Position: **Doctoral Candidate #2 (DC 2)**
Project: **Reliable sensing fusion framework for agricultural robots**
Host Institution: University of Coimbra - Portugal
PhD programme: Electrical and Intelligent Systems Engineering

Research project description

The PhD candidate will develop reliable ML techniques, on the top of deep-networks, by exploring post-hoc calibration and uncertainty quantification approaches eg, TTA, temperature scaling, isotonic regression. The calibrated models, with probabilistic explainability capacity - to allow reliable decision making and safety operation, will then be implemented in the robotic-perception framework for agriculture applications. The multisensory and multi-modality nature of the data (collected by UAV/drones and/or UGV/field-robots) will be incorporated in the probabilistic models according to early and middle fusion strategies, while late-fusion is agnostic to the single-modality models.

Objectives:

1. Study and evaluate different sensor fusion architectures considering the most widely adopted sensors for agricultural applications (LiDAR, GNSS, Camera, and so on).
2. Design low-level drivers for sensor data acquisition, calibration, and uncertainty calibration.
3. Characterise fundamental trade-offs from existing sensor fusion architectures, namely KF variants, and derive a dynamic, robust, and computationally efficient approach for varying sensor modalities.
4. Understand the impact of combining different sensing modalities in perception and validating the impact of the approach in real agriculture applications.

Expected Results:

- Comprehensive understanding of sensor fusion methods allowing to develop an optimization framework that enable combining relevant sensors for agriculture scenarios.
- Evaluation in a real-world environment and evaluate the appropriate key performance indicators.
- Generate results to be disseminated in world-class conferences and journals.

Keywords: ***sensor fusion; remote sensing; machine learning.***

Secondments

The secondments planned for this research project are at:

- INRAE institute (France)
- Sitia company (France)

Desirable skills, qualifications and specific requirements

- Your application should respect the **AIGreenBots** general requirements and eligibility criteria as described in https://aigreenbots.eu/recruitment/general-info.
- You should have a valid MEng/MSc degree, or equivalent, in (preferably) electrical engineering, computer science, mathematics, physics, or related fields.
- Python programming skills
- Some experience on robotics/remote-sensing, machine learning, AI, coding. Motivation, sense of responsibility, autonomy and problem-solving skills are highly desirable.

Benefits

- Very attractive salary - living allowance (gross): 2 285,06 €/month (x14)
- Excellent conditions including - social security tax, food allowance, PhD tuition fee, mobility allowance, family allowance (if eligible)

Funded by the European Union

AIGreenBots has received funding from the European Union's Horizon Europe research and innovation programme under the Marie Skłodowska-Curie Actions (MSCA) Grant agreement ID 101169330.

- Mobility allowance (if applicable): 600€/month
- Family allowance (if applicable): 495€/month
- Research, training and networking costs covered: Registration and attendance at international conferences.

How to apply

You should submit your application through this channel: https://aigreenbots.eu/recruitment/apply-now

Deadline: 02 of March 2025, 23:59.

Additional information

Supervisors of this PhD project: Prof. Gil Gonçalves, Prof. Lino Marques

Host institution and living conditions: University of Coimbra stands as one of the oldest and most prestigious universities in Europe, offering a unique blend of tradition, innovation, and vibrant student life. Founded in 1290, it has been a beacon of academic excellence for centuries, with its historic campus, including the stunning Joanina Library and the Royal Palace, offering a mesmerizing glimpse into Portugal's rich past. Your PhD work will be carried out in the DEEC department (Polo 2) and in the Institute of Systems and Robotics.

Coimbra is a dynamic city with a mix of youthful energy and historical charm. As a student, you will be immersed in a city that thrives on creativity, cultural expression, and a warm, and a very welcoming atmosphere. Coimbra is small enough to foster a close-knit community, yet lively enough to offer a myriad of opportunities for social interaction and personal growth.

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