

WRM Chip Development –Mathematical properties and algorithms ITN-EDUSAFE-ESR1

This position is with ITN partner: University of Roma “Tor Vergata”, Italy

As an ESR, the aim of your work is to participate to the development and formalization of a novel device the “Weighting Resistive Matrix” (WRM), aimed to enhance by far the present performance of pattern recognition systems. This is a high connectivity hybrid Analog-Digital circuit which projects an image from the real space to a given parametric space, with respect to an arbitrary hypothesis, with high reliability and noise rejection.

Your goal is to study the theoretical and mathematical aspects connected to the WRM, helping the design effort. These will range from the topological properties of the matrix nodes, to the study of implementation of the general Hough transform in the WRM system. Part of the work will consist in adapting to the WRM logic the algorithms developed by another ITN-EDUSAFE partner based in EPFL, Ecole Polytechnique Federale de Lausanne, Switzerland, which is developing feature-point and image-patch based technique which are more established and could be greatly accelerated by means of WRM.

This project is part of a large collaboration headed by the ATLAS experiment by the LHC of CERN aimed to develop a novel augmented reality system for operation in hazardous areas so you will be able to participate also to the system prototype creation and testing campaigns in the LHC ATLAS experiment environment.

You will spend a fraction of your time on secondments in collaborating institutions (EPFL, TUM, CERN) (on the following topics: computer vision, patch based recognition techniques, 3D reconstruction and pose determination, Augmented Reality applications and information visualization, rendering methods, radio protection and detection of ionizing radiation)

Preferred university diploma: Master/Diploma degree in Mathematics / Applied Mathematics.

Requirements:

- Knowledge in programming and languages (C, MatLab)
- experience in mathematical methods of image analysis, topologic transforms
- experience with Hough and Radon transform would be a plus
- Fluent English language is mandatory, Italian knowledge will be appreciated

The candidate will participate in network wide activities such as common test campaigns with ESRs from the other EDUSAFE partners, workshops, summer schools and conferences.

The appointed researcher will be offered the possibility to apply for a PhD in Mathematics at University of Roma “Tor Vergata”. The research performed within the EDUSAFE project is valid to obtain the PhD at the end of the 3 years contract

The ESR will be under employment contract with University of Roma “Tor Vergata”. The successful candidate will be based in Roma, Italy. The duration of the contract is 3 years starting October 2012, full time and fix-term.

Contact : Giulio Aielli (giulio.aielli@cern.ch)