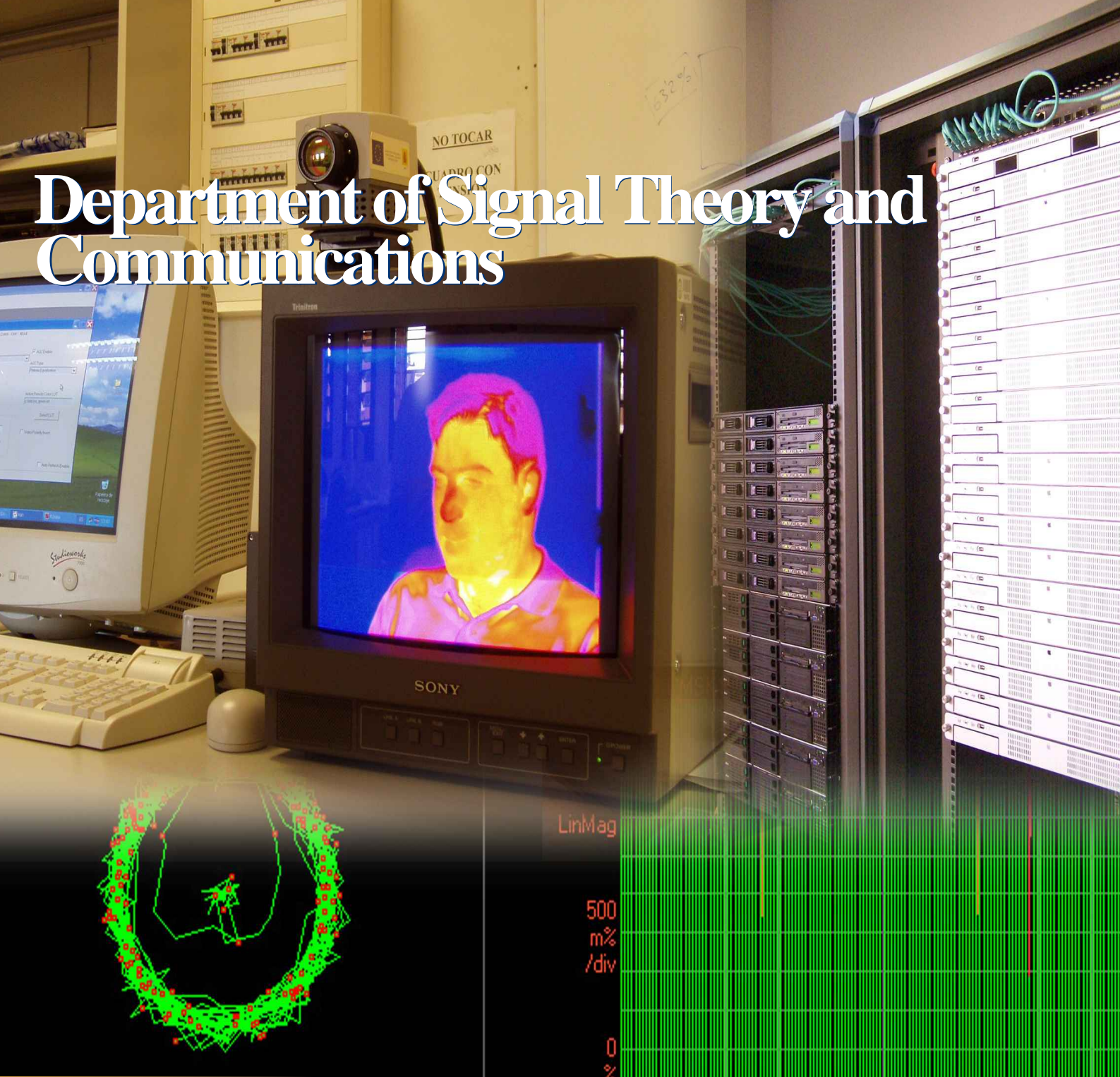
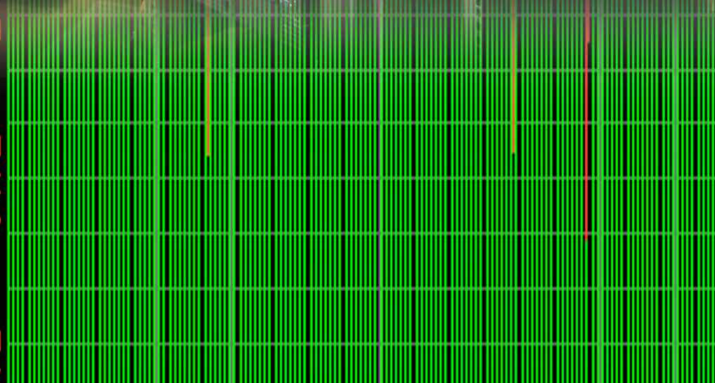


