FABRIZIO SANTI

CURRICULUM VITAE

ACADEMIC EMPLOYMENT

2014 – present days

Postdoctoral Researcher with the Department of Information Engineering, Electronics and Telecommunications, Sapienza University of Rome.

Research contracts:

Dec. 2019 – present days
Passive radar techniques for surveillance applications based on satellite illuminators of opportunity (*Assegno di ricerca*)

Aug. 2019 – Nov. 2019
Passive radar techniques for surveillance applications based on satellite illuminators of opportunity (*Incarico di lavoro autonomo*)

Aug. 2018 – July 2019
Parasitic concepts definition and analysis based on a Geo illuminator (*Assegno di ricerca*)

Feb. 2018 – July 2018
Bistatic radar detection and imaging exploiting satellite illuminators (*Borsa di studio*)

Dec. 2015 – Jan. 2016
Study and development of signal processing techniques for space-based passive radar systems (*Incarico di prestazione occasionale*)

Feb. 2014 – Jan. 2018
Study and development of focusing and processing techniques for active and passive multi-dimensional radar images (*Assegno di ricerca*)

EDUCATION

November 2010 – June 2014
PhD in Radar and Remote Sensing
Department of Information Engineering, Electronics and Telecommunications, Sapienza University of Rome, Italy
Dissertation: Active and passive multi-sensor radar imaging techniques exploiting spatial diversity
Advisor: Dr. Debora Pastina

April 2013 – September 2013
Visiting Research Student at the Microwave and Integrated Systems Laboratory, University of Birmingham (UK), headed by Prof. Mike Cherniakov.

8 – 15 July 2011
Attendance at the 3rd International Summer School on Radar/SAR, Wachtberg, Germany, organized by the Fraunhofer Institute for High Frequency Physics and Radar Techniques FHR.

2008 – 2010
Master's degree in Communication Engineering
Sapienza University of Rome, Italy
Final mark: 110 cum laude / 110
Dissertation: Oil spill detection using a X-band VTS radar
Advisor: Prof. Pierfrancesco Lombardo

2004 – 2007
Bachelor's degree in Communication Engineering
Sapienza University of Rome, Italy
Final mark: 108 / 110
Dissertation: Sensors based on relaxation oscillators
Advisor: Prof. Sergio Barbarossa

RESEARCH ACTIVITY

The main research interests of Fabrizio Santi are in the field of radar systems. Current research topics include:
- Monostatic and multistatic synthetic aperture radar (SAR)/ISAR systems and techniques
- Passive radar imagery using satellite illuminators
- GNSS-based passive radar for maritime surveillance
- Parasitic systems exploiting radar illuminators

PARTICIPATION IN RESEARCH PROJECTS

June 2018 – present days
GEO-SAR – Feasibility study for the development of a geosynchronous satellite for Earth Observation. Project funded by Italian Space Agency

January 2018 – September 2019
Apollo – Passive radar based on GNSS illuminators for maritime surveillance. POR FESR Lazio 2014-2020

July 2017 – June 2018
Study and development of ship target detection techniques with a passive multistatic radar based on navigation satellites. Sapienza Research Calls 2017 - Initial research project.

January 2015 – December 2017
SpyGLASS – Galileo-based passive radar system for maritime surveillance. Horizon 2020 research programme.

November 2010 – December 2011
Study on Distributed ISAR techniques. Project funded by Leonardo S.p.a. (formerly Galileo Avionica)

PROFESSIONAL ACTIVITIES

EDITORIAL ACTIVITY

May 2020 – present days
Topic Editor of the journal Remote Sensing (MDPI)

February 2020 – present days
Guest Editor for the Special Issue 'Recent Advances on Radar and Remote Sensing using Satellite Signals of Opportunity' – Remote Sensing (MDPI)

October 2019 – present days
Member of the Editorial Board of the International Journal of Electronics and Communications (AEÜ, Elsevier)

December 2012 – present days
Routinely reviewer for a number of international technical journals in the area of radar remote sensing and signal processing.

CONFERENCES AND WORKSHOPS

Member of the Organizing Committee of the 3rd Italian Workshop on Radar and Remote Sensing, Rome, 30-31 May 2019

Member of the Technical Review Committee of the IEEE Radar Conference 2020, IEEE Radar Conference 2019 and European Signal Processing Conference 2018.

Presenting author to more than 20 national and international conferences and workshops.

TEACHING EXPERIENCE

2019-2020
Lecturer for the courses 'Communication Engineering' and 'Radar and Earth Observation' - Master in Satellite Systems and Services (Sapienza University of Rome).

