

Part A. Personal Information

DATE	28/05/2019
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Surname(s)	GOMEZ GONZALEZ	
Forename	EMILIO	
ID number	--	
Sex	Male	
Age	50	
Researcher codes	WoS Researcher ID (*)	F-1655-2015
	SCOPUS Author ID(*)	6603056451
	Open Researcher and Contributor ID (ORCID)	0000-0002-8199-3192

(*) At least one of these is mandatory

A.1. Current position

Post/ Professional Category	Full Professor of Applied Physics	
UNESCO Code	physics (2200), optics (2209), artificial intelligence (120304), neurosurgery (321308), neuroscience (249000), digital image processing (2209.90), electromagnetism (2202), medical physics (2406.06).	
Key Words	applied physics, applied optics, artificial intelligence, augmented/virtual reality, holography and 3D visualization, biomedical engineering, neurosurgery, neuromeritics, non-invasive surgery, image-guided surgery, computer-aided diagnosis, focused ultrasound (MRgFUS), laser Doppler vibrometry, hepatology, radiology, interventional oncology	
Name of the University/Institution	Universidad de Sevilla	
	Department/Centre	Dpto. Física Aplicada III/ ETS Ingeniería
	Full Address	Camino de los Descubrimientos sn, 41092 Sevilla
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	Phone Number	(+34) 954486181
Start date	11/10/2016	

A.2. Education (title, institution, date)

Year	University	Degree	Title
1991	Universidad de Sevilla	First degree	Bachelor in Physics
1996	Universidad de Sevilla	PhD	PhD in Physics

A.3. Indicators of Quality in Scientific Production (See the instructions)

Publications: 77 peer-reviewed papers, 5 books (1 international) and 8 chapters (3 international). 9 augmented-reality apps and 15 audiovisual materials (video clips). 33 (14 international) plenary, invited presentations in high-level meetings, and other 107 (38 international) contributions.

Invited lecturing includes the International Neuromodulation Society (2017), the Postgraduate Course of the European Society of Pediatric Neurosurgery (2015), the European Symposium on Focused Ultrasound Therapy (2015, 2013), the Radiological Society of North America (2000, 2001) and the National Meetings of the Spanish Societies of Clinical Engineering (2019), Pediatric Neurosurgery (2014), Neurosurgery (2009) and Radiology (2004).

Patents: 41 granted (2 pending), corresponding to 30 devices and programs. They include 11 international (9 European/PCT), 12 Spanish Patents, 18 software programs). Transferred: 34.

R&D projects: 49. Principal Investigator (PI) in 34 projects. Participant researcher in other 15 (7 international, 8 national) projects, including clinical trials for the American Food and Drug Administration and European health regulators, early and pilot studies.

PhD Theses directed: 7 completed (4 engineers, 3 physicians). Other 3 currently in realization (1 engineer, 2 physicians). Completed also 4 MSc theses in radiology and biomedical engineering.

Awards: A total of 25 prizes and awards (19 related to research, 3 to innovative teaching and education, and 3 to scientific photography and science popularization. They include: the highest award of the Andalusian Region (2001), 3 national-level prizes for research projects (1999, 2000, 2009), 3 international distinctions, 4 national and 2 international awards in top-level meetings, and 3 national-level awards as a member (Director of Technology) of the interdisciplinary team who conducted the first case in Europe of Open Fetal Surgery for Intrauterine Correction of Spina Bifida (University Hospital "V. Rocío", Sevilla, Spain, 2007).

Part B. Free Summary of CV (*Max. of 3.500 characters, including spaces*)

Prof.Dr. Emilio Gómez-González (PhD in Physics), Full-Professor of Applied Physics in the Engineering School at Universidad de Sevilla (Spain) founded in 2001 the Group of Interdisciplinary Physics (GFI) that he leads since then. Currently, it has 12 members and 17 collaborators physics, industrial engineering, biomedical engineering, telecommunications engineering, neurosurgery, hepatology, neurology, radiology, anesthesiology, intensive care medicine, gynecology, oncology, ophthalmology, odontology, biochemistry, biology, psychology and social education.

He has been a visiting researcher at the Max-Planck Institute of Quantum Optics (Munich), visiting professor at Northwestern University (Chicago) and visiting professor at the National Polytechnic Institute of Mexico. Researcher of the Applied Neuroscience Group at Institute of Biomedicine of Seville (IBIS) and University Hospital "V. Rocio" (UHVR), in 2018 he entered the Royal Academy of Medicine and Surgery of Seville, Spain.

Currently he collaborates with the Joint Research Center (JRC) of the European Commission in the study of artificial intelligence (AI) systems and their impact on human behavior (Project Humaint), especially in the field of health. He leads an H2020 Project of physics and neurophotonics in neurosurgery within the ATTRACT consortium led by CERN.

