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Marie Skłodowska-Curie Actions

Green Field Data

Exceptional
36-months Double Degree PhD Scholarship
Position B
Phd in Computer Science from UCD and Mechanical Engineering from IST

Data collection and analysis empowered with AI for robotized Olive Oil Precision Farming

EU Recruiting institutions	University College Dublin, National University of Ireland, Dublin, Ireland (18 Months), Supervisor: Tahar Kechadi IST - Instituto Superior Técnico, University of Lisbon, Portugal (18 Months), Supervisor: Jorge Martins
Keywords	AI, Data Science, ML, Big Data, digital agriculture, Remote Sensing (IoT and IoRT), Data quality, Precision Farming, Data Collection

Exceptional benefits at a glance

- ***International PhD training excellence (here)***
- ***Renowned supervisors & top-tier labs***
- ***Interdisciplinary & multi sectoral research***
- ***Competitive MSCA salary & allowances***
- ***Global academic & industrial network***
- ***Non-academic secondments***

Salary

	Living Allowance	Mobility Allowance*	Family Allowance**
Gross amount	**EUR 5470**	**EUR 710**	**EUR 660**

Long Term leave allowance (if applicable)

Special needs allowance (if applicable)

*private mobility-related costs (e.g. travel and accommodation costs), not their professional costs under the action

**doctoral candidate has or acquires family obligations during the action duration, i.e. persons linked to him/her by (i) marriage, or (ii) a relationship with equivalent status to a marriage recognised by the legislation of the country or region where this relationship was formalised; or (iii) dependent children who are actually being maintained by the researcher, the family allowance must be paid to him/her as well

GreenFieldData Project at glance

GreenFieldData: "IoRT Data management and analysis for Sustainable Agriculture" is a project funded under the action HORIZON Marie Sklodowska-Curie Action (MSCA) Joint Doctoral Network. **GreenFieldData** will train a new generation of researchers able to tackle digital and green transition challenges using a human-centric approach to ensure the robustness and relevance of the solutions responding to the specific needs of the EU market in a context of climate change and increasing socio-economic constraints. At a policy level, **GreenFieldData** outcomes will feed in directly to the aims of the HE

Strategic Plan 2025-2027, EU Partnership Agriculture of Data and Digital EU Program. **GreenFieldData** proposes a high-level interdisciplinary, inter-sectoral and international (triple 'i') research project and training network on new IoRT (Internet of Robotic Things) based solutions for sustainable agriculture. **GreenFieldData** will mobilize 14 Doctoral Candidates (DCs) enrolled in Double Degree Doctorate programmes with 12 academic main beneficiary partners, across 7 EU countries. Moreover, 21 non-academic associated partners, and 3 academic associated partners will provide support to the DCs. The partners form a high quality network, where Academic partners have previous research collaborations as outlined in a common vision paper. The ambitious project will provide the DCs with a unique toolbox of cutting-edge knowledge, tools and strategies which will boost their employability and benefit the next generation operational workforce (researchers, Digital Technologies (DTs) and agricultural stakeholders). The project results will also benefit EU innovation as the human-centric IoT devices & robotics, and data-based solutions tailored to EU context will enable the agricultural sector to assess and mitigate the impacts of climate change, and define new sustainable low input practices, thus increasing resilience and competitiveness.

PhD Position B – *Data collection and analysis empowered with AI for robotized Olive Oil Precision Farming*

Context: Olive production has a tremendous economic and cultural impact on European agriculture. Portugal alone is the sixth largest producer of olive oil in the world and fourth in Europe. The current trend in agricultural practice is to transform olive orchards into intensive or semi-intensive layouts. Water is usually scarce in these regions, so improving irrigation in olive orchards is critical, given both production and environmental preservation. Another factor to consider is weed control. The main methods are mechanical (soil tillage) and chemical (spraying). These operations increase the costs of the olive grove but also impact soil health (interfering with soil biodiversity and its organic carbon stock), contributing negatively to carbon emissions and the degradation of organic matter (soil fertility). We have developed an autonomous ground scouting robot that continuously monitors soil, weeds and plants at a proximity level to the ground and plants close to 30cm in the row spaces underneath the olive trees. This approach contrasts with drone or satellite imagery, which is limited in viewing the in-row ground due to the blocked line of sight. Ground stations also do not provide an optimal solution since they are fixed in space, providing a relatively small spatial resolution. Only with ground autonomous robots can the ground underneath olive tree rows be accurately and practically monitored since it does not require extra human labour. In the near future, we envision multiple networked collaborative ground robots performing scouting and data acquisition tasks in a sustainable way, both environmentally and economically.

