Amir Raeisi Nafchi

Ph.D. Candidate

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AREAS OF INTEREST

Signal Processing and Communications
Fractional Multicarrier Modulation and Fractional OFDM
Machine Learning in Signal Processing and Adaptive Spectrum Sensing
Discrete Fractional Fourier Transform
Synthetic Aperture Radar, Ground Moving Target Indication

EDUCATION

- **PhD in Electrical Engineering**
  University of New Mexico 2014 - Present
  Anticipated graduation date: July, 2018
  GPA: 3.9
  Major: Signal Processing and Communications
  Minor: Pure math
  Advisers: Professor Ramiro Jordan, Professor Balu Santhanam
  Thesis Title: "Comprehensive Design and Analysis of Fractional Multicarrier Modulation System Design based on Discrete Fractional Fourier Transform "

- **Master of Science in Electrical Engineering**
  University of New Mexico 2012 - 2015
  GPA: 3.91
  Major: Signal Processing
  Adviser: Professor Ramiro Jordan
  Thesis Title: "Study of adaptive spectrum sensing and it's application in adaptive OFDM "

- **Master of Science in Electrical Engineering**
  University of New Haven 2011 - 2012
  Major: Electrical and Computer Engineering
  Adviser: Professor Reza Zekavat
  Thesis Title: "Localization of Wireless Capsule Endoscopy in gastrointestinal tract with DOA/TOA and Extended Kalman Filter"

- **Bachelor of Science in Electrical Engineering**
  Shahrekord University 2002 - 2008
  Recipient of silver medal of computer networks Olympiad
  Adviser: Dr. Ebrahim Rahimi
  Thesis Title: "Control and Monitoring of household appliances using microcontroller and web based application"

ACADEMIC RESEARCH EXPERIENCE

University of New Mexico Albuquerque, NM 2012 – Present
Graduate Research Assistant
Project 1: "Localization of Wireless Capsule Endoscopy based on TOA\DOA\TDOA and extended Kalman filter"
Tasks:

- Performing literature review about the topic.
- Signal modeling and design of extended Kalman filter.
- Implementing the designed algorithm in Matlab.
- Writing papers and reports about the research topic.
- Presenting the paper in conferences.

Project 2: "Vibration detection and estimation in synthetic aperture radar imagery using dual-beam SAR and discrete fractional fourier transform"

Tasks:

- Performing literature review about the topic.
- Signal modeling of dual-beam SAR.
- Organizing and preparing big data of SAR images in Matlab.
- Writing matlab codes to implement DFRFT transform on real SAR data.
- Writing reports and papers about the research results and findings.

Project 3: "Investigating the impact of fractional OFDM in visible light communications using software defined radio "

Tasks:

- Performing literature review about the topic.
- Completed a setup of siso VLC link using two photodiodes and two NI-USRP SDRs.
- Writing Labview codes to run experiments using NI-USRPs
- Writing papers to publish in peer reviewed journals.

Project 4: "Investigating the application of machine learning methods in spectrum sensing using collected data by software defined radio. "

Tasks:

- Performing literature review about the topic.
- Designing setup to collect wireless data information using NI-USRP.
- Writing Labview codes to run experiments using NI-USRPs
- Designing machine learning models using TensorFlow.

Project 4: " Design and Analysis of Fractional Multicarrier Modulation System Design based on Discrete Fractional Fourier Transform"

Tasks:

- Performing literature review about the topic.
- Simulating adaptive OFDM in Matlab and Labview.
- Uncertainty principle analysis of the proposed fractional OFDM signal models.
- Systematic analysis of Fractional OFDM system in terms of channel capacity and bit error rate.
- Designing new modulation with N^2 subcarriers.
- Writing reports and presentation of research progress before my research group.
- Writing papers and publications for peer reviewed conferences and journals.

