

Horizon 2020
Marie Skłodowska Curie Actions
PROFILE FORM – Expression of Interest

Organization Name / Department	Procesamiento Estadístico de Señales / Instituto de Investigaciones en Electrónica, Control y Procesamiento de Señales. CONICET - Universidad Nacional de La Plata	Organization Short Name LEICI - PES	EI SANU
Organization Type	<input checked="" type="checkbox"/> University <input type="checkbox"/> Public Research Centre <input type="checkbox"/> Large Scale Enterprise <input type="checkbox"/> Small and Medium Scale Enterprise	<input type="checkbox"/> Public Body <input type="checkbox"/> International NGO <input type="checkbox"/> National NGO	
Research Fields	<input type="checkbox"/> Chemistry CHE <input type="checkbox"/> Social and Human Sciences SOC <input type="checkbox"/> Economic Sciences ECO <input checked="" type="checkbox"/> Information Science and Engineering ENG <input type="checkbox"/> Environment and Geosciences ENV <input checked="" type="checkbox"/> Life Sciences LIF <input type="checkbox"/> Mathematics MAT <input type="checkbox"/> Physics PHY	<i>Sub-Fields / Keywords:</i> <i>G2 - Systems and Communication Engineering: Signal processing, Wireless communications</i> <i>L5 - Neurosciences and neural disorders: Neuroimaging and computational neuroscience</i>	
Short Description of the Organization / Department	<p>The Institute for Research in Electronics, Control and Signal Processing (LEICI) is jointly supported by the National Council for Scientific and Technological Research of Argentina (CONICET) and the National University of La Plata (UNLP). It is located in the Department of Electrical Engineering of the UNLP. This institute houses more than 30 researchers, 20 doctoral and postdoctoral fellows, and shows a good scientific and technological production. Its areas of interest range from renewable energies, communications, remote sensing and bioengineering.</p> <p>The Statistical Signal Processing group (PES) supports three research lines applied to (a) characterization of human brain neuronal activity; (b) radar and electromagnetic imaging and (c) GNSS receivers for aerospace applications.</p> <p>Members of the Institute teach undergraduate courses, towards the engineering degrees in Electronics, Computers and Telecommunications; as well as graduate ones, oriented to the Master or Doctor degree in Engineering.</p>		
Previous Related Projects / Research Experience	<p>Current related projects:</p> <p>i) "Sensor array signal processing for EEG, Radar and GNSS", PICT2014-1232 ANPCyT (National Agency for Scientific and Technological Research; 2015-2018).</p> <p>ii) "Sensor array signal processing applied to EEG, Radar and GNSS", 11I209 UNLP (National University of La Plata; 2016-2019).</p> <p>iii) "Statistical Signal Processing", CIC-PBA (Commission for Scientific Research of Buenos Aires Province; 2017, annually renewable)</p> <p>iv) "Meteorological Radar data processing algorithm", PDTS269 CIN-CONICET -INVAP (National Council of University Presidents – National Council of Scientific and Technological Research – Invap is a company involved in radar development, 2016-2018). Jointly with a group of National University of Rio Negro.</p> <p>v) "Multi-dimensional Radar data processing", PIP CONICET (National Council of Scientific and Technological Research, 2016-2018). Jointly with a group of National University of Rio Negro.</p> <p>vi) "Multi-antenna, multi-frequency GPS/Glonass receiver for a launching vehicle", sequence of agreements for developing special purpose GNSS receivers for CNAE (National Commission of Space Activities, 2015-2017). Jointly with Senyt (Electronic Systems for Navigation and Telecommunications, UNLP).</p>		

	<p>vii) "Identification of the epileptogenic zone in patients that are candidate to surgery. Use of intracerebral recordings with micro and macro electrodes and fMRI", PICT2016-1593 ANPCyT (National Agency for Scientific and Technological Research; 2017-2020).</p> <p>Graduate students in last 5 years: 4 PhD, 5 MSc in EE. National and international collaborations.</p>
<p>Short Description of the Project idea (if foreseeable)</p>	<p>Our projects deal with processing the signals derived from sensor arrays. These signals convey information that has to be extracted from measurements. However, they are contaminated by noise and perturbations, possess random features or are imperfectly known. This calls for a common base of tools of statistical inference such as estimation, filtering, detection, pattern recognition, classification, etc. that are applied and suitably modified to the problems we deal with:</p> <ul style="list-style-type: none"> ● Characterization of human brain neuronal activity. ● Radar and electromagnetic imaging. ● GNSS receivers for aerospace applications. <p>1) We interact with a neuroscience group working on epilepsy patients, to help generating methods and tools oriented to solving research as well as clinical problems, especially those that use intracranial electrode measurements (iEEG):</p> <ul style="list-style-type: none"> - More precise location and evolution of sources of brain activity with iEEG measurements, realistic head models derived from MRI, DTI and CT, and background noise noise. - Time-space modeling to derive connectivity models among regions of the brain in epilepsy patients. In particular, the search is after a model of the epileptogenic network. - Precise electrical modeling is used to study Transcranial Electric Stimulation strategies and prediction of its effects. Also applied to the detection of tissue changes of conductivity. Data and collaboration with ENyS (Neuroscience Studies and Complex Systems at El Cruce Hospital). <p>2) In the field of signal processing applied to radar problems our interests are in:</p> <ul style="list-style-type: none"> - We formulate statistical signal models to characterize the back-scattered electromagnetic field of targets in the presence of clutter. - We consider radar systems composed by arrays of sensors with polarization diversity. - We apply statistical inference and hypothesis testing to develop algorithms for target detection and tracking. - We collaborate with INVAP, a weather radar manufacturing company which grants us of real data. <p>3) With regards to the navigation of aerospace vehicles based on GNSS, we interact with a group (Senyt – Electronic systems for Navigation and Telecommunications) that develops this kind of systems for the Argentinian Space agency (CNAE) in the following problems</p> <ul style="list-style-type: none"> - Trajectory estimation and tracking for individual satellites and also for satellite formations oriented towards a collective mission. - Fast signal acquisition and tracking oriented at using antenna arrays. - Reflectometry (GNSS-R): Signal modeling and processing to analyze the GNSS signals scattered by the ocean. The aim is to use opportunisticly the GNSS to develop tools enabling the study of the ocean surface and its relation to winds.
<p>Related Call</p>	<p>MSCA related to RISE, ITN, IF-GF actions.</p>
<p>Contact Person</p>	<p>Carlos Horacio Muravchik</p>
<p>Position in the Organization</p>	<p>Head of the LEICI group on Statistical Signal Processing</p>

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