the VLSI Journal*, Vol. 70, pp. 99–107, 2020. (Scopus **Q2** 53% Percentile)
13. * N. Akkan, **M. Altun**, and H. Sedef, Modeling and Parameter Extraction of OFET Compact Models Using Metaheuristics-Based Approach, *IEEE Access*, Vol. 7, pp. 180438–180450, 2019. (Scopus **Q1** 90% Percentile)
14. * O. Tunali and **M. Altun**, A Fast Logic Mapping Algorithm for Multiple-type-Defect Tolerance in Reconfigurable Nano-Crossbar Arrays, *IEEE Transactions on Emerging Topics in Computing*, Vol. 7, Issue 4, pp. 518–529, 2019. (Scopus **Q1** 92% Percentile)
15. * S. Parvin and **M. Altun**, Perfect Concurrent Fault Detection in CMOS Logic Circuits Using Parity Preservative Reversible Gates, *IEEE Access*, Vol. 7, pp. 163939–163947, 2019. (Scopus **Q1** 90% Percentile)
16. * M. Atasoyu, **M. Altun**, and S. Ozoguz, Sensing Schemes for STT-MRAMs structured with high TMR in low RA MTJs, *Microelectronic Journal*, Vol. 89, pp. 30-36, 2019. (Scopus **Q2** 53% Percentile)
17. * T. Ayhan and **M. Altun**, Circuit Aware Approximate System Design with Case Studies in Image Processing and Neural Networks, *IEEE Access*, Vol. 7, pp. 4726–4734, 2019. (Scopus **Q1** 90% Percentile)
18. * M.C. Morgul and **M. Altun**, Optimal and Heuristic Algorithms to Synthesize Lattices of Four-Terminal Switches, *Integration the VLSI Journal*, Vol. 64, pp. 60–70, 2019. (Scopus **Q2** 53% Percentile)
19. * O. Tunali, M.C. Morgul, and **M. Altun**, Defect Tolerant Logic Synthesis for Memristor Crossbars with Performance Evaluation, *IEEE Micro*, Vol. 38, Issue 5, pp. 22–31, 2018. (Scopus **Q1** 86% Percentile)
20. * **M. Altun**, S. Parvin, and H. Cilasun, Exploiting Reversible Computing for Latent-Fault-Free Error Detecting/Correcting CMOS Circuits, *IEEE Access*, Vol. 6, pp. 74475–74484, 2018. (Scopus **Q1** 90% Percentile)
21. * F. Peker and **M. Altun**, A Fast Hill Climbing Algorithm for Defect and Variation Tolerant Logic Mapping of Nano-Crossbar Arrays, *IEEE Transactions on Multi-Scale Computing Systems*, Vol. 4, No. 4, pp. 522–532, 2018. (Scopus **Q1** 83% Percentile)
22. * O. Tunali and **M. Altun**, A Survey of Fault Tolerance Algorithms for Reconfigurable Nano-Crossbar Arrays, *ACM Computing Surveys*, Vol. 50, No. 6, Article 79, 2017. (Scopus **Q1** 99% Percentile)
23. D. Gungordu, **M. Altun**, and I. Cevik, Low Input Resistance Current Buffer Stage Using a Controllable Positive Feedback Loop, and Applications of Current Conveyor Based Filters, *AEU – International Journal of Electronics and Communications*, Vol. 82, pp. 58–65, 2017. (Scopus **Q1** 83% Percentile)
24. D. Alexandrescu, **M. Altun**, L. Anghel, A. Bernasconi, V. Ciriani, L. Frontini, and M. Tahoori, Logic Synthesis and Testing Techniques for Switching Nano-Crossbar Arrays, *Microprocessors and Microsystems*,Vol. 54, pp. 14–25, 2017. (Scopus **Q2** 53% Percentile)

