

Position Offered: PREDOCTORAL RESEARCHER

Project: *Digital Transformation of conservation and plant breeding activities by high-throughput phenotyping*

Technological and scientific fields: Computer Vision Image Analysis Robotics, Big Data and Information Processing Technology

Location: Alcalá de Henares, Madrid, Centro de Recursos Fitogenéticos, INIA-CSIC
<https://www.inia.es/en-en/units/Institutes%20and%20Centres/CRF/Paginas/Home.aspx>

Research Group/PI: Conservation of Plant Genetic Resources Luis Guasch Pereira.

PROJECT SUMMARY

The project consists of implementing, in collaboration with the company INYCOM, high throughput phenotyping systems for planta characterizations consisting of two field robots equipped with several hyperspectral image sensors and artificial intelligence tools. By combining various RGB cameras, RGB-D and LIDAR sensors, the aim is to reconstruct a three-dimensional model of the crops inspected by the robots from autonomous navigation. The reconstructed 3D point cloud model will include the spectral response (reflectance) of the cultures in more than 270 different wavelengths or channels (350 - 2000nm) taken with dedicated hyperspectral equipment. To this end, different methods and tools will be evaluated: artificial intelligence, 3D artificial vision and machine learning/deep learning. Morphological characters would be annotated on this system by segmentation both in plane and in 3D vision, as well as estimating biochemical parameters through the reflectances. The last phase would be the development of predictive models from spectral images to relate it to yield, drought tolerance, relationship with photosynthetic capacity, etc.

PROFESSIONAL PROFILE

Minimum requirements:

To carry out the doctorate, it is necessary to have a bachelor's degree and a master's degree in a degree related to data science, mathematics, physics, biology, engineering or others.

English (B2) is required for the mobility stays in other research centers.

Merits to be considered:

Knowledge of 3D artificial vision, machine learning, deep learning, plant characterization and Python and/or C++ programming language. English C1 or C2

WHAT IS OFFERED

The 130 ECTS training project would include navigation and self-guidance tests of the robots and the integration of the 3D models that would be carried out in the company. Later, the integration of data and annotation would be done. Finally, the models and the relationship between agronomic traits and spectral data and images would be carried out with field trials. Depending on the candidate's previous training, it is proposed to study the doctoral program in Automation and Robotics at the Polytechnic University of Madrid (in collaboration with the CAR-CSIC). Visits are planned to both CSIC, IAS centers; MBG, as European centres belonging to ESFRI EMPHASIS or with which we collaborate such as the IPK.

Contract conditions:

Predoctoral Researcher contract of 4 years' duration. Gross annual salary of 23,871.33 €.

Start of contract: before 31 December 2024

PRINCIPAL INVESTIGATOR CONTACT

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