ŞUAYB Ş. ARSLAN <arslans@mef.edu.tr>

Office: +90(212)3953735 http://www.suaybarslan.com

Ayazağa Cad. No.4 34396 Maslak/Sarıyer/İstanbul Alternate Email: suaybarslan@gmail.com

RESEARCH OF INTEREST

The theory of source and channel coding, information–reliability–system theory, digital storage systems, software-defined storage, wireless/wireline multimedia communications, data and failure modeling using stochastic processes, joint source–channel coding, image/video compression and processing applications, parallel/distributed computing and storage architectures, cross-layer design optimizations and cloud storage for big data management/analytics.

ACADEMIC POSITIONS

MEF University (Department of Computer Engineering), ***Istanbul, Turkey*** *March 2015-Current*
Associate Professor

MEF University (Department of Computer Engineering), ***Istanbul, Turkey*** *March 2014-March 2015*
Assistant Professor

EDUCATION HISTORY

Graduate:

University of California, San Diego, (Department of Electrical & Computer Engineering), ***La Jolla, CA, USA*** *Sept. 2006- March 2012*
Doctorate of Philosophy

- Thesis topic: "Bandwidth and Rate Allocation Tradeoffs of Source-Channel Coding, Packetization and Modulation in Unequally Protected Multimedia Communication Systems".
  Advisors:Prof. Pamela C. Cosman and Prof. Laurence B. Milstein.
- GPA: 3.8/4.00.

University of California, San Diego, (Department of Electrical & Computer Engineering), ***La Jolla, CA, USA*** *March. 2009*
Master of Science

- Project Title: "Progressive Source Transmissions using Joint Source-Channel Coding (JSCC) and Hierarchical Modulation in Packetized Networks".
  Advisors:Prof. Pamela C. Cosman and Prof. Laurence B. Milstein.

Undergraduate:

Bogazici University (Department of Electrical & Electronics Engineering), ***Rumeli hisar üstü, Istanbul, Turkey*** *Sept 2003 - June 2006*
Bachelor of Science

- Research concentration: "UWB Communications,Spread spectrum systems, Space Time block coding, Forward Error Correction (FEC) coding, Encrypted Mobile & Satellite communications/Networks".

- GPA: 3.85/4.00.
- Senior Project: Robust Receiver Design for Alamouti STB Coded UWB systems under Non- Gaussian Noisy Environment".
  Advisors: Assoc.Prof. Mutlu Koca and Prof. Hakan Delic.

Bogazici University (Department of Mathematics), ***Rumeli hisar üstü, Istanbul, Turkey*** *Sept 2002 - 2003*
Bachelor of Science - ***Transfer Student***

- Research interests: “Discerete Mathematics, Fields and Graph Theory".
- GPA: 3.84/4.00.

High School:

Kabatas High School, (Kabatas Erkek Lisesi), Ortaköy, Istanbul. *Sept 1997 - June 2001*

PREVIOUS RESEARCH EXPERIENCE

Advanced Development Lab., Quantum Corp., Irvine, CA *Sept. 2011 - present*
Principal R & D Design Engineer

- Extensive expertise on Error Correction Coding (ECC), efficient code design and decoding architectures, reliability estimations of Disk and Tape Drives.
- Extensive expertise on software-defined Cold & Cloud storage system design and rateless/network coding.
- Expertise on signal processing for communication/magnetic channel modeling.
- Design and analyze the constrained codes such as Run Length Limited (RLL) and Maximum Transition Run (MTR) codes.
- Design and implement improved detector/decoding architectures such as Viterbi, MAP and Belief Propagation. Design of reduced complexity soft decision algorithms such as Chase.
- Efficient and accurate data modeling for reliability performance predictions of tapes using hidden markov models.
- Efficient and accurate disk failure modeling for distributed storage.
- Submit patent applications for next generation Linear Tape Open (LTO) drives and propose innovative format changes with IBM and HP as copartners.
- Submit patent applications for next generation cloud systems using deduplication and fountain codes.
- Implementation of simple post-processor of tape–out data on multicore GPU chips using CUDA-C and CUDA-MEX (for Matlab).

Wireless Comm. Lab., UC San Diego, La Jolla, CA *March 2007 - March 2012*
Graduate Student Researcher

♢ **ADVISORS**:Prof. Pamela C. Cosman and Prof. Laurence B. Milstein.
- Lossy and Lossless data compression techniques.
  ◇ Image and Video source coding. Efficient entropy coding techniques.
- Joint Source-Channel coding and optimal packetization methodologies for multimedia.
- Hierarchical modulations for data transmission and storage for solid state drives.
- Cross layer optimization of multimedia communication systems.
- Efficient and capacity achieving coding techniques for multimedia storage and protection against noisy wireline and fade-dominated wireless channels.