ACADEMIC TEACHING EXPERIENCE

Instructor **2016-Present**

Department of Electrical & Computer Engineering, University of New Mexico

Courses:

- ECE238L digital logic design (Summer 2016, Summer 2017)
- ECE238L digital logic design lab (Summer 2016, Summer 2017)
- ECE330 Hardware software systems(Fall 2016)
- ECE 595 Advanced topic in Labview (Graduate Level, Academic Years 2015,2016 and 2017)
- ECE 495 Advanced topics in Labview (Undergraduate section Academic Years 2015,2016 and 2017)
- ECE131 Fundamentals of Programming(Online Class, Summer 2017)

Tasks:

- Developing syllabus that outlines the course requirements, rationale, goals, and objectives
- Preparing class sessions and assignments to help students grasp course content
- Teaching courses in accordance with defined course standards and outcomes
- Creating a learning environment that encourages student involvement and participation
- Documenting students' attendance, participation, and academic progress by giving and grading assignments, projects, quizzes and/or examinations that lead to a final grade.
- Design Lab Manuals for classes that included Lab sessions.
- Designed a fully self-contained online class for classes that were online or offered online sections.

Adjunct faculty **2014-2015**
Tagliatela College of Engineering, University of New Haven
Courses:

- EAS230 Funds and Appls of Analog Devices (Academic Year 2014)
- EE235 Analog circuits (Academic Year 2014)

Tasks:

- Developing syllabus that outlines the course requirements, rationale, goals, and objectives
- Preparing class sessions and assignments to help students grasp course content
- Teaching courses in accordance with defined course standards and outcomes
- Creating a learning environment that encourages student involvement and participation
- Documenting students' attendance, participation, and academic progress by giving and grading assignments, projects, quizzes and/or examinations that lead to a final grade.

Co-Instructor **2016-2017**
Department of Electrical & Computer Engineering, University of New Mexico
Courses:

- ECE440 Introduction to computer networks
- ECE439 Discrete Image Processing

Tasks:

- Designing the course
- Preparing and delivering the course materials and lectures.
- Grading assignments, exam.

Graduate Teaching Assistant **2013-2016**
Department of Electrical & Computer Engineering, University of New Mexico
Courses:

- ECE360 Electromagnetic Fields and Waves (Fall 2013)
- ECE460 Introduction to Microwave Engineering (Spring 2014)
- ECE238L Digital Logic Design (Fall 2015 and Spring 2016)

Tasks:

- Grading Assignments, exams, and students' discussions
- Helping students with their assignments
- Helping instructors to develop the course

Teaching Training
OILS 583 : Graduate Teaching I (Spring 2016)

- Graduate level course that introduces novel teaching methods to graduate students at UNM and also review various instructional methods, assessment strategies, and pedagogical theories pertinent to teaching in higher education.

PUBLICATIONS

Peer-Reviewed Journal Articles (Published/Accepted)

[1] A. R. Nafchi, S. T. Goh and S. A. R. Zekavat, "Circular Arrays and Inertial Measurement Unit for DOA/TOA/TDOA-Based Endoscopy Capsule Localization: Performance and Complexity Investigation," in IEEE Sensors Journal, vol. 14, no. 11, pp. 3791-3799, Nov. 2014.

Peer-Reviewed Journal Articles (Under Preparation)

[1] A. R. Nafchi, B. Santhanam, R. Jordan. "On the capacity of fractional OFDM systems," unpublished manuscript 2017.

[2] A. R. Nafchi, Balu Santhanam, Ramiro Jordan. "New architecture design of multicarrier modulation system based on discrete fractional Fourier transform," unpublished manuscript 2017.

[3] A. R. Nafchi, Balu Santhanam, Ramiro Jordan. "On the visible light communication subband coding," unpublished manuscript 2017.

[4] A. R. Nafchi, Francisco Estevez, Balu Santhanam, Ramiro Jordan. "Analysis of DFRFT in Software Defined Radio" unpublished manuscript 2017.

[5] A. R. Nafchi, Francisco Estevez,N. Kemp, W. Forristier, Balu Santhanam, Ramiro Jordan. "Fractional multicarrier modulation design for visible light communication systems" unpublished manuscript 2017.

Peer-Reviewed Conference Preceedings

[1] Amir Raeisi Nafchi. On the compactness of Gauss-Hermite polynomials and their application in fractional OFDM systems. In 2018 52nd Annual Conference on Information Sciences and Systems (CISS) (CISS 2018), Princeton, USA, March 2018.