2014 – present days
Co-supervisor of PhD students in Information and Communication Technologies and Visiting Phd students.

2013 – present days
Co-supervisor for a number of master's thesis in Communication Engineering and Space and Astronautic Engineering

2011 – present days
Seminars and lessons in the courses: 'Radar imaging' (Communication Engineering, Electronic Engineering, Space and Astronautic Engineering - Master Degree Program), 'Radar and Remote Sensing Laboratory' (Communication Engineering – Master Degree Program) and 'Radar Systems' (Communication Engineering – Master Degree Program).

- Co-author of the Second Best Student Paper awarded at the 2018 European Synthetic Aperture Radar Conference (Aachen, Germany, June 2018): "Ship targets feature extraction with GNSS-based passive radar via ISAR approaches: preliminary experimental study", by F. Pieralice, F. Santi, D. Pastina, M. Antoniou, M. Cherniakov.
- Best Italian Thesis on Remote Sensing Award from the IEEE Geoscience and Remote Sensing South Italy Chapter, 2010.

ANNEXES   Scientific publications

Roma, 28.09.2020   Fabrizio Santi

Scientific publications

Publications in international journals

[J12] D. Pastina, <u>F. Santi</u>, F. Pieralice, M. Antoniou, M. Cherniakov, "Passive radar imaging of ship targets with GNSS signals of opportunity", IEEE Transactions on Geoscience and Remote Sensing, *in press.*

[J11] <u>F. Santi</u>, D. Pastina, M. Bucciarelli, "Experimental Demonstration of Ship Target Detection in GNSS-Based Passive Radar Combining Target Motion Compensation and Track-before-Detect Strategies", Sensors 2020, 20(3), 599.

[J10] <u>F. Santi</u>, F. Pieralice, D. Pastina, "Joint Detection and Localization of Vessels at Sea With a GNSS-Based Multistatic Radar," IEEE Transactions on Geoscience and Remote Sensing, vol. 57, no. 8, pp. 5894-5913, Aug. 2019.

[J9] D. Pastina, <u>F. Santi</u>, F. Pieralice, M. Bucciarelli, H. Ma, D. Tzagkas, M. Antoniou, M. Cherniakov, "Maritime Moving Target Long Time Integration for GNSS-Based Passive Bistatic Radar", IEEE Transactions on Aerospace and Electronic Systems, vol. 54, no. 6, pp. 3060-3083, Dec. 2018.

[J8] H. Ma, M. Antoniou, D. Pastina, <u>F. Santi</u>, F. Pieralice, M. Bucciarelli, M. Cherniakov, "Maritime Moving Target Indication Using Passive GNSS-Based Bistatic Radar", IEEE Transactions on Aerospace and Electronic Systems, vol. 54, no. 1, pp. 115-130, Feb. 2018.

[J7] Z. Li, <u>F. Santi</u>, D. Pastina, P. Lombardo, "Passive Radar Array with Low-Power Satellite Illuminators Based on Fractional Fourier Transform", IEEE Sensors Journal, vol. 17, no. 24, pp. 8378-8394, Dec. 2017

[J6] <u>F. Santi</u>, D. Pastina, M. Bucciarelli, "Estimation of ship dynamics with a multiplatform radar imaging system," IEEE Transactions on Aerospace and Electronic Systems, vol. 53, no. 6, pp. 2769-2788, Dec. 2017.

[J5] Z. Li, <u>F. Santi</u>, D. Pastina, P. Lombardo, "Multi-frame fractional Fourier transform technique for moving target detection with space-based passive radar", IET, Radar, Sonar & Navigation, vol. 11, no. 5, pp. 822-828, May 2017.

[J4] <u>F. Santi</u>, M. Bucciarelli, D. Pastina, M. Antoniou, M. Cherniakov, "Spatial resolution improvement in GNSS-based SAR using multistatic acquisitions and feature extraction", IEEE Transactions on Geoscience and Remote Sensing, vol. 54, no. 10, pp. 6217-6231, Oct. 2016.

[J3] <u>F. Santi</u>, D. Pastina, "A parasitic array receiver for ISAR imaging of ship targets using a coastal radar", Hindawi International Journal of Antennas and Propagation, Volume 2016 (2016), Article ID 8485305.

[J2] <u>F. Santi</u>, M. Antoniou, D. Pastina, "Point Spread Function Analysis for GNSS-Based Multistatic SAR", IEEE Geoscience and Remote Sensing Letters, vol. 12, no. 2, pp. 304-308, Feb. 2015.