Department of Signal Theory and Communications



LinMag
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m%
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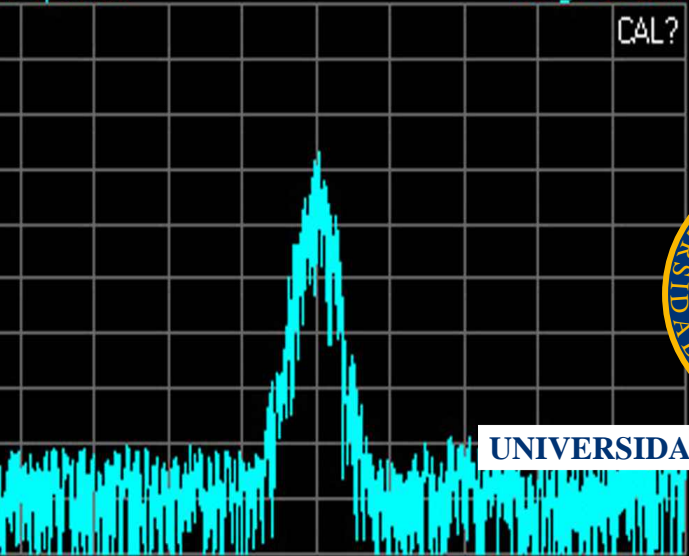
TSC

Ch1 Spectrum

Range: 20 dBm

D: Ch1 MSK1 Syms/Errs

Range: 3.162278



Parameter	Value	Unit	Value	Unit	Value	Unit
EVM	139.75	%rms	216.75	% pk at sym	121	
Mag Err	17.582	%rms	-93.126	% pk at sym	76	
Phase Err	102.60	deg	-179.56	deg pk at sym	91	
Freq. Err	-58.665	kHz				
	-16.205	dB				
	1144	deg	Gain Imb	-0.78	dB	



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Department of Signal Theory and Communications

The **Department of Signal Theory and Communications (TSC)** of the University Carlos III of Madrid is made up of researchers, most of them Ph.D. in Telecommunications Engineering, who combine specialised knowledge on multidisciplinary fields to provide technological solutions within the framework of the information and communication society.

Such a high degree of technological specialisation and knowledge complementarity among the different researchers enables providing **specific solutions** to highly complex problems as well as **comprehensive solutions** combining the various technologies. In this sense, we offer the companies complete and custom-made services through R&D projects, training courses, consultancy, prototype design and technological demonstrations, always with the commitment of providing the most advanced technical solutions that better suit their needs.

We are well recognized and experienced on the leadership of projects both at the national and the European levels, and we maintain exceptional relations with numerous domestic and foreign companies and research centres working on these areas.

READY FOR THE CHANGE

From the beginning of its activity, the TSC Department has provided results of great interest for the ICT sector which are the product of the ideas and work of its members. The research, that focuses on four main themes (Communications, Radiofrequency, Signal and Data Processing, and Multimedia Processing), is carried out by the members of six Research Groups in collaboration, all of them recognized by the University Carlos III of Madrid. The experience and expertise of the groups in the different areas are described below:

• **Communications:**

This group is highly proficient on the analysis, design and evaluation, by means of prototypes, of fixed and mobile communication systems, which allows providing alternatives for optimising the applications and services supported on them. The researchers working on this field make up the Communications Group led by Professor Ana Garcia-Armada. Their main R&D lines are:

- Multiantenna (MIMO) systems for wideband communications
- OFDM multicarrier modulation
- Turbocoding
- Ultra-wideband techniques
- Signal processing for digital communications
- Communication systems simulation and modelling
- Application of the previous techniques to: Wireless Local Area Networks (WLAN), Wireless Metropolitan Area Networks (WMAN), next generation mobile systems (4G) and satellite communication systems.

• **Radiofrequency:**

The main R&D activities deal with multifrequency and wideband printed antennas for planar and conformal antenna arrays, as well as amplifying, oscillating and mixing active antennas. Periodic structures (EBGs, FSS and metamaterials) are used for antenna design and implementation. Passive devices are designed and implemented in planar and waveguide technologies. The researchers working on this field make up the Radiofrequency Group led by Professor Daniel Segovia-Vargas. Their main R&D lines are:

- Antenna arrays
- Stacked and self-diplexed radiators
- New technologies and materials for antenna implementation
- Antenna coupling
- Adaptive or smart antennas and digital beam forming
- Wideband and high performance active antennas
- Numerical methods and signal processing techniques for the analysis and design of passive and radiating electromagnetic structures
- Advanced synthesis methods for the design of filters and multiplexers for satellite communications
- Simulation, design, construction and experimental characterization of microwave circuits and subsystems on hybrid, monolithic and waveguide technologies.