[2] A. R. Nafchi, R. Jordan amd B. Santhanam "Bit Error Rate {(BER)} Analysis of Discrete Fractional Fourier Transform {(DFrFT)} based Systems"," IEEE 8th Annual Ubiquitous Computing, Electronics and Mobile Communication Conference (UEMCON) (IEEE UEMCON 2017), New York, NY, 2017.

[3] A. R. Nafchi, S. T. Goh and S. A. R. Zekavat, "High performance DOA/TOA-based Endoscopy Capsule localization and tracking via 2D circular arrays and inertial measurement unit," IEEE International Conference on Wireless for Space and Extreme Environments, Baltimore, MD, 2013, pp. 1-6.

MENTORING EXPERIENCE

- **Graduate:**
  Department of Electrical & Computer Engineering, University of New Mexico (May 2017-July 2018)
  Thesis topics:. *Thesis Title: "Implementation of Discrete Fractional Fourier Transform on Labview and FPGA".*
  Tasks:
  - Defining the research problems.
  - Teaching the student on how to perform research including efficient paper reading, literature review, critical thinking and etc.
  - Assigning research tasks.
  - Conducting regular research meetings with the student.
  - Writing reports on the progress of the research
  - Monitoring performance of student and preparing progress reports
  - Writing papers to publish in peer reviewed journals.
  - Mentored two undergraduate senior design projects in electrical engineering at the university of New Mexico.

- **Undergraduate:**
  Department of Electrical & Computer Engineering, University of New Mexico (Sept 2017-July 2018)
  Senior Design Project:." *Analysis of Visible Light Communication over different Modulation schemes ".*
  Tasks:
  - Mentoring two undergraduate students for their senior design projects.
  - Defining the research problems.
  - Teaching the student on how to perform research including efficient paper reading, literature review, critical thinking and etc.
  - Assigning research tasks.
  - Conducting regular research meetings with the student.
  - Writing reports on the progress of the research
  - Monitoring performance of student and preparing progress reports
  - Writing papers to publish in peer reviewed journals.

HONORS AND AWARDS

- IEEE Eta Kappa Nu (**IEEE-HKN**) honorary society member since 2011
- Nominated to receive **best graduate student award** of electrical and computer engineering department at the university of New Mexico, anticipated award date May 2018.
- Nominated to receive **best graduate student of school of engineering** award at the University of New Mexico, anticipated award date May 2018.
- Nominated to receive **IEEE outstanding graduate student** award, anticipated award date May 2018.
- Recipient of silver medal for **Iranian national computer networks Olympiad**, award date May 2003.

MEMBERSHIPS AND PROFESSIONAL ACTIVITIES

Chair and Founder (2017-Present)	IEEE Signal Processing Society Chapter, Albuquerque Section
Member (2008 - Present)	IEEE
Member (2011 - Present)	IEEE-HKN Etta Kappa Nu Honor Society
Member (2012 - Present)	IEEE SPS, COMSOC Societies

PAPER REVIEW EXPERIENCE

- Reviewer for Signal Processing Letters (IEEE)
- Reviewer for Journal of Sensors (IEEE)
- Reviewer for IET Image Processing (IEEE)
- Reviewer for IET Microwave, Antennas & Propagation (IEEE)
- Reviewer for International Journal of Wireless Information Networks (Springer)
- Reviewer for IET Electronic Letters (IEEE)
- Reviewer for IET Signal Processing (IEEE)

PROGRAMMING PROFICIENCIES

Matlab	C/C++	Verilog/VHDL
Python	LabView	TensorFlow

SELECTED COURSE WORKS

Quantum Information Theory	Grade: A	Carlton Caves
Measure Theory	Grade: A+	Professor Matthew Blair
Detection and Estimation Theory	Grade: A	Professor Majeed Hayat
Statistical Inferences	Grade: A	Professor Gabriel Huerta
Advanced Machine Learning	Grade: A+	Professor Manel Martinez-Ramon