

# MASTER'S THESIS INTERNSHIP OFFER

## DESCRIPTION

- › **Title :** Extraction of pea root architecture from a neural network
- › **Hosting organization:** University of Poitiers
- › **Lab:** Xlim
- › **Research Team:** ICONES
- › **Scientific pole:** ASALI
- › **Starting date (month/date):** 15 avril 2024

### › Short description of the internship offer (up to 5 sentences):

The project involves extracting and analyzing the architecture of the pea root system from temporal image sequences using an innovative neural network architecture.

### › Objectives (up to 5 sentences):

Ces travaux de recherche contribueront à la sélection de nouvelles variétés plus résilientes au stress hydrique, et à la transition agroécologique, notamment via le développement de solutions alternatives à l'utilisation d'intrants de synthèse. Pour atteindre ces objectifs, ce projet bénéficiera des compétences interdisciplinaires et complémentaires entre l'équipe de biologie végétale SEVE du laboratoire EBI et l'équipe d'analyse d'images et d'intelligence artificielle ICONES du laboratoire Xlim.

### › Description of the internship offer:

The development of protein crops in France, such as peas (*Pisum sativum*), is crucial to promoting independence from protein production for animal and human consumption. In the current context of climate change, pea yields are strongly impacted by drought episodes. Increasingly frequent and early periods of drought also have an impact on pea vegetative development, including root growth. Studying the root system is a major area of research for securing pea yields. Furthermore, in an effort to limit chemical inputs, the use of natural biostimulants is increasingly developed to protect crops from environmental constraints. The project involves setting up a 2D analysis of the architecture of the pea root system. This analysis will make it possible to generate data on pea root growth and



extract structural information (lengths, positions, numbers, etc.) over time as a function of various stresses to which the plant may be subjected and/or following the application of biostimulant products. This data extraction work is based in particular on software developed jointly by EBI and Xlim, and on image databases acquired by the SEVE team. Students will also be working with the RootNav 2.0 library [1], which uses a convolutional neural network (CNN) architecture to extract roots. They will then have to improve the initial architecture (CNN in encoder-decoder configuration) by integrating a sequential aspect into image acquisition.

› **Photo (optional)**

› **Description of the research team:**

The research activities of ICONES research team are organized around the modeling and the processing of color and spectral images and videos in the three following themes: Representation models of multivalued images, Optical metrology Perception and quality assessment.

## SKILLS

› **Expected skills of the applicant:**

- Knowledge and use of programming environments
  - Very good knowledge of English language
  - Ability to work both independently and within a team
  - Interest for multidisciplinary research and biomedical applications
- Cliquez ou appuyez ici pour entrer du texte.

## PHD THESIS OPPORTUNITIES

› **PhD thesis opportunity after the Master course:**

Yes       No

› **If yes, financing already obtained:**

Yes       No



› **If yes, what kind of funds:** Cliquez ou appuyez ici pour entrer du texte.

## CONTACT & APPLICATION

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› **Surname and first name of the internship supervisor(s):**

HELBERT David, MERCIER Bruno

› **Email of the supervisor(s):** [david.helbert@univ-poitier.fr](mailto:david.helbert@univ-poitier.fr), [bruno.mercier@univ-poitiers.fr](mailto:bruno.mercier@univ-poitiers.fr)

› **Phone number of the supervisor(s):**

› **The application shall be sent to the email:** all addresses above

› **Closing date for applications:** Cliquez ou appuyez ici pour entrer une date.