Following an unconventional trajectory, he has oriented his scientific activity towards the design, development and implementation of physics-based systems in highly demanding, real applications in multidisciplinary environments. His lines of work include i) optical and neurophotonic technologies combined with AI for non-invasive and image-guided surgery in neurosurgery, fetal surgery and interventional oncology; ii) diagnostic support systems and personalized medicine combined with AI in hepatology, radiology, neurology, gynecology and other medical areas; and iii) optical architectures and applications of augmented reality and 2D/3D visualization.

His scientific production includes over 40 patents of devices and software programs and numerous publications. As principal investigator, he has led more than 30 projects in competitive calls.

He presents 20 years of direct work in clinical, medical and surgical environments. In diagnostic support systems, he has designed image processing methods and computational tools for electromagnetic and biomechanical modeling and monitoring of the human brain and structures of the central nervous system.

In surgical technology, he led the implementation of the first site in Spain with non-invasive surgery by focused ultrasound guided by magnetic resonance, extended oncological fluorescence for the treatment of pediatric brain tumors and designed a surgical helmet microscope (Leica model HM500). He directed the technological part of the Program of Fetal Neurosurgery of UHVR for intrauterine correction of spina bifida (in fetuses of 24 weeks) -performing the first case in Europe in 2007- and the Program of EXIT (Ex Utero Intrapartum Treatment) Fetal Surgery performing several pioneering procedures.

He collaborates with the National Accelerator Center, Calar Alto Astronomical Center, Institute of Astrophysics of Andalusia-CSIC and other entities. He has over 25 years of experience in university teaching and scientific photography and video for science popularization, including the development of 3D augmented reality systems for people with disabilities, and apps for innovative education.

Part C. Relevant accomplishments

C.1. Publications

Tirado-Caballero J, Rivero-Garvía M, Gómez-González E, Kaen A, Cardenas Ruiz-Valdepeñas E, Márquez-Rivas J. 2018. Dynamic chess-table cranial expansion for treatment of craniocerebral disproportion: Technical note and volumetric results. World Neurosurg. (doi:10.1016/j.wneu.2018.11.119).

Tirado-Caballero J, Muñoz-Nuñez A, Rocha-Romero S, Rivero-Garvia M, Gomez-González E, Marquez-Rivas J. 2018. Long term reliability of telemetric Neurovent-P-Tel sensor: in vivo case report. Journal of Neurosurgery. (doi:10.3171/2018.4.JNS172988).

Mayorga-Buiza, M. J., Rivero-Garvia, M., Gomez-Gonzalez, E. and Marquez-Rivas, J. Cardiac pulmonary resuscitation in prone position. 2018. The best option for posterior fossa neurosurgical patients. Pediatr Anaesth, 28: 746-747(doi:10.1111/pan.13448).

Mayorga-Buiza MJ, Marquez-Rivas J, Gomez-Gonzalez E. 2017. Can fetus feel pain in the second trimester? Lessons learned from a sentinel event (Letter to the Editor). Childs Nerv Syst. (doi:10.1007/s00381-017-3677-6).

Mayorga-Buiza MJ, Rivero-Garvia M, Marquez-Rivas J, Velasquez-Rodriguez C, Gomez-Gonzalez E. 2017. Letter to Editor: Postoperative hyponatremia. Journal of Neurosurgery: Pediatrics, 19(3), 372-374(doi:10.3171/2016.7.PEDS16347).

Gallego-Duran R, Cerro-Salido P, Gomez-Gonzalez E et al. 2016. Imaging biomarkers for steatohepatitis and fibrosis detection in non-alcoholic fatty liver disease. Scientific Reports, 6, 31421. (doi:10.1038/srep31421) [Nature Publishing Group].

C.2. Research Projects and Grants

PROJECT: “Combined optical imaging and ultrasound focusing for hand-held, non-invasive cleaning of implanted cerebrospinal fluid shunting devices in patients of hydrocephalus: initial design and proof-of-concept (FUSCLEAN)”.

Type: H2020 European Project. Date: 2019-2020.

Entity: ATTRACT Consortium, lead by CERN.

Reference: Grant Agreement 777222.

Principal Investigator: Prof.Dr. Emilio Gómez González

Participants: Universidad de Sevilla, Technological Corporation of Andalusia.

PROJECT: “Human behavior and machine intelligence (HUMAIN)”

Type: European Project. Date: 2018-2020.

Entity: Joint Research Center (JRC), European Commission.

Reference: JRC HUMAIN

Principal Investigator: Prof.Dr. Emilia Gomez Gutierrez

Participation: Prof.Dr. Emilio Gómez González, as Fellow.

Participants: Centre for Advanced Studies, Joint Research Centre (JRC), European Commission.

PROJECT: “Liver Investigation: Testing Marker Utility in Steatohepatitis (LITMUS Project)”.

Type: European Project H2020. Date: 2017-2020.

Entity: European Commission. Reference: Grant Agreement 777377.

