

SEIFALLAH JARDAK

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EDUCATION

2014 - 2018, Ph.D. in Electrical Engineering (Major: Communications),
King Abdullah University of Science and Technology (KAUST), Thuwal, KSA
Expected graduation date: August 2018

2012 - 2014, M.Sc. in Electrical Engineering (Major: Communications), GPA: 4/4
King Abdullah University of Science and Technology (KAUST), Thuwal, KSA

2009 - 2012, Diplôme d'Ingénieur in Signals and Systems, Grade: 14.3/20, Rank: 3/52
Tunisia Polytechnic School (EPT), Tunis, Tunisia

2007 - 2009, Diploma of General University Studies, Grade: 14.46/20, Rank: 1/28
Preparatory Engineering Institute of Tunis (IPEIT), Tunis, Tunisia
Success at the Tunisian National Exam for Entrance to Engineering Schools (Rank : 28/1500)

RESEARCH INTERESTS

- Signal processing for radar applications.
- Array signal processing and beamforming.
- Detection and estimation algorithms.
- Iterative and genetic numerical optimization algorithms.
- Hardware system design and implementation.

PROFESSIONAL EXPERIENCE

RESEARCH EXPERIENCE

- Assessed the detection and tracking performance of a portable low-cost 24 GHz FMCW radar designed by VTT, Finland and programmed entirely by myself.
- Applied the monopulse approach for the passive array radar setting to estimate the direction of arrival of two targets located in the half space.
- Investigated the performance of a green mobile operator collaborating with other non-green mobile operators. Its goal is to achieve a tradeoff between its CO₂ emissions and its profit by offloading its users to neighbor networks and exploiting renewable energies. The problem is modeled as a two-level Stackelberg game and its equilibrium is derived.
- Proposed a computationally efficient method to estimate the reflection coefficient, the direction of arrival and the Doppler shift of a moving target for colocated MIMO radars using 2-D Fast Fourier Transforms. Derived a closed form solution of the Cramér-Rao lower bound to assess the performance of our estimates.
- Introduced a new non-iterative method to jointly solve the problem of beampattern and waveform design for MIMO radar applications. Developed a general method to map Gaussian random variables onto modulated Finite Alphabet Constant Envelope signals and derived the relationship between the cross correlation of Gaussian and Finite Alphabet random variables.

INTERNSHIPS

Visiting Researcher

Nov. 2015 - Apr. 2016

VTT Technical Research Centre, Finland

- Designed and developed a C code to command a hand held battery powered FMCW radar based on the Infineon BGT24MTR12 chip and the Max32 micro-controller board.
- Developed a Python code to visualize the output of the radar unit and use it for applications such as range estimation, range-direction scanning and velocity estimation using the slow time processing technique.

International Summer School on Radar/SAR

10 - 17 July 2015

Haus Humboldtstein Rolandseck, Germany

- Participated in the 7th international summer school on Radar/SAR organized by the Fraunhofer Institute for High Frequency Physics and Radar Techniques (FHR).
- Participated in the workshop entitled "Advanced SAR Imaging Techniques".

Graduation Project

Feb. 2012 - Jun. 2012

King Abdullah University of Science and Technology (KAUST), KSA

- Studied different aspects of MIMO radar technology: detection, beamforming, and waveform design.
- Developed a new algorithm to generate QPSK waveforms with given cross-correlation properties.

Engineering Internship

Jun. 2011 - Aug. 2011

CodinTek, Tunisia

- Emulated and verified a VHDL code of a Forward Error Correction module based on Turbo Codes for a Power Line Communication device.

MENTORING and TEACHING EXPERIENCE**Instructor**

Jan. 2014

King Abdullah University of Science and Technology (KAUST), KSA

- Conducted a one week workshop on how to build a simple Radar to detect the speed and the range of a target. 14 graduate students from different majors registered for the event.