[J1] D. Pastina, <u>F. Santi</u>, M. Bucciarelli, "MIMO Distributed Imaging of Rotating Targets for Improved 2-D Resolution", IEEE Geoscience and Remote Sensing Letters, vol. 12, no. 1, pp. 190-194, Jan. 2015.

Under review

[Js1] I. Pisciottano, <u>F. Santi</u>, D. Pastina, D. Cristallini, "DVB-S based passive polarimetric ISAR – methods and experimental validation", submitted to IEEE Jensors Journal.

Publications in international conference proceedings

[C23] <u>F. Santi</u>, D. Pastina, M. Antoniou, M. Cherniakov, "GNSS-based multistatic passive radar imaging of ship targets," IEEE RadarConf 2020.

[C22] I. Pisciottano, D. Cristallini, D. Pastina, <u>F. Santi</u>, "Experimental Results of Polarimetric Passive ISAR Exploiting DVB-S2 Illumination", IEEE RadarConf 2020.

[C21] <u>F. Santi</u>, F. Pieralice, D. Pastina, M. Antoniou, M. Cherniakov, "Passive radar imagery of ship targets by using navigation satellites transmitters of opportunity," International Radar Symposium IRS 2019, Ulm, Germany, 26-28 June 2019.

[C20] <u>F. Santi</u>, D. Pastina, "Application of track-before-detect techniques in GNSS-bases passive radar for maritime surveillance," IEEE Radar Conference 2019, Boston, Massachusetts (USA), 22-26 April 2019.

[C19] F. Pieralice, <u>F. Santi</u>, D. Pastina, M. Antoniou, M. Cherniakov, "Ship targets feature extraction with GNSS-based passive radar via ISAR approaches: preliminary experimental study", EUSAR 2018, Aachen, Germany, 4-7 June 2018.

[C18] <u>F. Santi</u>, F. Pieralice, D. Pastina, "Multistatic GNSS-based passive radar for maritime surveillance with long integration times: experimental results", 2018 IEEE Radar Conference, Oklahoma City, OK, USA, 23-27 Apr. 2018.

[C17] F. Pieralice, D. Pastina, <u>F. Santi</u>, M. Bucciarelli, "Multi-transmitters ship target detection with GNSS-based passive radar", Radar 2017, International Conference on Radar Systems, Belfast (UK), 23-26 Oct. 2017.

[C16] <u>F. Santi</u>, D. Pastina, M. Bucciarelli, "Maritime moving target detection technique for passive bistatic radar with GNSS transmitters", IRS 2017, 18th International Radar Symposium, Prague (CZ), 28-30 June 2017.

[C15] F. Pieralice, <u>F. Santi</u>, D. Pastina, M. Bucciarelli, H. Ma, M. Antoniou, M. Cherniakov, "GNSS-based passive radar for maritime surveillance: Long integration time MTI technique", 2017 IEEE Radar Conference, Seattle, WA, USA, 8-12 May 2017.

[C14] H. Ma, M. Antoniou, M. Cherniakov, D. Pastina, <u>F. Santi</u>, F. Pieralice, M. Bucciarelli, "Maritime target detection using GNSS-based

radar: Experimental proof of concept", 2017 IEEE Radar Conference, Seattle, WA, USA, 8-12 May 2017.

[C13]	Z. Li, F. Santi, D. Pastina, P. Lombardo, "Satellite-based PCL for moving target detection using Keystone transform and FrFT", RADAR 2016 - CIE International Conference on Radar, Guangzhou, China, 10-13 October 2016.

[C12]	F. Santi, M. Bucciarelli, D. Pastina, M. Antoniou, M. Cherniakov, "Passive multi-perspective GNSS-based SAR using CLEAN technique: an experimental study", EUSAR 2016, Hamburg, Germany, 6-9 June 2016.

[C11]	F. Santi, M. Bucciarelli, D. Pastina, M. Antoniou, M. Cherniakov, "Passive multistatic SAR with GNSS transmitters and using joint bi/multi-static CLEAN technique", 2016 IEEE Radar Conference, Philadelphia, PA, USA, 2-6 May 2016.

[C10]	F. Santi, M. Bucciarelli, D. Pastina, M. Antoniou, "CLEAN technique for passive bistatic and multistatic SAR with GNSS transmitters", RADAR 2015 - IEEE Radar Conference, Arlington, Virginia (USA), 10-15 May 2015.

[C9]	F. Santi, M. Bucciarelli, D. Pastina, "Multi-sensor ISAR technique for feature-based motion estimation of ship targets", RADAR'14, International Radar Conference 2014, Lille, France, 13-17 Oct. 2014.