Objectives:

This PhD research project will focus on three main objectives:

1. Engage farmers and association technicians, to target and deploy cost-effective data collection technology and develop innovative context-awareness algorithms for monitoring olive crop and AI techniques, adaptive enough to deal with the spatial evolution of organic matter and soil.
2. Develop an unified process in managing robotized precision agriculture methods (making informed decisions for timing and resource allocation, in weeding operation planning, fertilizer applications, water irrigation, etc.).
3. Provide improved decisions to optimize resources and yields, adapting to changing environmental conditions.

Work plan:

1. Conduct a literature review on cost-effective and tuned data collection technology to monitor the crop in real-time [Month 1 – 6].
2. Develop a technique for robotic data collection, ensuring its performance and anticipating the

degradation of water and nutrient supplies [Month 3 – 6].
3. Develop efficient multimodal and context-awareness ML algorithms for smart farming monitoring. [Month 6 – 12].
4. Develop and implement adaptive spatio-temporal ML algorithms to deal with spatial evolution of organic matter and soil pH [12 – 24].
5. Implement an olive smart farming framework for providing informed decisions of key farming operations. [Month 24 – 33]

Expected Results

1. Cost-effective and tuned data collection technology to monitor the crop in real-time, ensuring its performance and anticipating the degradation of water and nutrient supplies.
2. Efficient multimodal and context-awareness ML algorithms for smart farming monitoring.
3. Adaptive spatio-temporal ML algorithms to deal with spatial evolution of organic matter and soil pH.
4. Olive smart farming framework for providing informed decisions of key farming operations.

References

1. Y. Li, S. Dhelim, L. Chen and M-T. Kechadi, "Evaluate the Winter Wheat GVMI and NDMI correlations with the Rainfall," *2024 IEEE Smart World Congress (SWC)*, Nadi, Fiji, 2024, pp. 2089-2094, doi: 10.1109/SWC62898.2024.00320.
2. Bansal, Y., Lillis, D. and Kechadi, M-T. A neural Meta Model for Predicting Winter Wheat Crop Yield. Machine Learning 113, 3771–3788 (2024). https://doi.org/10.1007/s10994-023-06455-1
3. N. Chergui and M-T. Kechadi, "Data analytics for crop management: a big data view", Journal of Big Data, 9(1), 2022, https://doi.org/10.1186/s40537-022-00668-2
4. Y. Li, S. Dhelim, and M-T. Kechadi, "Estimation of Winter Wheat Crop Yield through Multi-Modal Analysis using Satellite Imagery and Meteorological Data," *2024 IEEE International Conference on Knowledge Graph (ICKG)*, Abu Dhabi, United Arab Emirates, 2024, pp. 186-193, doi:10.1109/ICKG63256.2024.00031.
5. Robotics4Farmers PRR project: https://robotics4farmers.tecnico.ulisboa.pt/

PRACTICAL INFORMATION

Recruiting and host institutions	• University College Dublin, National University of Ireland, Dublin, Ireland (18 Months) (Recruiting institution) • IST - Instituto Superior Técnico, University of Lisbon, Portugal (18 Months),
Doctoral schools	• UCD SGS @ UCD, National University of Ireland, Dublin, Ireland. • Técnico Doctoral School @ IST - Instituto Superior Técnico, University of Lisbon, Portugal
Supervisors	• Pr. Tahar Kechadi (University College Dublin, Ireland) • Pr. Jorge Martins (IST, Portugal)
Non-academic mentors	• Mr. M. Connolly (M2Geo, Ireland) • Gonçalo Cané (APAP, Portugal)
Secondments (1 to 6 hosting months)	• M2Geo, M. Connolly, 15th month, 2 months, identification of most appropriate methods and technological solutions used in industrial for multimodal data analytics and the use of cloud computing tools. • APAP, 8th month, 2 months (1 week per month), training on pilot

	data acquisition using robots and preprocessing data
Contact information	• tahar.kechadi@ucd.ie • jorgemartins@tecnico.ulisboa.pt