25. * H. Yadavari and **M. Altun**, Distinct Degradation Processes in ZnO Varistors: Reliability Analysis and Modeling with Accelerated AC Tests, *Turkish Journal of Electrical Engineering and Computer Sciences*, Vol. 25, No. 4, pp. 3240-–3252, 2017. (Scopus **Q3** 49% Percentile)
26. * O. Tunali and **M. Altun**, Permanent and Transient Fault Tolerance for Reconfigurable Nano-Crossbar Arrays, *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems*, Vol. 36, Issue 5, pp. 747—760, 2017. (Scopus **Q1** 79% Percentile)
27. * O. Susam and **M. Altun**, Fast Synthesis of Reversible Circuits using a Sorting Algorithm and Optimization, *the Journal of Multiple-Valued Logic and Soft Computing*, Vol. 29, Issue 1-2, pp. 1–23, 2017. (Scopus **Q2** 54% Percentile)
28. * H. Cilasun and **M. Altun**, A Novel Reversible Fault Tolerant Microprocessor Design in AMS 0.35um Process, *Istanbul University - Journal of Electrical and Electronics Engineering*, Vol. 17, No. 1, pp. 3147–3154, 2017. (Scopus **Q3** 27% Percentile)
29. **M. Altun** and M. D. Riedel, A Study on Monotone Self-dual Boolean Functions, *Acta Mathematicae Applicatae Sinica - English Series*, Vol. 33, Issue 1, pp. 43–52, 2017. (Scopus **Q3** 35% Percentile)
30. * **M. Altun** and V. Comert, A Change-Point based Reliability Prediction Model using Field Return Data, *Reliability Engineering and System Safety*, Vol. 156, pp. 175–184, 2016. (Scopus **Q1** 97% Percentile)
31. E. Alaybeyoglu, A. Guney, **M. Altun**, and H. Kuntman, Design of Positive Feedback Driven Current-Mode Amplifiers Z-Copy CDBA and CDTA, and Filter Applications, *Analog Integrated Circuits and Signal Processing*, Vol. 81, No. 1, pp. 109–120, 2014. (Scopus **Q3** 41% Percentile)
32. **M. Altun** and M. D. Riedel, Logic Synthesis for Switching Lattices, *IEEE Transactions on Computers*, Vol. 61, Issue 11, pp. 1588–1600, 2012. (Scopus **Q1** 85% Percentile)
33. **M. Altun** and M. D. Riedel, Robust Computation through Percolation: Synthesizing Logic with Percolation in Nanoscale Lattices, *International Journal of Nanotechnology and Molecular Computation*, Vol. 3, Issue 2, pp. 12–30, 2011.
34. **M. Altun**, H. Kuntman, S. Minaei, and O. K. Sayin, Realisation of nth-order Current Transfer Function Employing ECCIIs and Application Examples, *International Journal of Electronics*, Vol. 96, Issue 11, pp. 1115–1126, 2009. (Scopus **Q2** 51% Percentile)
35. **M. Altun** and H. Kuntman, Design of a Fully Differential Current Mode Operational Amplifier with Improved Input–output Impedances and Its Filter Applications, *AEU – International Journal of Electronics and Communications*, Vol. 62, Issue 3, pp. 239–244, 2008. (Scopus **Q1** 83% Percentile)

Patents

1. **M. Altun** and S. Parvin, Perfect Detection of Concurrent Faults in CMOS Circuits By Exploiting Reversible And Preservative Gates, *US Patent No: 11,307,252 B2*, 2022.
2. **M. Altun** and S. Rahimi, Multi-Neural Network Architecture and Methods of Training and Operating Networks According to Said Architecture, *US Patent Application No: 17/396,822*, 2021.
3. **M. Altun**, S. Safaltin, and I. Cevik, A continuation-in-part of the granted patent titled "CMOS Compatible Device based on Four-Terminal Switching Lattices", *US Patent No: 10,847,428 B2*, 2020.
4. **M. Altun**, S. Safaltin, and I. Cevik, CMOS Compatible Device based on Four-Terminal Switching Lattices, *US Patent No: 10,720,522 B1*, 2020.
5. **M. Altun** and S. Parvin, Realization of Perfect Concurrent Fault Tolerant CMOS Circuits by exploiting Reversible Preservative Gates, *Turkish Patent Application Number: GE-513362*, 2019.

