

## Research Grants for PhD students from the China Scholarship Council

Information Form (please read the guidelines carefully on the website [www-csc.utt.fr](http://www-csc.utt.fr))

Supervisor's name :  Given names :

Status (prof., assistant prof., ...):

Laboratory :  Website address :   
Institution :  Website address :

### Scientific competence of the supervisor:

A. Hafiane is Associate Professor at INSA Centre Val de Loire and head of Image and Vision group in Prisme lab. His research interests include image processing theory and methods, computer vision and machine learning, particularly for biomedical and agricultural applications. He has developed several methods and approaches for biomedical image analysis based on robust descriptors, segmentation and machine learning algorithms. Several of these methods have been successfully applied to several research projects.

### Two major publications in the field proposed for the PhD :

1.
2.

Website address of the personal page :

**Supervisor's email :**

**Description of the research work proposed for a PhD** **Topic # (see list) :**

Title :

### Subject :

The analysis of medical ultrasound images is an important area of research. Although extensive research has been conducted in this area, it is still an open problem that requires further study. The ultrasound imaging modality is associated with poor visual properties, artifacts, speckle, shadows, signal dropout, etc. It faces challenging problems such as tissue analysis, machine learning with noisy data, variability of anatomical structures, tracking in low visualization conditions... Machine learning approaches, especially deep learning, have shown impressive performance in solving many computer vision problems. However, these approaches have revealed several limitations in medical images, where there is a lack of large labeled datasets, specific vision-based tasks, different imaging modalities, ... Paradigms such as self-attention, contrastive learning, could be a key solution to many medical image analysis problems, including ultrasound imaging. The objectives of the thesis are to design and develop robust methods to localize, analyze and track anatomical structures such as nerves, vessels ... The dynamic information will be incorporated by self-attention models. The self-supervised learning approach will be used to build adaptive models for detection and tracking. Theoretical analysis of some learning mechanisms will be covered in this thesis.

### Keywords :

### Expected collaborations :

### Background required from the applicant :

Existence of a PDF file detailing the proposal ("yes" or "no") :   
(see guidelines on the website [www-csc.utt.fr](http://www-csc.utt.fr))