Channel Group, Quantum Corp, Irvine, CA. *June 2011 - Sept. 2011*
Research Intern

♢ **SUPERVISORS**: Turguy Goker, Dr. Jaewook Lee
- Error Event Study for noise predictive maximum likelihood detection algorithms for tape drives.

- Development of List-Noise predictive maximum likelihood detection (List-NPMLD) algorithm based on periodic error detections for magnetic recording channels.
- Post-ECC performance evaluation based on low complexity estimation algorithms and the quantification of the Post-ECC SNR gains using various detection algorithms.

Imaging Group, Mitsubishi Electric Research Lab., Cambridge, MA. *May 2009 - Sept 2009*
Research Intern

♢ **SUPERVISOR**: Dr. Fatih Porikli

- Development of a fast C-MEX based tissue simulation program using bi-cubic interpolation methods and a Finite Element Method for object morphing (a tumor in our case) for a given 3D volume.
- Image and Video processing algorithm development, generating synthetic images for tracking a visible or an invisible object,
- Optimum spectral clustering for large dimensional data, robust nonlinear least squares regression for the improvement of segmentation algorithms,
- Unsupervised multilevel segmentation algorithm based on confidence maps based on a set of random seed allocations,
- 2D texture coding and tracking based on a subgroup of general linear group theory. Application to more complex motion models such as bilinear or planar surface flow models.

Transmission department of Turk Telekom A.S., Istanbul, Turkey *June - Sept. 2005*
Coordinator & Engineer Intern

- Analyzed DWDM technology(Optical Networking) to increase the maximum multiple access under the given tolerable interference.
- Development of techniques used in analysis of SONET & SDH technologies.

TEACHING EXPERIENCE

MEF University, Istanbul, Turkey.
Instructor

- **EE 203**: *Digital System Design* Fall 2016.
- **COMP 206**: *Computer Architecture* Spring 2016.
  Information about classes can be found at .

Channel Group, Quantum Corp, Irvine, CA.
Instructor

- **QTM** ECC: *Fundamentals of Coding Theory* Summer 2013.
  Algebraic and probabilistic codes and their performances.
  Some of the class notes can be found at *http://suaybarslan.com/teaching.html*.

UC San Diego, La Jolla, CA
Teaching Assistant

- **ECE** 53: *Fundamentals of Electric Circuits* Electrical & Computer Engineering, UC San Diego,CA, **INSTRUCTOR**: Prof. Pamela Cosman, Fall 2009.
- **ECE** 258B: *Digital Communications* Electrical & Computer Engineering, UC San Diego,CA, **INSTRUCTOR**: Prof. Laurance Milstein, Spring 2008.
- **ECE** 154A: *Communications Systems I* Electrical & Computer Engineering, UC San Diego, CA, **INSTRUCTOR**: Prof. Laurance Milstein Fall 2007.
- **EE** 374: *Communication Engineering* Electrical & Electronics Engineering, Bogazici University, Turkey, **INSTRUCTOR**: Asistant Prof. Mutlu Koca, Oct. 2007.

PUBLICATIONS

• *Publication record and citation information available online:*
`http://scholar.google.com/citations?user=Tjrq9YEAAAAJ&hl=en`

Thesis:

- **S. S. Arslan**, "Bandwidth and Rate Allocation Tradeoffs of Source-Channel Coding, Packetization and Modulation in Unequally Protected Multimedia Communication Systems" Ph.d. Thesis, Department of Electrical and Computer Engineering, University of California, San Diego, March 2012, Advisor: Prof. Pamela Cosman, Coadvisor: Prof. Laurence Milstein.
  Available Online: `http://www.escholarship.org/uc/item/97c3938x`

Recently working papers:

- **S. S. Arslan**, "An extension to birthday problem: Collision analysis of convergent-like encryption", to be submitted to IEEE Security Magazine.
- **S. S. Arslan**, "Incremental Redundancy, Fountain Codes and Advanced Topics", in submission, *IEEE Communications Surveys and Tutorials*.
  This is a comprehensive study. Initial Version is available at *http://suaybarslan.com/FountainCodes.pdf* and in Wikipedia at *https://en.wikipedia.org/wiki/Fountain_code*.
- **S. S. Arslan**, "Dependent MDS Disk Array Reliability: More Parity or More Decorrelated Failures?," in submission, *IEEE Trans. on Information Theory*.
- J. Lee, **S. S. Arslan**, James Peng, Turguy Goker, John Moore, and Mark Pastor, "Continuously Improving Technology Enables Tape to Provide Best-In-Class Data Durability," in submission to *IEEE 31th International Conference on Massive Storage Systems and Technology, MSST 2016*.