International Book Chapters

1. M. Atasoyu, **M. Altun**, and S. Ozoguz, "Sensing Schemes: Spintronic Resistive Memories", in Modelling Methodologies in Analogue Integrated Circuit Design, edited by G. Dundar and M.B. Yelten, *IET*, pp. 283-292, 2020.
2. **M. Altun**, "Computing with Emerging Nanotechnologies", in Low-Dimensional and Nanostructured Materials and Devices, edited by H. Unlu, N. Horing, and J. Dabowski, *Springer*, pp. 635-660, 2016.

Refereed International Conference Papers

1. N. Akkan, H. Sedef, and **M. Altun**, Level 3 Based SPICE Model for Low-Voltage Pentacene Thin Film Transistors, *International Conference on Synthesis, Modeling, Analysis and Simulation Methods and Applications to Circuit Design (SMACD)*, Sardinia, Italy, 2022.
2. M. Nojehdeh, S. Parvin, and **M. Altun**, Efficient Hardware Implementation of Convolution Layers Using Multiply-Accumulate Blocks, *IEEE Computer Society Annual Symposium on VLSI (ISVLSI)*, Florida, USA, 2021.
3. S. Parvin and **M. Altun**, A Study on Hardware-Aware Training Techniques for Feedforward Artificial Neural Networks, *IEEE Computer Society Annual Symposium on VLSI (ISVLSI)*, Florida, USA, 2021.
4. R. Karamani, I. Fyrigos, V. Ntinas, O. Liolis, G. Dimitrakopoulos, **M. Altun**, M. Adamatzky, M. Stan, and G. Dimitrakopoulos, Memristive Learning Cellular Automata: Theory and Applications, *International Conference on Modern Circuits and Systems Technologies (MOCAST)*, Bremen, Germany, 2020.
5. M. Nojehdeh, L. Aksoy, and **M. Altun**, Efficient Hardware Implementation of Artificial Neural Networks Using Approximate Multiply-Accumulate Blocks, *IEEE Computer Society Annual Symposium on VLSI (ISVLSI)*, Limassol, Cyprus, 2020.
6. L. Aksoy, S. Parvin, M. Nojehdeh, and **M. Altun**, Efficient Time-Multiplexed Realization of Feedforward Artificial Neural Networks, *IEEE International Symposium on Circuits and Systems (ISCAS)*, Seville, Spain, 2020.
7. L. Aksoy and **M. Altun**, A Novel Method for the Realization of Complex Logic Functions Using Switching Lattices, *IEEE International Symposium on Circuits and Systems (ISCAS)*, Seville, Spain, 2020.
8. **M. Altun**, I. Cevik, A. Erten, O. Eksik, M. Stan, and C. Moritz, Nano-Crossbar based Computing: Lessons Learned and Future Directions, *Design, Automation and Test in Europe (DATE)*, Grenoble, France, 2020.
9. I. Cevik, L. Aksoy, and **M. Altun**, CMOS Implementation of Switching Lattices, *Design, Automation and Test in Europe (DATE)*, Grenoble, France, 2020.
10. H. Yildiz, **M. Altun**, D. Gungordu, and M. Stan, Analog Neural Network based on Memristor Crossbar Arrays, *International Conference on Electrical and Electronics Engineering (ELECO)*, Bursa, Turkey, 2019.
11. S. Parvin and **M. Altun**, Implementation of CMOS Logic Circuits with Perfect Fault Detection Using Preservative Reversible Gates, *IEEE International Symposium on On-Line Testing and Robust System Design (IOLTS)*, Rhodes Island, Greece, 2019.
12. S. Safaltin, O. Gencer, M.C. Morgul, L. Aksoy, S. Gurmen, C.A. Moritz, and **M. Altun**, Realization of Four-Terminal Switching Lattices: Technology Development and Circuit Modeling, *Design, Automation and Test in Europe (DATE)*, Florence, Italy, 2019.
13. L. Aksoy and **M. Altun**, A Satisfiability-Based Approximate Algorithm for Logic Synthesis Using Switching Lattices, *Design, Automation and Test in Europe (DATE)*, Florence, Italy, 2019.

