# OPEN PHD POSITION FOR MARIE SKŁODOWSKA-CURIE INNOVATIVE TRAINING NETWORKS (MSCA-ITN) AT CSIC

**MSCA-ITN**

ACHIEVE: AdvanCed Hardware/software components for Integrated/Embedded Vision systEms

**PROJECT**

ESRI1: Computational imaging for early acceleration of deep learning inference schemes applied to video analytics

**PhD SUPERVISOR(S)**

Dr. Jorge Fernández and Dr. Ricardo Carmona

**SCIENTIFIC AREA**

Physical science and technology

**HOST INSTITUTION**

Institute of Microelectronics of Seville (IMSE)

**DURATION**

36 months

**FIXED START DATE:**

Application deadline: **March 1, 2018**  
Start date: **April 1, 2018**

**PLANNED SECONDMENT(S):**

6-month secondment (internship) in the Finnish company Kovilta (http://www.kovilta.fi/). This company has extensive experience in the design, implementation and testing of full-custom ASICs, efficient techniques and parallel algorithms for image analysis, FPGA and embedded system design and software design.

**EMAIL OF THE PhD SUPERVISOR(S)**

rcarmona@imse-cnms.csic.es / berni@imse-cnms.csic.es

**WEBSITE OF THE ITN-MSCA**
http://www.achieve-itn.eu

WEBSITE OF THE RESEARCH GROUP OR CENTRE/INSTITUTE
http://www2.imse-cnm.csic.es/~rcarmona/  http://www2.imse-cnm.csic.es/~berni/

IDEAL CANDIDATES

We are looking for a motivated early stage researcher in the field of Computational Imaging, specifically in the design of custom sensing-processing hardware for early acceleration of deep neural networks in ultra-low-power embedded vision systems.

You have a Master of Science (MsC) degree at the start of the PhD and a background in Electrical Engineering and/or Computer Science. Candidates with an MsC in another discipline but with a strong knowledge of Signal/Image Processing and/or Machine Learning may also be considered.

You have a strong interest in hardware design, artificial intelligence and computer vision as well as a good knowledge of mathematics and signal/image processing, as well as basic programming skills. In our lab, you will use Cadence, MATLAB, OpenCV and deep learning frameworks like Caffe or Tensor Flow. The research work will involve evaluating the state of the art in specific hardware for acceleration of deep neural networks, proposing new circuit and sensing structures with potential of enhancing reported performance in parameters like power consumption, area or throughput, implementing a sensing-processing chip incorporating such structures and testing that chip.

You perform well in a team. You have good or excellent English and scientific writing skills. You combine a strong interest in scientific research with a desire to see your work applied in industry. Due to EC funding rules, only candidates with less than 4 years of research experience can be considered. Candidates must not have carried out their main activity (work studies ...) in Spain for more than 12 months in the past 3 years. CSIC implements gender neutral recruitment and selection procedures. Female candidates are especially encouraged to apply.
**PhD PROJECT**

The PhD student will work at the IMSE research group on Smart Imagers and Vision Chips. This group has long expertise, leading several projects in this area. The new researcher will therefore work in a team with experienced researchers, cooperating with the other students in the ACHIEVE network and participating in the ACHIEVE’s training program.

**Our offer:** You will receive a PhD scholarship according to the general conditions at CSIC. The scholarship includes full social security coverage (net monthly amount starting at ± 1500 EUR/month + 500 EUR/month mobility allowance + (if applicable) family allowance of 200 EUR/month). The contract will be for 3 years and will start in the first quarter of 2018.

**Objectives:** Deep learning has emerged as an end-to-end approach based on learned multi-level scene representations. It has boosted a scenario of innovation and rapid development in the field of computer vision. However, when it comes to the design and implementation of embedded vision systems, image sensing is considered as a separate stage in virtually all cases. The primary goal of this PhD dissertation is to break the status quo by exploiting the possibility of integrating both sensing and processing in CMOS technologies. The main hypothesis is that monolithic sensing-processing – i.e. computational imagers – can lead to substantial performance boosting in embedded vision systems in terms of form factor, power consumption and throughput.

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**HOW TO APPLY**

Please submit your application by email to both Dr. Ricardo Carmona (rcarmona@imse-cnmcsic.es) and Dr. Jorge Fernández (berni@imse-cnmcsic.es). In your email, please include the following: • A brief motivation of your application: what do you consider the best facts in your CV proving your academic excellence in BSc and/or Msc. education? What are your reasons to pursue a PhD? Why would you like to work at IMSE? ... • A detailed CV, describing your earlier experience and studies; • A list of publications (if available); • A transcript of your educational record (list of courses per year, number of obtained credits, obtained marks) if available. It is not mandatory to provide an official document at this stage; • A (rough) indication or estimate of your rank among other students (e.g., top 10% among 35 students in my Master); • If available: 1-3 English language documents describing your previous research (e.g., scientific papers, Master’s Thesis, report on project work, etc.). These documents need not be on the particular topic of the position.