Recently submitted papers:

- **S. S. Arslan**, Rod Wideman and Turguy Goker, "Joint Dedup-Fountain coded Archival Storage System," submitted to GLOBECOM'16 , Washington, USA.

Recently accepted papers:

- **S. S. Arslan**, "Implementation of Multi-threaded Erasure Coding under Multi-Processing Environments", accepted to 24th IEEE Signal Processing and Communications Applications Conference, Zonguldak, Turkey.

Refereed Journal Papers:

- **S. S. Arslan**, Jaewook Lee, Jerry Hodges, James Peng, Hoa Le and Turguy Goker, "MDS Product Code Performance Estimations under Header CRC Check Failures and Missing Syncs", *IEEE Transactions on Device and Materials Reliability* Vol. 14, No. 3, pp. 921-930, Sept. 2014.
- **S. S. Arslan**, "Redundancy and Aging of Efficient MDS–Parity Protected Distributed Storage Systems," *IEEE Transactions on Device and Materials Reliability*, Vol. 14, No. 1, pp. 275-285, Mar. 2014.
- **S. S. Arslan**, J. Lee and T. Goker, "Cycle Slip Detection and Correction through Classification of Run Length Limited Code Failures," *IEEE Transactions on Magnetics*, Vol. 49, No. 9, pp. 4988-4998, Sept. 2013.
- **S. S. Arslan**, J. Lee and T. Goker, "Error Event Corrections Using List-NPMLD Decoding and Error Detection Codes," *IEEE Transactions on Magnetics*, Vol. 49, No. 7, pp. 3775–3778, July 2013.
- **S. S. Arslan**, P.C. Cosman, and L.B. Milstein, "Concatenated Block Codes for Unequal Error Protection of Embedded Bit Streams," *IEEE Transactions on Image Processing*, Vol. 21, No. 3, pp. 1111-1122, March 2012.
- **S. S. Arslan**, P.C. Cosman, and L.B. Milstein, "Coded Hierarchical Modulation for Wireless Progressive Image Transmission," *IEEE Transactions on Vehicular Technology*, vol.60, no.9, pp. 4299-4313, Nov. 2011.

- **S. S. Arslan**, P.C. Cosman and L.B. Milstein, “Generalized Unequal Error Protection LT Codes for Progressive Data Transmission," *IEEE Transactions on Image Processing*, Vol. 21, No. 8, pp. 3586-3597, August 2012.

Refereed Conference Papers:

- **S. S. Arslan**, “Minimum Distortion Variance Concatenated coding for Scalable Multimedia Transmission," accepted paper, *ICNC 2014* (acceptance rate < 25%), a draft of this paper is also available at *arXiv:1210.2815v1 [cs.MM] 2012*.
- **S. S. Arslan**, J. Lee and T. Goker, “Embedding Noise Prediction into List-Viterbi Decoding using Error Detection Codes for Magnetic Tape Systems," *In proceedings of the ASME 2013 Conference on information storage and processing systems*, Jun. 24-25, Santa Clara, CA, USA, 2013.
- **S. S. Arslan**, P.C. Cosman, and L.B. Milstein, "Optimization of Generalized LT Codes for Progressive Image Transfer," *VCIP 2012*, San Diego. (Finalist, Best Paper Award)
- **S. S. Arslan**, P.C. Cosman, and L.B. Milstein, “On hard decision upper bounds for coded M-ary hierarchical modulation," *IEEE Conference on Information Sciences and Systems*, Baltimore, MD, USA, 2011.
- M. Hussein, F. Porikli, R. Li and **S. S. Arslan**, “CrossTrack: robust 3D tracking from two cross-sectional views," *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, Colorado springs, CO, USA, 2011.
- **S. S. Arslan**, P.C. Cosman, and L.B. Milstein, “Progressive Source Transmissions using Joint Source-Channel Coding and Hierarchical Modulation in Packetized Networks," *IEEE Globecom 2009*, Hawaii, USA.

For more info: `http://suaybarslan.com/researchpub.html`

Other working papers:

- S. S. Arslan and F. Porikli, “On the Performance of Object/Tumor Segmentation and Contour Tracking for Biomedical Applications", in submission to the journal of IEEE computer society.

