EXPRESSION OF INTEREST- ULPGC SUPERVISOR

FOR HOSTING MARIE SKŁODOWSKA-CURIE INDIVIDUAL FELLOWSHIPS (CALL MSCA-IF 2020)

Supervisor/Scientist in charge	• Juan L. Navarro-Mesa. • Carmen Paz Suarez-Araujo.
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Department/Institute/Centre	• Instituto para el Desarrollo Tecnológico y la Innovación en Comunicaciones (IDeTIC). • Instituto Universitario de Ciencias y Tecnologías Cibernéticas (IUCTC).
Address	Edificio de Electrónica y Telecomunicación. Campus de Tafira. 35017 Las Palmas de Gran Canaria. España
Research Area	☐ Chemistry (CHE) ☐ Economic Sciences (ECO) ☒ Information Science and Engineering (ENG) ☐ Environmental and Geosciences (ENV) ☐ Life Sciences (LIF) ☐ Mathematics (MAT) ☐ Physics (PHY) ☐ Social Sciences and Humanities (SOC)
URLs	www.ulpgc.es Web Research Institute / Group: • http://www.idetic.eu/ • http://iuctc.ciber.ulpgc.es/
Applications: documents to be submitted and deadlines *(Indicar qué documentación deberán remitir los interesados/as para establecer contacto: CV, letter of motivation, letter of references, etc.)*	At the deadline for the submission of proposals **(09/09/2020),** researchers (*): - shall be in possession of a **doctoral degree** or have at least **four years of full-time equivalent** research experience. - **Comply with the mobility rule**: you cannot apply for a fellowship in our institution if you do not meet the call mobility rule -> might change depending on the type of MSCA-IF. - Proficiency/fluency in English language (including writing). If you are interested in submitting a proposal, please send us the next documents by e-mail **before July 15th 2020**: ☒ CV with the contact details of 2 referee ☒ Letter of motivation

	☒ One-page research project ☐ Other:
Contact *(e-mails)*	Supervisor: juanluis.navarro@ulpgc.es European Projects Office: ope@fpct.ulpgc.es

(*) Further details on the Call and additional eligibility criteria can be found at the Participants´ Portal

BRIEF DESCRIPTION OF THE CENTRE / RESEARCH GROUP / SUPERVISOR

(Max. 1600 caracteres con espacio, aprox. 16 líneas): Información sobre el centro / grupo de investigación / proyectos financiados / personal científico, destacando los aspectos más relevantes de los mismos.

The **IDeTIC** is an Institute dedicated to research in different areas of technology. Some of the activities are: (1) Developing and collaborating in national and international projects; (2) To carry out scientific dissemination; (3) To provide undergraduate and postgraduate training. The Digital Signal Processing Division embraces expertise in Biomedical Signal Processing, Biometric Identification Systems, Sensor Networks and Applications. Our research is supported by hundreds publications in international journals and conferences, as a result of the participation in more than fifty research projects of different Spanish and international institutions and companies.

Juan L. Navarro-Mesa is an associate professor in Signal Theory and is a member of the Digital Signal Processing Division in the IDeTIC. specialised in statistical processing, machine learning and sensor systems applied to biomedical engineering. He has a high expertise in these topics being Project Leader of 4 European Projects, and investigator in 10 Research Projects, with many scientific papers published, congress and international cooperation.

The **IUCTC** is an interdisciplinary research Institute which embraces expertise in Computer Science and Technology, Robotic, Software Engineering, Intelligent Computing, Computational Neuroscience, Cognitive Computing, Intelligent Systems, Data Analytics and Big Data, with application in Health, Clinical, Environmental scopes, among others. The main objectives are generating knowledge of above-mentioned areas using them to solve real problems, which bring about hundreds of journal publications and conferences. To carry out research diffusion and technology transference. It provides the appropriate framework for fruitful multidisciplinary interaction developing research projects with national and international institutions and companies. It provides postgraduate training too.

Carmen Paz Suárez-Araujo is full professor in Computer Sciences and Artificial Intelligence; Head of Computational Neuroscience Research Division at the Institute of Cyber (IUCTC). The main research lines of her division are Artificial Neural Networks; Design of New Neural Architectures; Neural Computing Application in Clinical, Environmental & Neuroscientific Scopes, Computational Neuroscience. She has a high expertise in these topics being Project Leader and Investigator of 20 international and national Research Projects, with many scientific papers published, congress, invited talks & international cooperation.

Partner Organization: Intensive Medicine Service, University Hospital Insular-Maternal and Child. Government of the Canary Islands.

Luciano Santana-Cabrera: lsancabx@gobiernodecanarias.org
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PROJECT DESCRIPTION

(Max. 1800 caracteres con espacio): Breve descripción sobre el proyecto / línea de investigación en el que se acogería al investigador/a MSCA.

TITLE: APPLICATION OF COMPUTATIONAL INTELLIGENCE TECHNIQUES TO SOLVE MAJOR PROBLEMS OF PATIENTS WITH COVID-19 IN INTENSIVE CARE UNITS

- **RESEARCH DESCRIPTION:**

Recent technological advances in computational intelligence and biomedical engineering facilitated the development of complex biomedical systems including innovated clinical and computer-based decision support systems, knowledge acquisition and management. Additionally, these advances can be implemented in real-world applications through machine learning, neural computing, etc.

Since the first cases of COVID-19 were identified in December, 2019, there has been a growing interest in applying technological solutions to the enormous challenges encountered. In particular, as reported case fatality rates vary between worrying margins, the impact of this disease on Intensive Care Units (ICUs) and other services in hospital receives prominent attention. Respiratory failure is obviously the leading cause of death. If the situation deteriorates, COVID-19 is known to be complicated by shock and multiple organ failure. Unfortunately, the real course of the disease is not yet well described. Therefore, expert systems to monitor its course and early detection of patient deterioration (e.g. necrotizing tracheobronchitis) are critical for improving outcomes, where each hour of delayed treatment may lead to an increase in mortality.

To address those problems, we will focus our developments on intelligent computing-based prognostic models for predicting the progression of the disease to more severe stages. This approach offers innovative and promising solutions. We will propose and analyse hybrid and ontogenetic neural networks essentially for cross-sectional studies, and for longitudinal ones we will develop Deep Learning-Based solutions, for example, Long-Short Term Memory type neural architectures, Convolutional Neural Networks, etc. The information environment is composed of physiological, clinical and analytical data, as well as diagnostic tests provided by hospitals from Canary Health System (CHS).

This proposal is a translational medicine Project with a high impact in clinical practice with important outcomes concerning the mortality associated to Covid-19, which could be reduced.

- **REQUIREMENTS OF CANDIDATES**:

The candidate must possess: (1) good theoretical background in artificial intelligence, machine learning and statistical processing; (2) experience in biomedical engineering or related areas; (3) experience programing in Python, Matlab, and similar software packages.