Marco La Manna

Research Interests

Digital signal processing • Hardware prototyping

Education

Michigan Technological University Houghton, MI
PhD, Electrical Engineering 2012 - 2016

Relevant courses: Detection and estimation theory, Optimum array processing, Information theory, Introduction to algorithms

University of Pisa Pisa, Italy
MS, Telecommunications Engineering 2008 - 2011

Relevant courses: Electrical and digital communications, Microwave engineering, Image processing, Antenna theory, Radar theory

University of Pisa Pisa, Italy
BS, Telecommunications Engineering 2005 - 2008

Research Experience

University of Wisconsin - Madison Madison, WI

Postdoctoral research associate Oct. 2016 - Present

Project: Revolutionary enhancement visibility by exploiting active light-fields (funded by DARPA). The goal of the project is to see around corners using ultra-fast optical equipment.

- Designed, implemented (MATLAB) and published an iterative algorithm based on backprojection and algebraic reconstruction techniques
- Assembled and tested a multifunctional hardware prototype for fast and reliable data acquisition
- Programmed and debugged the data acquisition scripts and organized the git repository for the scripts
- Mentored, supervised and collaborated with undergraduate and graduate students in the realization of simulations and experiments
- Assisted in developing a better theoretical mathematical framework for the non-line-of-sight scenario through a collaboration with group members

Michigan Technological University Houghton, MI

Graduate research assistant Feb. 2012 - Aug. 2016

PhD dissertation: Hybrid MIMO phased array radar (HMPAR) receive signal processing (partially funded by the Dave House graduate research fellowship). The goal of the project is to understand how to process the received signal at an HMPAR.

- Conducted literature review on HMPAR
- Derived analytically the Cramer-Rao lower bounds (CRLB) for various HMPAR configurations
- Evaluated the HMPAR CRLB and compared them to the state-of-the-art through MATLAB simulations

Project: An active divide-and-conquer algorithm for sparse support recovery (partially funded by US NSF grant no. EECS-0925881).

- Conducted literature review on compressed sensing
- Analyzed and implemented a novel algorithm for sparse support recovery, based on a divide-and-conquer approach

Michigan Technological University Houghton, MI

Visiting researcher (MS student) Jan. 2011 - Jul. 2011

*MS thesis:*Adaptive sensing in distributed MIMO radars

- Conducted literature review on MIMO radars
- Implemented a novel algorithm for target localization in a 2D discrete space
- Evaluated algorithm performance through MATLAB simulations

University of Pisa Pisa, Italy

MS student Spring 2010

Project: EMvironment final project

- Designed a scenario that included a mobile antenna tower, apartment complex, commercial buildings and open spaces; evaluated the electromagnetic fields inside an apartment produced by a mobile antenna tower

Project: Ansoft Designer final project

- Implemented a GPS antenna described in a research paper provided by instructor
- Verified the performance reported in the paper
- Analyzed antenna performance as parameters were changed

University of Pisa Pisa, Italy

BS student Summer 2008

BS thesis: Convergence time analysis of RIP and OSPF routing protocols in a network of Juniper routers

- Constructed a virtual network of Juniper routers using virtual machines on a laptop
- Analyzed the convergence time of RIP and OSPF routing protocols while simulating network node failures

Skills

Hardware	Electronic test instruments, RF/optical components, Class 4 lasers (pulsed), time-of-flight cameras, stereo-cameras
Scripting/Programming	MATLAB, C/C++, LabVIEW
Computer	*OS:* Windows, Mac, Linux *Software:* Microsoft Word, Excel, Powerpoint, LaTeX

Publications

Journal

- **M. La Manna**, et al., "Error backprojection algorithms for non-line-of-sight imaging", (Early Access) *IEEE Trans. Pattern Anal. Mach. Intell.*, Jun. 2018
- S. A. Reza, **M. La Manna**, A. Velten, "A physical light transport model for non-line-of-sight imaging applications", (online) *Pre-print, arXiv:1802.01823*, Feb. 2018 https://arxiv.org/abs/1802.01823
- **M. La Manna**, D. Fuhrmann, "Cramer-Rao lower bound comparison for 2D Hybrid-MIMO and MIMO radar", *IEEE J. Sel. Topics Signal Proc*., vol. 11, no. 2, Mar. 2017

Conference

- M. Laurenzis, **M. La Manna**, et al., "Advanced active imaging with single photon avalanche diodes", *Proc. SPIE 10799 Security & Defence*, Sep. 2018
- S. A. Reza, **M. La Manna** and A. Velten, "Imaging with phasor fields for non-line-of-sight applications", *Imaging and Applied Optics 2018*, Jun. 2018
- M. La Manna, **M. [Marco] La Manna**, "Cognitive radar waveforms for frequency dense environments", *2017 Radar conf. (RadarConf)*, May 2017
- **M. La Manna**, D. Fuhrmann, "Target location estimation performance evaluation for a 2D hybrid MIMO radar", *2017 Radar conf. (RadarConf)*, May 2017
- M. La Manna, D. Fuhrmann, "Hybrid-MIMO and phased array receive signal processing", *2016 Radar conf. (RadarConf)*, May 2016
- M. La Manna, D. Fuhrmann, "An active divide-and-conquer algorithm for sparse

recovery support: fluctuating target case", *IEEE 3rd Int. Workshop Compressed Sens. Theory Applicat. Radar Sonars Remote Sens.*, Jun. 2015

Communication Skills

- Oral presentation at the *2018 SIAM Conference on Imaging Science* (Bologna, Italy) — Jun. 2018
- Oral presentation at the *2018 SPIE Defense + Commercial Sensing* - Three Dimensional Imaging, Visualization, and Display Conference (Orlando, FL) — Apr. 2018
- Oral presentation at the *2017 SPIE Optics & Photonics* - Wavelets and Sparsity XVII Conference (San Diego, CA) — Aug. 2017
- Oral presentation at the *2017 IEEE Radar Conference* (Seattle, WA) — May 2017
- Oral presentation at the *2016 IEEE Radar Conference* (Philadelphia, PA) — May 2016
- Oral co-presentation at the *2016 Midwestern Association of Graduate Schools (MAGS)*, 72nd annual meeting (Chicago, IL) — Apr. 2016
- Poster presentation at the *CoSeRa Workshop* (Pisa, Italy) — Jun. 2015

Honors & Awards

- 2016 IEEE Radar Conference (RadarConf) student travel grant — May 2016
- Dave House graduate research fellowship — 2014-2016
- Jonathan Bara award for outstanding graduate teaching assistant — Spring 2014
- IEEE Eta Kappa Nu (IEEE Honors Society) — Spring 2015

Leadership Experience

Michigan Technological University

- Vice-President of the Graduate Student Government — 2014-2015
- Public Relations Chair of the Graduate Student Government — 2013-2014
- ECE department representative at the Graduate Student Government — 2012-2013
- Member of teaching assistant stipend review committee — 2012-2013

Teaching Experience

Michigan Technological University Houghton, MI

Graduate teaching assistant 2013 - 2014

Course: Circuits and instrumentation, undergraduate class (20 hours/week)

- Guided and supervised the class (15-20 students) in the creation of physical and simulated electrical circuits in a laboratory environment
- Graded homework and laboratory assignments
- Held weekly office hours

Professional Service

Reviewer

- IEEE Trans. Aerosp. Electron. Sys. (AES), IEEE Radar Conference (RadarConf), Elsevier Signal Processing (DSP)

Affiliations

● IEEE	Member	2013 - Present
● IEEE HKN	Member	2015 - Present
● SPIE	Member	2017 - Present
● OSA	Member	2017 - Present