Poster presentations, Seminars & Invited talks:

- S. S. Arslan, “The Evolution of Erasure Codes for Large Scale Data Storage and Multimedia Broadcast", *Bahcesehir University, Sept. 2013*.
- S. S. Arslan, “Magnetic Tape Recording: Future Projections, Challenges and Quantum’s Research Focus", *Bogazici University, Jan. 2013*.
- S. S. Arslan “Challenges of Tape Recording: Past and Present", *Bilkent University, Feb. 2013*.
- S. S. Arslan, J. Lee and Turguy Goker, “Error Event Corrections Using List-Noise Predictive Maximum Likelihood Decoding and Error Detection Codes", *12th IEEE International Magnetics Conference, Chicago, IL. USA, Jan. 2013.*
- S. S. Arslan, P.C. Cosman, and L.B. Milstein “Concatenated Coding for Embedded Bit streams " *Center for Wireless Communications (CWC) Research Review*, UC San Diego, La Jolla, 2011.
  Available Online: `http://www.youtube.com/watch?v=mstIuokbQX0`
- S. S. Arslan and Fatih Porikli, “Tumor Segmentations and Tracking (Visible/Invisible), *MERL Imaging Workshop*, Cambridge, MA, Sept 2009.
- S. S. Arslan, “Novel Ideas in Multiple Description Coding", *Network Information Theory mini-Workshop*, Calit2, UC San Diego, La Jolla, June ,2007.

Patents:

- T. Goker, S. S. Arslan, J. Lee, “HDD based Storage Subsystem Architecture for Data Centers", *pending, U.S. patent office*.
- R. Wideman, S. S. Arslan, J. Lee and T. Goker, “Data Deduplication with adaptive Erasure Code Redundancy", US 20160013815 A1.

- Rod Wideman, S. S. Arslan, Jaewook Lee, Turguy Goker, “Doubly Distributed Erasure Codes", Application number: US 14/727,893
- S. S. Arslan and Turguy Goker, “Efficient high/low energy zone solid state device data storage", Application number: US 15/006,403.
- S. S. Arslan, Turguy Goker and Rod Wideman, “A method for joint dedup-erasure coded distributed storage system", *pending, U.S. patent office*.
- S. S. Arslan, T. Goker, J. Lee, Hoa Le and P. Kiebach, “Tape layout optimization for reliable ECC decoding based on media defect characteristics", under review by *Patents Review Committee*.
- S. S. Arslan, J. Lee and T. Goker, “A method and apparatus for header error correction coding for Tape systems", accepted by *Patents Review Committee*.
- S. S. Arslan, J. Lee and T. Goker, “A method and apparatus for cycle slip detection and correction using ECC-assisted RLL decoding," *pending, U.S. patent office*.
- S. S. Arslan, J. Lee and T. Goker, "Bit Error Detection and Correction with Error detection code and List-NPMLD", US 20140173381 A1.

Research Reports:

- S. S. Arslan, Gelisme Raporu (Technical Document) 01/09/2015–01/03/2016, “Bulut depolama sistemleri için özelleştirilmiş sistematik pınar kod tasarımı ve büyük bit yıgınları üzerindeki uygulaması", Under the umbrella of TUBITAK 2232 Project.
- S. S. Arslan, “Header Error Statistics for LTO5 and next generation LTO systems", TR_QTM_LTO_0001 *Sept. 2012*.
- S. S. Arslan, “LTO format CWI allocation strategies for improved ECC decoding", TR_QTM_LTO_0007 *Nov. 2012*.
- S. S. Arslan, “On the modes of C1 and C2 decoding and complexity estimations of RS decoders", TR_QTM_LTO_0011 *Feb. 2013*.
- S. S. Arslan, “Tape map and error charactrizations", TR_QTM_LTO_0019 *Feb. 2013*.
- S. S. Arslan, “Iterative Reed Solomon (C1-C2) decoding based on generalized minimum distance decoders and hard decisions", TR_QTM_LTO_0027 *May. 2013*.
- S. S. Arslan, “LTO reliability and capacity loss due to read/write failures and tokens", TR_QTM_LTO_0033 *March. 2013*.
- S. S. Arslan, Jaewook Lee and Turguy Goker, “Header ECC and code design for reliable header protection", TR_QTM_LTO_0035 *Apr. 2013*.

Other Research Projects Involved:

- IBM, HP and QTM – Joint Development Agreement (JDA), “Logical TWG for next generation LTO format", *2012-2013*.
- Jieun Oh, HyeGyeong Park, JS Ha and Jae Moon, “RS-LDPC concatenation: Simulation and Performance evaluation for the Tape Channel", A project funded by Information Storage Industry Consortium (INSIC), 2013.
- Suayb S. Arslan and Ahmet Erten, “Reduced Complexity Face Recognition and Classification in Transform Domain", 2012 (to be TUBITAK funded).