14. M.C. Morgul, L. Frontini, O. Tunali, I. Vatajelu, V. Ciriani, L. Anghel, C. Moritz, M. Stan, D. Alexandrescu, and **M. Altun**, Integrated Synthesis Methodology for Crossbar Arrays, *IEEE/ACM International Symposium on Nanoscale Architectures (NANOARCH)*, Athens, Greece, 2018.
15. N. Akkan, **M. Altun**, and H. Sedef, Parameter Extraction Method Using Hybrid Artificial Bee Colony Algorithm for an OFET Compact Model, *International Conference on Synthesis, Modeling, Analysis and Simulation Methods and Applications to Circuit Design (SMACD)*, Prague, Czech Republic, 2018.
16. T. Ayhan and **M. Altun**, Approximate Fully Connected Neural Network Generation, *International Conference on Synthesis, Modeling, Analysis and Simulation Methods and Applications to Circuit Design (SMACD)*, Prague, Czech Republic, 2018.
17. O. Tunali and **M. Altun**, Logic Synthesis and Defect Tolerance for Memristive Crossbar Arrays, *Design, Automation and Test in Europe (DATE)*, Dresden, Germany, 2018.
18. B. Karadeniz and **M. Altun**, Sampling based Random Number Generator for Stochastic Computing, *IEEE International Conference on Electronics Circuits and Systems (ICECS)*, Batumi, Georgia, 2017.
19. O. Tunali and **M. Altun**, Yield Analysis of Nano-Crossbar Arrays for Uniform and Clustered Defect Distributions, *IEEE International Conference on Electronics Circuits and Systems (ICECS)*, Batumi, Georgia, 2017.
20. T. Ayhan, F. Kula, and **M. Altun**, A Power Efficient System Design Methodology Employing Approximate Arithmetic Units, *IEEE Computer Society Annual Symposium on VLSI (ISVLSI)*, Bochum, Germany, 2017.
21. M. Atasoyu, **M. Altun**, S. Ozoguz, and K. Roy, Spin-Torque Memristor based Offset Cancellation Technique for Sense Amplifiers, *International Conference on Synthesis, Modeling, Analysis and Simulation Methods and Applications to Circuit Design (SMACD)*, Taormina, Italy, 2017.
22. I. Ercan, O. Susam, **M. Altun**, and H. Cilasun, Synthesis and Fundamental Energy Analysis of Fault-tolerant CMOS Circuits, *International Conference on Synthesis, Modeling, Analysis and Simulation Methods and Applications to Circuit Design (SMACD)*, Taormina, Italy, 2017.
23. **M. Altun**, V. Ciriani, and M. Tahoori, Computing with Nano-Crossbar Arrays: Logic Synthesis and Fault Tolerance, *Design, Automation and Test in Europe (DATE)*, Lausanne, Switzerland, 2017.
24. D. Alexandrescu, **M. Altun**, L. Anghel, A. Bernasconi, V. Ciriani, and M. Tahoori, Synthesis and Performance Optimization of a Switching Nano-crossbar Computer, *Euromicro Conference on Digital System Design (DSD)*, Limassol, Cyprus, 2016.
25. E. Vahapoglu and **M. Altun**, Accurate Synthesis of Arithmetic Operations with Stochastic Logic, *IEEE Computer Society Annual Symposium on VLSI (ISVLSI)*, Pittsburgh, PA, USA, 2016.
26. M.C. Morgul, F. Peker, and **M. Altun**, Power-Delay-Area Performance Modeling and Analysis for Nano-Crossbar Arrays, *IEEE Computer Society Annual Symposium on VLSI (ISVLSI)*, Pittsburgh, PA, USA, 2016.
27. H. Yadavari, B. Sal, **M. Altun**, E. Erturk, and B. Ocak, Effects of ZnO Varistor Degradation on the Overvoltage Protection Mechanism of Electronic Boards, *European Safety and Reliability Conference (ESREL)*, Zurich, Switzerland, 2015.
28. B. Sal and **M. Altun**, Extensive Investigation of Calibrated Accelerated Life Testing (CALT) in Comparison with Classical Accelerated Life Testing (ALT), *European Safety and Reliability Conference (ESREL)*, Zurich, Switzerland, 2015.
29. O. Tunali and **M. Altun**, Defect Tolerance in Diode, FET, and Four-terminal Switch based Nano-crossbar Arrays, *IEEE/ACM International Symposium on Nanoscale Architectures (NANOARCH)*, Boston, MA, USA, 2015.