• **Signal and Data Processing:**

Information processing is a key ingredient in many business fields and not only in technological environments. In this respect, we offer efficient designs, not only on the traditional applications of signal processing but also for the exploitation of databases and texts. These advanced techniques are of interest both for companies on the field of Information and Communication Technologies and for companies related to marketing and business, analysis of financial information and economic data, human resources, business intelligence, e-learning, etc. The researchers working on this field make up three research groups recognized by the University:

Group of Information Processing and Management, led by Professor Aníbal R. Figueiras-Vidal.

Their main R&D lines are:

- Neural networks / decision and estimation machines
- Adaptive systems
- Emergent optimisation

And their application to:

- Signal processing
- Communications
- Decision support / data mining
- Text and web mining
- Information recovery and contents management

Group of Signal Processing, led by Professor Antonio Artés-Rodríguez.

Their main R&D lines are:

- Detection and classification of signals and images
- Machine learning for signal and image processing
- Advanced adaptive signal processing techniques
- Information Theory applications.

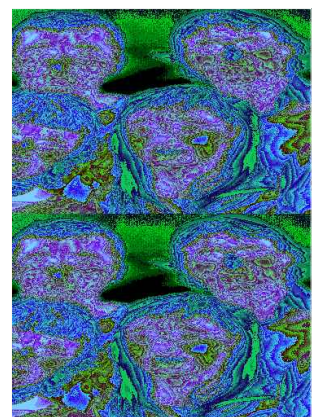
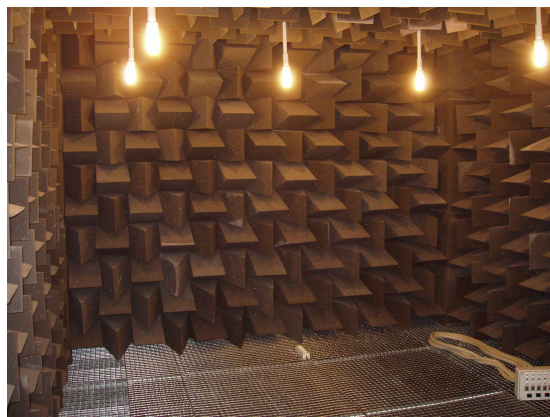
And their application to:

- Communications
- Security
- Health.

Group of Probabilistic Methods for Time Series, led by Professor Francisco J. González-Serrano.

Their main R&D lines are:

- Signal decomposition
- Signal prediction
- Bayesian methods for time series filtering
- Probabilistic methods in communications



• **Multimedia Processing:**

This group actively works on speech, audio, image and video processing techniques, especially on the automatic multimedia content extraction, automatic speech recognition and last-generation video coding. The applications of these techniques are many and varied: voice-enabled interfaces for mobile devices, voice transcription as support to the process of subtitling for the hearing impaired, multicamera video coding for intelligent theatres, video coding for digital TV and multimedia applications for UMTS. The researchers working on this field make up the Multimedia Processing Group led by Professor Fernando Díaz-de-María. Their main R&D lines are:

- Application of the SVMs and the Neural Networks to Speech Recognition, Speaker Verification and Video Coding
- Robust speech recognition
- Voice-enabled interfaces for Mobile Telephones and PDAs
- Multicamera video coding
- H.264/AVC video coding
- Automatic multimedia content extraction for information retrieval.

OUR MEANS

The department has excellent laboratories equipped with advanced systems that allow the development of a wide range of projects and works:

Hardware equipment:

- Anechoic chamber for antenna measurement
- Spectrum and vector network analysers
- Logic analysers
- DSP platform for the prototyping of communications systems
- Radiofrequency laboratory for the implementation and measurement of printed antennas and microwave circuits on hybrid technology
- Equipment for the processing and recording of infrared images
- Hardware for video acquisition and reproduction: high quality cameras, cards, monitor



- Acoustics anechoic chamber
- Hardware for audio capture, processing, storage and reproduction. Microphones and loudspeakers
- Sonometres, acoustic and audio real time multianalyser
- Computing grid for HPC (High Performance Computing), currently consisting of 57 nodes

Software media:

- Simulation software for communications
- Platforms for the development of applications for wireless systems
- Software for the automatic indexing of multimedia information
- Text and voice databases for the design of acoustic and language models
- Audio and video editors
- Simulation software for electroacoustics and enclosure acoustics
- Software for management applications of communications contents
- Software for helping in decision making and for data mining

OUR EXPERIENCE

The TSC Department collaborates in a regular way with the business environment by providing specific designs and solutions according to the customer's needs. Some of these collaborations have given rise to long term strategic agreements formalised through Chair endowments (Telefónica, Ericsson) or donations (Motorola Foundation). The good results attained with the different projects and services have made the Department deservedly win the recognition and confidence of the institutions working with its researchers.





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