Funding Organizations:

- 2016, MEF University & Horizon 2020 & TUBITAK.
- 2013, Hewlett-Packard Development Company, L.P.,
- 2013, Quantum Corporation, Irvine, CA,
- 2012, LG Electronics Inc., San Diego, CA
- 2006–2009, Intel Inc., Portland, OR
- 2006–2011, The Center for Wireless Communications at the University of California at San Diego,
- 2006–2011, the University of California Discovery Grant Program of the state of California,
- 2006–2011, the National Science Foundation (NSF) under Grant CCF-0915727.
- 2006 UCSD ECE Supplemental Departmental Fellowship.

- 2006 TUBITAK fellowship.

PROFESSIONAL SERVICES

- **GLOBECOM 2016** Technical Program Committee (TPC) Member – Data Storage.
- **Quantum representative**, LTO LTWG 2014.
- **Reviewer**, IEEE VTC 2014. {Seuol, 2014}
- **Reviewer**, IEEE TRANSACTIONS ON MAGNETICS. {2013-present}
- **Reviewer**, SAIEE AFRICA RESEARCH JOURNAL. {2013-present}
- **Reviewer**, ELSEVIER JOURNAL OF PHYSICAL COMMUNICATION. {2013-present}
- **Reviewer**, IEEE JOURNAL ON SELECTED AREAS IN COMMUNICATIONS. {2012-present}
- **Reviewer**, IEEE TRANSACTIONS ON COMMUNICATIONS. {2012-present}
- **Reviewer**, IEEE COMMUNICATION LETTERS. {2012-present}
- **Reviewer**, IEEE TRANSACTIONS ON IMAGE PROCESSING. {2010-present}
- **Reviewer**, HINDAWI PUBLISHING CORPORATION, "Journal of Electrical and Computer Engineering" {2009-present}
- **Reviewer**, IEEE TRANSACTIONS ON VEHICULAR TECHNOLOGY. {2009-present}
- **Student Editor**, IEEE potentials. {2008-2009}
- **Volunteer Student**, Information Theory and Applications Workshop . {Jan. 29 - Feb. 2, 2007}, San Diego, CA.
- **Volunteer Student**, Portland International Center for Management of Engineering and Technology.{July 8 - 13, 2006}, Istanbul, Turkey.

AWARDS & HONORS

- Listed in Marquis Who's Who Publications, 2013.
- Recipient of **Quantum Outstanding Research Award**, Dec. 2012, Nov. 2013.
- Finalist, Best Paper Award, VCIP 2012.
- Intel and LG Electronics (LGE) Research fellow during the graduate study at UC San Diego.
- Recipient of ECE departmental **Fellowship** Supplement, University of California, San Diego (July 2006).
- Selected for the **Dean's office high honor list** in all semesters completed in Bogazici University (2002-2006)
- Recipient of **Fellowship** of US $ 35,000 by TUBITAK, (2006)
- Recipient of **Istanbul Metropolitan Municipality Full Scholarship** US $3000.(2001,2006)
- Recipient of **First** standing in Department of Mathematics, Bogazici University.(June-2002).

SPECIAL SKILLS

Language:

- Turkish (native), English (fluent), French(fair), Spanish(Beginner)

Computer Software:

- C, C++, C-MEX, CUDA C-MEX, Pascal, Perl(Beginner stage), QT C++, LATEX, Visual Basic, Javascript editor, Microsoft Outlook Express, Macromedia Fireworks, Swish, Corel Draw, Wings3D, Macromedia Dreamwaver , Videowave, Lightwave 3D, Ms-Dos, Microsoft Office tools.

Simulation Software:

- Matlab, DesignLab, Pspice, NVIDIA's CUDA, Multism, Modelsim, Catapult, Labview.

Other:

- H.264/AVC, MPEG 2 Part 2/10, EZW, SPIHT, JPEG2000, Random walker & Graphcut segmentation algorithms, Adaboost, Histogram classification, All channel coding algorithms (Linear block codes like Reed-solomon codes, Convolutional codes, Turbo codes, LDPC, IRA, Online, LT, Raptor, etc...), Linear Tape Open (LTO) systems, Distributed Storage Systems, ML (Noise predictive and list architectures) and MAP detectors, 60–GHz channel modeling with link breaks, Linear/Dynamic Programming, CDMA, LTE, WiMax.

PROFESSIONAL MEMBERSHIPS

- IEEE, Member (9th year),
- Sigma Xi, Associate Member (5th year),
- IEEE Communications Society,
- INSIC, Industry Member (2nd year),
- ASME, Member (2nd year)

REFERENCES

Available upon request.