RECRUITMENT CRITERIA

General criteria

- MSCA Mobility Rule: researchers must not have resided or carried out their main activity (work, studies, etc.) in **Ireland** for more than 12 months in the 36 months immediately before their date of recruitment
- All researchers recruited in a DN must be doctoral candidates (i.e. not already in possession of a doctoral degree at the date of the recruitment)
- An applicant must have received the equivalent of 300 ECTS with a major in computer science, from which at least 60 ECTS corresponds to a master's degree. The master's degree must be granted by a university recognized by the International Association of Universities.
- Scientific excellence to fit the PhD project
- Fluent (oral and written) English skills as the project operates in English language
- Knowledge of the language of the host country may be considered a merit
- Team-mindedness

Required skills

- Advanced ML and programming skills
- Interdisciplinary work
- Master's degree in Computer Science
- Basic skills in IoT and Robotics
- A taste for plant science and field monitoring will be appreciated

APPLICATION

How to apply?

- **All information are provided here**

Deadline: **15th April 2026**

Other information

UCD

University College Dublin (UCD) is **Ireland's largest university** and one of Europe's leading **research-intensive** institutions.

- **Established:** Founded in **1854** by John Henry Newman as the Catholic University of Ireland, it is one of Ireland's oldest universities.
- **Location:** Its main campus, **Belfield**, is a large, modern, and beautiful parkland estate spanning 133 hectares, located about six kilometres south of Dublin's city centre.
- **Size:** UCD hosts over **38,000 students**, making it the largest university in Ireland. It has a significant international presence, with students from over 150 countries.
- **Academics & Reputation:** It's consistently ranked within the **top 1% of higher education institutions** worldwide. UCD is highly regarded for its commitment to research and its graduates' **employability**, ranking #1 in Ireland for this metric.
- **Affiliation:** It is a constituent college of the **National University of Ireland (NUI)**.

UCD School of Computer Science

The UCD School of Computer Science is the **largest computer science department in Ireland** and is known for its strong emphasis on both the principles and practice of the field.

- **Location:** The school is primarily located within the state-of-the-art **UCD Science Centre (also known as the O'Brien Centre for Science)**, on the Belfield campus.
- **Programs:** It offers a comprehensive range of programs, including a 4-year **BSc Honours degree in Computer Science** (with specialisation options like Data Science & AI), various Masters degrees (MSc) for both Computer Science graduates and conversion students, and a Structured PhD program.
- **Research Excellence:** The school is a hub for high-impact research, contributing to Ireland's national research efforts. Key research areas include:
    - **Data Science, Machine Learning & AI**
    - **Computer Security** (including Digital Forensics)
    - **Digital Health**
    - **Human-Computer Interaction (HCI)**
    - **Software Engineering and Distributed Systems**
- **Research Centres:** It is a co-host for major Science Foundation Ireland (SFI) Research Centres, notably the **Insight Centre for Data Analytics** (Ireland's largest data research centre) and the **CeADAR** (Centre for Applied Data Analytics & AI), which links applied research with commercial deployment

Instituto Superior Técnico (IST), University of Lisbon

Instituto Superior Técnico (IST), often known as **Técnico Lisboa**, is the largest and most prestigious school of engineering, science, and technology in Portugal. Established in **1911**, it is an integral part of the **University of Lisbon (UL)** and is consistently ranked among the top engineering schools in Europe.

IST is dedicated to providing high-quality education, promoting research, development, and innovation, and extending its services to the community.

- **Broad Academic Offer:** IST offers a wide range of academic programs, including **Bachelor's (Licenciatura)**, **Master's**, and **Doctoral (PhD)** degrees across diverse fields of engineering—such as Civil, Mechanical, Electrical, Computer, and Aerospace—along with pure sciences, including Mathematics, Physics, and Chemistry.
- **Research Excellence:** The institution is a powerhouse of **multidisciplinary research**, hosting numerous R&D centers and participating in various international consortia. It plays a pivotal role in advancing scientific and technological knowledge across Portugal and beyond.

- **International Profile:** IST maintains strong international connections through student and staff mobility programs (like **Erasmus+**), research collaborations, and joint degree programs with prestigious universities worldwide, fostering a global learning environment.
- **Campuses:** It operates three main campuses: the historic **Alameda campus** in the heart of Lisbon, the **Taguspark campus** located in Oeiras (a technology hub), and the **Saldanha campus** (offering executive training).

Técnico offers its community a wide range of cultural, ludic, and sport activities. Student organisations and student clubs at Técnico promote the academic spirit, which contributes to full integration of students into the school's life. Complete information may be obtained here.