[C8]	F. Santi, M. Antoniou, D. Pastina, D. Tzagkas, M. Bucciarelli, M. Cherniakov, "Passive multi-static SAR with GNSS transmitters: preliminary experimental study", EuRAD 2014, Rome, Italy, 8-10 Oct. 2014.

[C7]	F. Santi, M. Antoniou, D. Pastina, D. Tzagkas, M. Bucciarelli, M. Cherniakov, "Passive multi-static SAR with GNSS transmitters: first theoretical and experimental results with point targets", EUSAR 2014, Berlin, Germany, 2-5 June 2014.

[C6]	F. Santi, D. Pastina, P. Lombardo, "ISAR while-scan mode for coastal surveillance", RADAR 2014 - IEEE Radar Conference, Cincinnati, Ohio (USA), 19-23 May 2014.

[C5]	F. Santi, D. Pastina, M. Bucciarelli, "Multi-sensor ISAR techniques for motion estimation of pitching, rolling and yawing targets", RADAR 2013 - IEEE Radar Conference, Ottawa, Ontario, Canada, 29 April - 3 May 2013.

[C4]	F. Santi, M. Bucciarelli, D. Pastina, "Target rotation motion estimation from distributed ISAR data", RADAR 2012 - IEEE Radar Conference, Atlanta, Georgia (USA), 7-11 May 2012.

[C3]	D. Pastina, F. Santi, M. Bucciarelli, P. Lombardo, "2D-MIMO SAR/ISAR imaging of moving targets with reconfigurable formation of platforms", EUSAR 2012, Nuremberg, Germany, 23-26 April 2012.

[C2]	D. Pastina, F. Santi, M. Bucciarelli, "Multi-angle distributed ISAR with stepped-frequency waveforms for surveillance and recognition", RADAR 2011 - CIE International Conference on Radar, Chengdu, China, 24-27 October 2011.

[C1]	F. Santi, P. Lombardo, D. Pastina, "Oil spill detection using a coastal high-resolution radar", RADAR 2011 - IEEE Radar Conference, Kansas City, Missouri (USA), 23-27 May 2011.

Accepted abstracts

[Cs1]	F. Santi, I. Pisciottano, D. Cristallini, D. Pastina, "Preliminary investigations toward multi-frame DVB-S based passive ISAR", 2020 European Synthetic Aperture Radar Conference, to be held in Leipzig, Germany, April 2021 (accepted for lecture presentation).

Speeches at national and international conferences and workshops

[W7]	F. Santi, F. Pieralice, D. Pastina, " Detection localization and imaging of vessels at sea with a GNSS-based passive radar," 3rd Italian Radar and Remote Sensing Workshop, Rome, Italy, 30-31 May 2019.

[W6]	F. Santi, F. Pieralice, D. Pastina, "Passive multistatic imaging exploiting GNSS transmitters", IEEE GNSS+R 2019 Specialist Meeting on Reflectometry using GNSS and other Signals of Opportunity, Benevento, Italy, 20-22 May 2019.

[W5]	F. Santi, F. Pieralice, D. Pastina, " Ship target detection and localization with a GNSS-based passive radar using long integration times and multistatic acquisitions," 7th PCL Focus Day, Wachtberg (Germany), 7-8 May 2019.

[W4]	F. Santi, F. Pieralice, D. Pastina, "Multistatic GNSS-based passive radar for maritime surveillance", 2nd Italian Radar and Remote Sensing Workshop, Pavia, Italy, 28-29 May 2018.

[W3]	F. Pieralice, F. Santi, D. Pastina, M. Bucciarelli, H. Ma, M. Antoniou, M. Cherniakov, "GNSS-Based Passive Radar Detection for Maritime Surveillance", 1st Italian Radar and Remote Sensing Workshop, Naples, Italy, 25-26 May 2017.

[W2]	F. Santi, M. Bucciarelli, D. Pastina, M. Antoniou, D. Tzagkas, M. Cherniakov, "Passive multistatic imaging exploiting GNSS transmitters", 5th PCL Focus Day, Wachtberg (Germany), 28-29 April 2015.

[W1]	F. Santi, M. Bucciarelli, D. Pastina, "2D-MIMO distributed ISAR imaging of rotating targets with improved range and cross-range resolution", IEEE GOLD Remote Sensing Conference, Rome, Italy, 4-5 June 2012.

Dissertations

[D1]	F. Santi, "Active and passive multi-sensor radar imaging techniques exploiting spatial diversity", PhD final dissertation, June 2014.

Roma, 28.09.2020