30. M.C. Morgul and **M. Altun**, Synthesis and Optimization of Switching Nanoarrays, *IEEE International Symposium on Design and Diagnostics of Electronic Circuits and System (DDECS)*, Belgrade, Serbia, 2015.
31. V. Comert, **M. Altun**, M. Nadar, and E. Erturk, Warranty Forecasting of Electronic Boards using Short-term Field Data, *Reliability and Maintainability Symposium (RAMS)*, Palm Harbor, FL, USA, 2015.
32. O. Susam and **M. Altun**, An Efficient Algorithm to Synthesize Quantum Circuits and Optimization, *IEEE International Conference on Electronics Circuits and Systems (ICECS)*, Marseille, France, 2014.
33. V. Comert, H. Yadavari, **M. Altun**, and E. Erturk, Reliability Prediction of Electronic Boards by Analyzing Field Return Data, *European Safety and Reliability Conference (ESREL)*, Wroclaw, Poland, 2014.
34. E. Alaybeyoglu, A. Guney, **M. Altun**, and H. Kuntman, Low Input Impedance Current Differencing Unit for Current Mode Active Devices Improved by Positive Feedback and ZC-CDBA Filter Application, *International Conference on Electrical and Electronics Engineering (ELECO)*, Bursa, Turkey, 2013.
35. **M. Altun** and M. D. Riedel, Lattice-Based Computation of Boolean Functions, *ACM/IEEE Design Automation Conference (DAC)*, Anaheim, CA, USA, 2010.
36. **M. Altun**, M. D. Riedel, and C. Neuhauser, Nanoscale Digital Computation Through Percolation, *ACM/IEEE Design Automation Conference (DAC)*, San Francisco, CA, USA, 2009.
37. M. Sayginer, **M. Altun**, and H. Kuntman, A CMOS FTFN Realization with Constant-gm Rail-to-Rail Input Stage, *IEEE Mediterranean Electrotechnical Conference (Melecon)*, Ajaccio, Corsica, France, 2008.
38. **M. Altun** and H. Kuntman, A High-Drive Fully Differential Current Mode Operational Amplifier Providing High Output Impedance and Filter Application, *International Conference on Electrical and Electronics Engineering (ELECO)*, Bursa, Turkey, 2007.
39. **M. Altun** and H. Kuntman, High CMRR Current Mode Operational Amplifier with a Novel Class AB Input Stage, *ACM Great Lakes Symposium on VLSI (GLSVLSI)*, Stresa, Italy, 2007.
40. **M. Altun** and H. Kuntman, A Wideband CMOS Current-mode Operational Amplifier and Its Use for Band-pass Filter Realization, *Applied Electronics (AE)*, Pilsen, Czech Republic, 2006.

