



UNIVERSITÀ DEGLI STUDI DI NAPOLI
FEDERICO II

itee_{PhD}
information technology
electrical engineering



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UNI
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Massimo Rosamilia

Radar Signal Processing

Tutor: Prof. A. De Maio

Cycle: XXXV

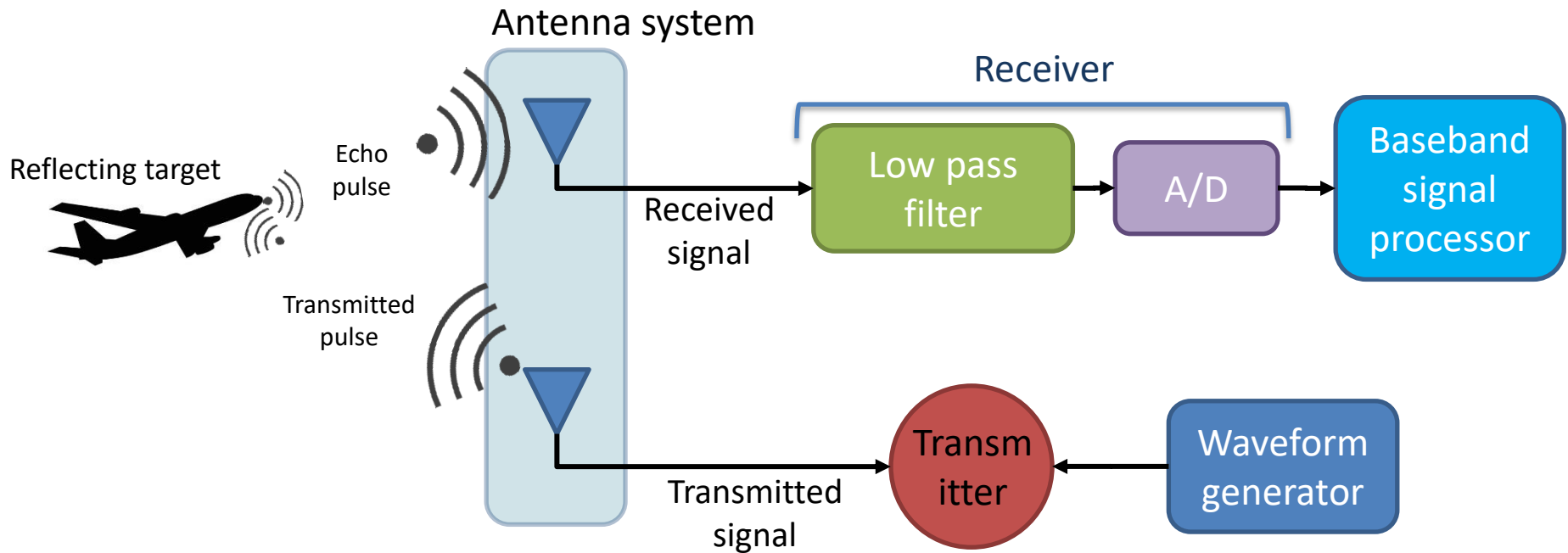
Year: 1

My Background

- **Master Science degree:** Computer Engineering at the University of Salerno
- **Research group/laboratory:** Radar Signal Processing and Electronic Defense Research Group (*RSPRG*)
- **PhD start date:** 01/11/2019
- **Scholarship type:** UNINA

Research Field of Interest

Radar Signal Processing



Block diagram of a simple radar system

Research Field of Interest

Radar Signal Processing

- Detection
- Direction-of-arrival estimation
- Range estimation
- Fault-tolerant algorithm

Summary of study activities

Study activities

- Spectral Analysis of Signals
- Advanced Radar Techniques
- Detection, Estimation, and Modulation Theory
- Convex Optimization Theory

Ad hoc PhD courses / schools

- Intelligenza Artificiale ed Etica: La ricerca in IA alla prova delle sfide etiche
- Deep Learning for Computer Vision: Classification, Segmentation, and Recognition
- Matlab Fundamentals
- Scientific Programming and Visualization with Python
- Innovation management, entrepreneurship and intellectual property
- Virtualization technologies and their applications
- IEEE AESS Radar Summer School
- Strategic Orientation for STEM Research & Writing

Courses attended borrowed from MSc curricula

- Tecniche Di Elaborazione Dei Segnali Per la Bioingegneria

Conferences / events attended

- 2020 IEEE Radar Conference (Florence, Italy), Sept. 2020 (1 paper presented)

Summary of study activities

	Courses	Seminars	Research	Tutorship	Total
Bimonth 1	1.7	0.2	1	0	2.9
Bimonth 2	0	0.2	6	0	6.2
Bimonth 3	4	0.8	7	0	11.8
Bimonth 4	18	5.8	8	0	31.8
Bimonth 5	0	0	6	0	6
Bimonth 6	3.6	2.4	7	0	13
Total	27.3	9.4	35	0	71.7
Expected	20 - 40	5 - 10	10 - 35	0 - 1.6	

Research activity: Overview

- Problem
 - Simultaneous Target Detection And Angle Estimation
- Objective
 - Joint target detection and accurate angular estimation using a single pulse spatial processing
 - Implementable within all the search beams of a multifunction phased array radar
 - Useful in the target confirmation (verification) process

Research activity: Overview

- Intended contribution
 - Design of a signal processing architecture able to perform simultaneous target detection and angle estimation from the array pointing direction
 - Optimal ML estimates of the unknown displacements provided via the Dinkelbach's algorithm or approximated through a Coordinate Descent algorithm
 - Close-to-optimum detection performance and high-quality angular estimates in many scenarios of practical relevance for modern phased array radar

Products

[C1]	M. Rosamilia, A. Aubry, A. De Maio, and S. Marano, “Simultaneous radar detection and constrained target angle estimation via Dinkelbach algorithm,” 2020 IEEE Radar Conference (Florence, Italy), Sept. 2020, RadarConf20. Published, 2020.
[J1]	A. Aubry, A. De Maio, S. Marano, and M. Rosamilia, “Single-Pulse Simultaneous Target Detection and Angle Estimation in a Multichannel Phased Array Radar”, IEEE Transaction on Signal Processing, IEEE TSP. Accepted (AQ).

Thanks!