Principal Investigator: Prof. Quentin M Anstee. Of Work Package 5: Prof.Dr. Manuel Romero-Gomez.

Participation: Prof.Dr. Emilio Gómez González, as Researcher on Work Package 5.

Participant (WP5): Oxford University, Antaros, Perspectum, Servicio Andaluz de Salud, Echosens.

PROJECT: “Study of application of techniques of neurophotronics, hyperspectral Imaging and laser Doppler vibrometry to improve the neurosurgical treatment of refractory surgical epilepsy”.

Type: R&D Project. Date: 2016-2019.

Entity: Regional Health Ministry (Consejería de Salud de la Junta de Andalucía).

Reference: PI-0196-2016.

Principal Investigator: Prof.Dr. Emilio Gómez González

Participants: University Hospital “Virgen del Rocio”, Universidad de Sevilla.

C.3. Contracts

C.4. Patents and other IPR

Márquez Rivas J, Mayorga Buiza MJ, Gómez González E. *Exit-preventing connector for infusion lines*. Servicio Andaluz de Salud y Universidad de Sevilla. Patent P17191ES00 (pending), 2018.

Márquez Rivas J, Mayorga Buiza MJ, Garvia Rivero M, Gómez González E. *Endoscopic device for fluid application*. Servicio Andaluz de Salud, Universidad de Sevilla. Patent P201831211 (pending), 2018.

Rivero Sánchez A, Gómez González E. Program SAIM: *Software for Multispectral Image Analysis*. Intellectual Property Registry 2018999023318882, Universidad de Sevilla, 2018.

Gómez González E, Galán Serrano JM, Márquez Rivas J, Mayorga Buiza MJ. *Program VIDEO3D (Software)*. Intellectual Property Registry 201699902746573. Universidad de Sevilla, Servicio Andaluz de Salud, 2016.

Romero Gómez M, Gómez González E, Gallego Duran MR, Cerro Salido P. *Optical image processing methods for analysis of magnetic resonance images for quantifying or determining liver lesions*. Servicio Andaluz de Salud y Universidad de Sevilla. European Patent EP16382390.9 and others, 2016.

Galán Serrano JM, Gómez González E, Márquez Rivas J, Mayorga Buiza MJ. *Program CAMPOS3D. Software of interactive visualization of electromagnetic fields created by implanted electrodes in organs and tissues (Software)*. Intellectual Property Registry 201699902266631, Universidad de Sevilla, Servicio Andaluz de Salud, 2016.

Gómez González e, Izquierdo Ayuso G, Rosales Martínez M, García Sánchez MI. *Software (Program DISTANCIA) for quantification of the distance of sequence of oligoclonal bands to a reference pattern for diagnosis help (Software)*. Intellectual Property Registry 201599902838465. Universidad de Sevilla, Servicio Andaluz de Salud, 2015.

Gómez González E: *Multilayer planar optical device*, Patents P201401053 and PCT/ES2015/000180. Universidad de Sevilla, 2014.

C.5. Significant research leading

1999-2019. Lead designer of image-based CAD and AI systems in hepatology (liver fibrosis, NAFLD), neurology (multiple sclerosis), neurosurgery (hydrocephalus, brain tumors), radiology (breast and lung cancer) and gynecology (nodules), and personalized 3D biomodeling of biomechanics, hydrodynamics, and electromagnetic fields in structures of the central nervous system.

2006-2019. Lead designer of neurosurgical instrumentation and neurophotonics in multidisciplinary teams. It includes a surgical helmet microscope (Leica model HM500, 2009); a visual stimulator for intraoperative monitoring of the optical pathway (2006); the extension of oncological fluorescence for the treatment of pediatric brain tumors (2007); mobile image and data integration in the operating room (2008-2010), multispectral imaging (2017) and 3D bioelectromagnetic modeling (2018).

2005-2019. Scientific and technology director responsible for equipment coordination inside the operating room in pioneering neurosurgical and fetal surgery procedures at the University Hospital “V. Rocio” (Sevilla, Spain). Among them, first case in Europe of Intrauterine Correction of Spina Bifida in a 24-week fetus (2007) and the EXIT (Ex Utero Intrapartum Treatment) Program of Fetal Surgery, with several first-cases in Spain: correction of an epignatus tumor in twins (2008), severe malformations (2008-2012), and separation of conjoined twins (2008). Both programs are currently active.

2007-2010 Principal investigator to setup the first site in Spain (Seville) of magnetic resonance guided focused ultrasound surgery (MRgFUS), in collaboration with GE Healthcare (Spain), InSightec (Israel) and local companies. Published the first cases in Spain of MRgFUS treatment of uterine fibroids (2009) and of palliative treatment of metastatic pain in oncology patients (2010). The site received national and European quality certificates (2009) and was recognized as one the most relevant international centers (European Congress of Radiology, 2010).