Refereed National Conference Papers (in Turkish)

1. V. Nakci ve **M. Altun**, Çoklu Gaz Algılayıcıları ile Bir Etin Bozulduğu ve Bozulmasına Kalan Zamanı Yüksek Doğrulukla Tespit Eden Bir Algoritma, *Elektrik-Elektronik, Bilgisayar ve Biyomedikal Mühendisliği Sempozyumu (ELECO)*, Bursa, Turkey, 2022.
2. H. Avci ve **M. Altun**, MOSFET Geçit Oksidi Kırılması İçin Yeni Bir Güvenilirlik Modeli, *Elektrik-Elektronik, Bilgisayar ve Biyomedikal Mühendisliği Sempozyumu (ELECO)*, Bursa, Turkey, 2018.
3. F. Kula, T. Ayhan ve **M. Altun**, FPGA Üzerinde Yaklaşık FIR Süzgeç Tasarımı, *Sinyal İşleme ve İletişim Uygulamaları Kurultayı (SİU)*, İzmir, Turkey, 2018.
4. S. Aygun, **M. Altun** ve E. Gunes, Stokastik Aritmetik-Lojik Birim Tasarmı ile Görüntü işlemede Sobel Filtre Operasyonu , *Sinyal İşleme ve İletişim Uygulamaları Kurultayı (SİU)*, Antalya, Turkey, 2017.
5. S. Yavuz ve **M. Altun**, Stokastik Hesaplamada Hata Oranlarını Azaltmak için Rastgele Bit Karıştırma Yöntemi, *Elektrik-Elektronik, Bilgisayar ve Biyomedikal Mühendisliği Sempozyumu (ELECO)*, Bursa, Turkey, 2014.

6. M. C. Morgul ve **M. Altun**, Anahtarlamalı Nano Dizinler ile Lojik Devre Tasarımı ve Boyut Optimizasyonu, *Elektrik-Elektronik, Bilgisayar ve Biyomedikal Mühendisliği Sempozyumu (ELECO)*, Bursa, Turkey, 2014.
7. O. Susam ve **M. Altun**, Kuantum Devre Sentezi ve Optimizasyonu için Verimli bir Algoritma, *Elektrik-Elektronik, Bilgisayar ve Biyomedikal Mühendisliği Sempozyumu (ELECO)*, Bursa, Turkey, 2014.
8. M. Sayginer, **M. Altun** ve H. Kuntman, Beslemeden Beslemeye Giriş Katlı bir CMOS FTFN Tasarımı ve Topraklanmış Endüktans Uygulaması, *12. Ulusal Biyomedikal Kongresi*, Eskisehir, Turkey, 2007.
9. **M. Altun** ve H. Kuntman, Yüksek Başarımlı, Tümüyle Farksal Akım Modlu İşlemsel Kuvvetlendirici (COA) Tasarımı ve Tüm Geçiren Suzgeç Yapısında Kullanımı, *Elektrik-Elektronik, Bilgisayar ve Biyomedikal Mühendisliği Sempozyumu (ELECO)*, Bursa, Turkey, 2006.

Teaching and Advising

Teaching

- Courses taught at **Istanbul Technical University**, 2012–
  - ELE523E: Computational Nanoelectronics
  - EHB322E: Digital Electronic Circuits
  - EHB205E: Introduction to Logic Design
  - BLG231E: Digital Circuits
  - ELE222E: Introduction to Electronics
  - EHB262: Elektronik II (In Turkish)
  - EHB262E: Electronics II
  - EHB 211E: Basics of Electrical Circuits
  - EHB 101E: Introduction to Electronics and Communication Engineering & Engineering Ethics
- Courses taught at **MEF University**, 2015–2016 and 2022–2023
  - EE206: Analysis of Microelectronic Circuits and Devices
  - EE212: Electrical and Electronic Circuits
- Courses taught at **University of Minnesota**, 2010–2011
  - EE2301: Introduction to Digital System Design