Teaching Assistant

Fall 2013, Fall 2014, Fall 2017

King Abdullah University of Science and Technology (KAUST), KSA

- Prepared and gave multiple recitation sessions in the following courses: Probability and Statistics, Numerical Optimization and Linear Algebra. The problem solving sessions are attended by 15 graduate students. Also, graded the homework assignments and exams for the above mentioned classes.

Instructor

Nov. 2013

King Abdullah University of Science and Technology (KAUST), KSA

- Introduced the cross-platform library Open Computer Vision (OpenCV) to 12 graduate students as part of the IEEE & IET workshop week. Through several examples, different basic and moderately advanced notions were covered.

SELECTED PROJECTS**Taqadam - SenViz**

Dec. 2016

King Abdullah University of Science and Technology (KAUST), KSA

- Participated in the first version of the university accelerator program "Taqadam" and launched my start-up SenViz (SenViz.com). SenViz is a wearable navigation and collision avoidance device that helps the visually impaired enjoy their outdoor journeys.

TuniRobots 2011

Apr. 2011

Tunisia Polytechnic School(EPT), Tunisia

- Participated in the second edition of the TuniRobots competition. With a team of 4 members, we built an obstacle avoiding robot using ultrasound sensors.

RoboCOMP 2010

Apr. 2010

Tunisia Polytechnic School(EPT), Tunisia

- Participated in the first edition of the International Robotics Competition. Designed a line follower robot using infrared sensors (Prize: Best Home Made robot).

HONORS and AWARDS

- 2017, Participation in the Dubai Global Grad Show event.
- 2016, Earned a Taqadam grant to develop our Senviz start up.
- 2014, Earned a Fellowship for PhD studies in King Abdullah University of Science and Technology.
- 2012, Earned a Fellowship for Master's degree in King Abdullah University of Science and Technology.
- 2012, Best graduation project award at Ecole Polytechnique de Tunisie.
- 2012, Excellency Fellowship at Ecole Polytechnique de Tunisie.
- 2008-2009, Excellency Award at Institut Preparatoire aux Etudes d'Ingenieurs de Tunis.

TECHNICAL SKILLS

Computer Skills

- Operating Systems: Linux, Windows
- Programming Languages: Bash, C, C++, Python, Java, Android, Assembly, VHDL

Engineering Softwares

- Computing: Matlab, Mathematica, Maple, Octave, Python
- Simulation: NI LabView, Proteus Isis, Eagle, Altium, Protel, Xilinx, HFSS
- IDE: MPLab, MicroC, Xilinx
- 3D Design: Blender, AutoCad

LANGUAGES

English: Very good level
French: Very good level
German: Beginner level
Arabic: Native language

EXTRACURRICULAR ACTIVITIES

- President of Improvisational Theatre Club at KAUST (2014) (12 members)
- Vice president of RoboCEPT (2010) : the club of robotics at EPT (25 members)
- Administrator of InfoCEPT (2010) : the computer science club at EPT (20 members)
- RoboCOMP2010: Participated with a line follower robot (Prize: Best Home Made robot)
- TuniRobots2011: Participated with an obstacle avoiding robot
- EPT Virtual Tour: Designed EPT in 3D using Blender (<http://vimeo.com/19536314>)

REFERENCES

Prof. Mohamed-Slim Alouini Professor, Electrical Engineering King Abdullah University of Science and Technology Office: +966 1 2808-0283 E-mail: Slim.Alouini@kaust.edu.sa	Dr. Sajid Ahmed Associate Professor, Electrical Engineering Information Technology University Office: +92 42 35880062 E-mail: Sajid.Ahmed@itu.edu.pk
Prof. Ahmed Kamal Sultan Salem Visiting Assistant Professor, Electrical Engineering King Abdullah University of Science and Technology E-mail: Salatino@alumni.stanford.edu	Dr. Tero Kiuru Senior Scientist VTT Technical Research Centre of Finland E-mail: Tero.Kiuru@vtt.fi

