

## Scientific Project Proposal for International Exchange Student

---

**Topic :** Multi modal imaging of skin-ulcers

**Supervisors :** Omar Zenteno (PhD student), Sylvie TREUILLET (PhD, Ass. Professor)

**Laboratory :** PRISME – Computer Vision & Image Processing team

**Internship period :** From January 15th till May 2018

### Abstract

Skin ulcers (SU) are one of the most frequent causes of consultation in primary health-care units in tropical areas. Usually, the therapeutic follow-up and assessment of cutaneous ulcers in care units remains essentially based on subjective visual observation, and a large proportion of their diagnosis is performed by physicians not specialized in dermatology in under-served areas. In the context of international collaboration with Latin America countries (Peru, Colombia), IMPULSO project (IMage Processing for ULcerS in trOpical areas) aims to explore and combine new imaging modalities and computer-aided-diagnosis to improve diagnosis and monitoring of the ulcers. An acquisition campaign collected a multimodal image database of Cutaneous Leishmaniasis ulcers in Peru, including color images, 3D scans (scatter plots, surface), ultrasound images (US) and hyperspectral cubes (HSI) acquired from the same ulcers. In a previous work, a MATLAB graphical interface was developed for joint visualization / exploration of color and high-frequency ultrasound images [1,2]: the superficial tissues observed in color images where overlaid with sub-dermic information provided by high-frequency ultrasound giving complementary information to improve diagnosis. The GUI proposes to manually define some 3D singular points as landmarks to perform a semi-automatic registration between the two modalities and to visualize them in a similar reference frame. In the future work, we want to develop fully automatic multimodal registration and include other modalities like 3D mesh of the skin ulcers obtained from a series of color pictures [3].

**Required skills:** good knowledge of programming

### Bibliography

[1] Ru Zhang, MULTimodal Viewing Interface for skin ulcers (Leish-MUVI), Internship report, Polytech Orleans, January-May 2017.

[2] Ru Zhang, Omar Zenteno, Sylvie Treuillet and Benjamin Castaneda, Multimodal viewing Interface for skin ulcers, VIPimage, Porto, October 18-21th, 2017.

[3] Omar Zenteno, & al., Volume estimation of skin ulcers: Can camera be as accurate as a laser scanner ?, VIPimage, Porto, October 18-21th, 2017.

**Contact :** Sylvie TREUILLET (PhD, Ass. Professor), [sylvie.treuillet@univ-orleans.fr](mailto:sylvie.treuillet@univ-orleans.fr)



École polytechnique  
de l'université d'Orléans

Premier réseau français  
des écoles d'ingénieurs  
polytechniques des universités

■ 12 rue de Blois, BP 6744  
45067 Orléans cedex 2  
France  
Tél. +33(0)2 38 41 70 02  
Fax. +33(0)2 38 41 73 77