Advising

- **Current Scholars/Students**
  - 3 **Ph.D.** candidate students: Ikramul Sohel, Beyza Yedikardes, and Galen Altas
  - 1 **M.Sc.** student: Veli Nakci
- **Previous PostDoc Scholars**
  1. Levent Aksoy, **Research fellow**, 2018–2020, Ph.D., previously worked at Dialog Semiconductor and ALGOS research unit of INESC-ID; Research area: Synthesis of switching lattices and hardware implementations of neural networks, Next position: Postdoctoral researcher at TalTech – Tallinn University of Technology
  2. Tuba Ayhan, **PostDoc**, 2016–2018, Ph.D. from the Katholieke Universiteit (KU) Leuven, Belgium; Research area: Approximate circuit and system design, Next position: Assistant professor in MEF University
- **Ph.D. Graduates**
  1. Burak Karadeniz, **Ph.D.**, Electronics Engineering, Istanbul Technical University, 2017–2023; Thesis topic: Energy efficient hybrid bit parallel-serial neural network hardware implementations, Next position: Director of electronic warfare systems at Istanbul Naval Shipyard
  2. Nihat Akkan, **Ph.D.**, Electronics Engineering, Yildiz Technical University, 2015–2022; Thesis topic: Modelling and circuit design for emerging technologies including four-terminal switch

based devices and organic transistors, Next position: R & D engineer in Interuniversity Microelectronics Centre (IMEC)

3. Mohammadreza Nojehdeh, **Ph.D.**, Electronics Engineering, Istanbul Technical University, 2016–2021; Thesis topic: Approximate computing and circuit design with neural network hardware implementations, Next position: Research engineer in Barcelona Supercomputing Center

- **M.Sc. Graduates**

1. Ece Kurt, **M.Sc.**, Nano Science and Engineering, Istanbul Technical University, 2018–2021; Thesis topic: Electrochromic materials and organic transistors, Next position: Researcher in Sisecam
2. Sajjad Parvin, **M.Sc.**, Electronics and Communication Engineering, Istanbul Technical University, 2017–2020; Thesis topic: CMOS Fault Tolerance by Exploding Reversible Computing, Next position: Ph.D. student and research assistant in the University of Bremen
3. Ensar Vahapoglu, **M.Sc.**, Electronics and Communication Engineering, Istanbul Technical University, 2015–2018; Thesis topic: Stochastic and bit stream computing, Next position: Ph.D. student and research assistant in the University of New South Wales - CQC2T
4. Furkan Peker, **M.Sc.**, Electronics and Communication Engineering, Istanbul Technical University, 2014–2017; Thesis topic: Variance tolerance for nano-crossbar arrays, Next position: Ph.D. student and research assistant in Istanbul Technical University
5. M. Ceylan Morgul, **M.Sc.**, Electronics and Communication Engineering, Istanbul Technical University, 2014–2017; Thesis topic: Logic synthesis and performance modeling for nano-crossbar arrays, Next position: researcher in Istanbul Technical University - ECC, followed by Ph.D. student and research assistant in the University of Virginia - ECE
6. Hadi Yadavari, **M.Sc.**, Control and Automation Engineering, Istanbul Technical University, 2013–2016; Thesis topic: Electronics reliability, Next position: Ph.D. student and research assistant in the University of Maryland - CALCE
7. Vehbi Comert, **M.Sc.**, Electronics and Communication Engineering, Istanbul Technical University, 2013–2016; Thesis topic: Electronics reliability with field return data, Next position: R & D engineer in TUBITAK Bilgem
8. Onur Tunali, **M.Sc.**, Nano Science and Engineering, Istanbul Technical University, 2013–2016; Thesis topic: Defect tolerance for nano-crossbar arrays, Next position: Ph.D. student and research assistant in Istanbul Technical University
9. Omercan Susam, **M.Sc.**, Nano Science and Engineering, Istanbul Technical University, 2013–2015; Thesis topic: Reversible circuit design, Next position: Ph.D. student in Istanbul Technical University and teaching assistant in MEF University
10. Serter Yavuz, **M.Sc.**, Electronics and Communication Engineering, Istanbul Technical University, 2013–2015; Thesis topic: Stochastic circuit design, Next position: R & D engineer in Bilko