PUBLICATIONS

Journals:

- [J4] S. Jardak, S. Ahmed, T. Kiuru, *et al.* "Compact mmWave FMCW radar: implementation and performance analysis," *IEEE Aerospace and Electronic Systems Magazine*, Aug. 2018.
- [J3] S. Jardak, S. Ahmed and, M.-S. Alouini, "Low Complexity Parameter Estimation For Off-The-Grid Targets using Capon and APES beamformers," *IEEE Transactions on Signal Processing*, Jun. 2017.
- [J2] S. Jardak, S. Ahmed and, M.-S. Alouini, "Generalized two target localization using passive monopulse radar," *Special Issue of IET Radar, Sonar & Navigation*, Sept. 2016.
- [J1] S. Jardak, S. Ahmed and, M.-S. Alouini, "Generation of correlated finite alphabet waveforms using Gaussian random variables," *IEEE Transactions on Signal Processing*, Sept. 2014.

Patents:

- [P2] S. Ahmed, M.-S. Alouini, and S. Jardak, "Navigation and collision avoidance for visually impaired people," submitted in June, 2017.
- [P1] S. Ahmed, M.-S. Alouini, and S. Jardak, "Generation of correlated finite alphabet waveforms using Gaussian random variables," *U.S. Patent No: 20,160,013,819*, Jan 14, 2016.

Conferences:

- [C10] S. Jardak, S. Ahmed and, M. -S. Alouini, "Generation of correlated PSK waveforms using complex Gaussian random variables," *2018 IEEE Global Conference on Signal and Information Processing*, Anaheim, USA, Nov. 2018.
- [C9] S. Ahmed, S. Jardak and, M. -S. Alouini, "Closed-form solution to directly design frequency modulated waveforms for beam patterns," *IEEE Global Conference on Signal and Information Processing*, Montreal, Canada, Nov. 2017.
- [C8] T. Kiuru, M. Metso, S. Jardak, *et al.* "Movement and respiration detection using statistical properties of the FMCW radar signal," *2016 Global Symposium on Millimeter Waves (GSMM)*, Espoo, Finland, June, 2016.
- [C7] S. Jardak, T. Kiuru, M. Metso, *et al.* "Detection and localization of multiple short range targets using FMCW radar signal," *2016 Global Symposium on Millimeter Waves (GSMM)*, Espoo, Finland, June, 2016.
- [C6] S. Ahmed, S. Jardak and, M. -S. Alouini, "Low complexity algorithms to independently and jointly estimate the location and range of targets using FMCW", *IEEE Global Conference on Signal and Information Processing*, Greater Washington, D.C., USA, Nov. 2016.
- [C5] S. Jardak, S. Ahmed, and, M. -S. Alouini, "Angle estimation of two targets using monopulse technique for passive radar," *IEEE Radar Conference*, Johannesburg, South Africa, Oct. 2015.
- [C4] S. Jardak, S. Ahmed and, M.-S. Alouini, "Low complexity parameter estimation for off-the-grid targets," *Sensor Signal Processing for Defence (SSPD)*, Edinburgh, UK, Sep. 2015.
- [C3] H. Ghazzai, S. Jardak, E. Yaacoub, H.-C. Yang and, M.-S. Alouini, "A Game Theoretical Approach for Cooperative Green Mobile Operators under Roaming Price Consideration," *IEEE International Conference on Communications (ICC)*, London, UK, June 2015.
- [C2] S. Jardak, S. Ahmed and, M.-S. Alouini, "Low complexity joint estimation of reflection coefficient, spatial location, and Doppler shift for MIMO-radar by exploiting 2D-FFT," *International Radar Conference*, Lille, France, Oct. 2014.
- [C1] S. Jardak, S. Ahmed and, M.-S. Alouini, "Generating correlated QPSK waveforms by exploiting real Gaussian random variables," *Asilomar Conference on Signals, Systems and Computers (ASILOMAR)*, Nov. 2012.