

Position: Doctoral Candidate #10 (DC 10)
Project: Adaptive robotic/manually controlled vehicle coordination
Host Institution: Harper Adams University – United Kingdom
PhD programme: Harper Adams University PhD programme

Research project description

Safe and legal operation of robots in agricultural environments

Agricultural robots and Artificial Intelligence (AI) technologies could soon be helping farmers improve global food security by alleviating labour shortages, increasing efficiency, sustainability and resilience to climate change, and reducing the use of chemicals, fertiliser, water and energy; thereby minimising farming's environmental impact.

AI offers a new expedient method of developing control systems for tasks that would be difficult to manage using classical technologies. Agricultural applications present a unique opportunity for AI systems as they often involve repeatable tasks within a relatively low-safety-risk environment, unlike public or transportation applications.

Although some agricultural technology developers are already incorporating AI systems in their products to enhance the control and functionality, there are growing concerns about functional safety regulations and product certification due to the inherent uncertainty of how AI systems make decisions. Classical engineering development guidelines, are difficult to interpret or simply not transferrable to AI systems. There are virtually no satisfactory ways of exhaustively ensuring and demonstrating that these stochastic systems meet the demonstrable, repeatable, and predictable expectations of existing safety legislation. This is hindering their development and delaying their introduction into the market.

The engineering process for ensuring compliance with functional safety requirements involves thorough risk analyses for the intended application and product. This includes evaluating the system's ability to perform reliably under environmental and technical limitations, and establishing redundancies, where necessary, to ensure these limits are maintained and honoured.

Objective: This project's two aims are (1) Establish the best approach for developing machine learning based control systems for agricultural applications that will allow developers to demonstrate that their AI systems meet safety requirements, based on reviewing and interpreting current legislation for non-deterministic AI systems. (2) Create new compliance testing procedures and processes for agricultural AI machine learning systems. These are essential for manufacturers developing these systems, and will accelerating the supply of AI machine learning controlled machinery to farmers unlocking all of the benefits described in the first paragraph.

Expected Result:

- Identify the current legislation framework regarding deployment of robotics aided by AI in agriculture, in the UK, EU and worldwide when applicable.
- Develop control systems with AI integrated that meet safety requirements and guarantee performance indicators.
- Develop deployment procedures for robotized agricultural machinery.
- Disseminate the results in world-class international conferences and journals.

Keywords: Law, legal, patent, standards, robotics, AI, machine learning, international.

Secondments

The two secondments planned for this research project are at:

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

- (option) any European University or Company where the secondments benefit the candidate/project.

Desirable skills, qualifications and specific requirements

- Your application should, ideally, respect the **AIGreenBots** general requirements and eligibility criteria as described in <https://aigreenbots.eu/recruitment/general-info>.
- Have a valid European Master's degree, or equivalent, in law, manufacturing and/or engineering.
- Be fluent in legal and technical English and, preferably, speak one other European language.
- Motivation, flexibility, sense of responsibility, ability to listen and compromise, autonomy, and problem-solving skills.
- Ability to work with a small cutting edge commercial/academic technology team, and work with a high level of autonomy and integrity when unsupervised.
- Candidates must be prepared and able to travel internationally, sometimes at short notice.
- It is also highly desirable that you have a sound understanding of robotics, machine learning, and AI.

Benefits

- Extremely attractive salary and living allowance: open to negotiation€/year (This project has an industrial sponsor who is prepared to pay a stipend on top of the salary. Total remuneration is expected to exceed all other salaries in this call).
- Excellent conditions including - social security tax, health costs, food allowance, PhD tuition fee, mobility allowance, family allowance (if eligible)
- Mobility allowance (if applicable): 600€/month
- Family allowance (if applicable): 495€/month
- Research, training and networking costs covered: Registration and attendance at international conferences.
- Sponsor will cover travel and subsistence costs as required.
- Opportunity for additional paid consultancy work to support the sponsor's other high-tech research projects.

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. Fernando Alfredo Auat Cheein, Dr Richard CP Green

Host institution and living conditions: Harper Adams University is a specialist agriculture, agribusiness, engineering, food and rural university based central England, with the University currently having more than 5,000 enrolled students. Harper Adams University has regularly been the top specialist UK university of the year. Undergraduate and postgraduate programmes are available in agriculture and crops, animal studies, business, management and marketing, countryside, environment and wildlife, engineering, food studies, geography, rural estate, property and land management and veterinary studies. Harper Adams University performs very well in a number of national rankings. Its graduate employment rate is currently >98%, student satisfaction is 89% and it is in the top five most safe and most welcoming UK universities. HAU will be responsible for WP7 Safe and legal operation of robots in agricultural environments. This will involve the delivery of a workshop for all the Researchers. HAU will also be responsible for supervising DC10 and will host other Researchers providing them real-world experiences in the HAU's Hands Free Robotic Farm.

At this stage we have no concept of what the ideal candidate looks like, we encourage applications from anyone regardless of their age, sex, religion, ethnicity, physical ability, or sexuality that feels they meet the brief and are up to the challenge. You might not feel you meet our requirements, but you never know, be prepared to be surprised!!!