Professional Activities

Invited Talks

- **In Conferences**
  - **Keynote Talk**: Computing with Nano-crossbar Arrays, *International Conference on Advances in Circuits, Electronics and Micro-electronics (CENICS)*, Nice, France, 2019.
  - **Invited Talk**: Future and Emerging Computing Paradigms in Electronics, *IEEE International Conference on Electronics Circuits and Systems (ICECS) - flagship conference of IEEE Circuits and Systems Society*, Batumi, Georgia, 2017.
  - **Invited Talk**: Circuit Design and Optimization of Nano-Crossbar Arrays, *Nanoscience and Nanotechnology Conference (NANOTR)*, Kocaeli, Turkey, 2016.
  - **Plenary Talk**: Implementation of a Switching Nano-Crossbar Computer, *International Conference on Applied Computer Science (ACS)*, Istanbul, Turkey, 2016.

- **In Seminars/Meetings**
  - Computing with Switching Lattices, Host: Prof. Hassan Najafi, *University of Louisiana at Lafayette ECE Department Seminar*, Lafayette, LA , USA, 2022.
  - Computing with Nano-crossbar Arrays, Host: Prof.Ilker Hamzaoglu, *Sabanci University EE Department Seminar*, Istanbul, Turkey, 2021.
  - Nanoelectronics and New Computing Paradigms, *Science Unites All (SCI-ALL) - European Researchers' Night Event*, Istanbul, Turkey, 2017.
  - Circuit Design Techniques for Nano-Crossbar Arrays and Large-Area Electronics, Host: Prof. Mircea Stan, *University of Virginia ECE Department Seminar*, Charlottesville, VA, USA, 2016.
  - EU H2020 Success Story, *H2020 MSCA 2016 Istanbul Training and Info Event*, Istanbul, Turkey, 2016.
  - Computing with Nano-crossbar Arrays, Host: Prof. Gunhan Dundar and Prof. Ilke Ercan, *Bogazici University EE Department Seminar*, Istanbul, Turkey, 2015.

Reviewing

- **In Journals (selected)**
  - IEEE Transactions on Computers (TC)
  - IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD)
  - IEEE Transactions on Very Large Scale Integration Systems (TVLSI)
  - IEEE Transactions on Emerging Topics in Computing (TETC)
  - IEEE Transactions on Nanotechnology (TNANO)
  - IEEE Micro
  - IEEE Access
  - IEEE Transactions on Circuits and Systems for Video Technology (TCSVT)
  - Reliability Engineering and System Safety (RESS)
  - ACM Transactions on Design Automation of Electronic Systems (TODAES)
  - Electronics Letters (ELL)
  - Turkish Journal of Electrical Engineering and Computer Sciences
- **In Projects**
  - The European Cooperation in Science and Technology (COST) projects
  - The Scientific and Technological Research Council of Turkey (TUBITAK) projects
  - Turkish Ministry of Transport research-development projects
  - Istanbul Technical University ARI Techno-park research projects

Miscellaneous (selected)

- **Technical committee member**, *IEEE/ACM International Symposium on Nanoscale Architectures (NANOARCH)*, 2017-2019
- **Organizer** of the invited special session "Circuit Design Techniques for Emerging Computing Systems", *IEEE International Conference on Electronics Circuits and Systems (ICECS)*, 2017