**Call for Studentship Proposals**

This is an open call, to all potential AgriFoRwArdS CDT supervisors, for Studentship Proposals that are defined in partnership with an industry partner. The projects are to be largely funded by EPSRC, together with a financial contribution from an industry partner/s.

Primary Supervisors should complete the Project Proposal Form and return it to the AgriFoRwArdS Delivery Team for consideration by the Selection Panel.

**Deadline**: 24th September 2021

**Email address for completed Project Proposal Form**: agriforwards.cdt@lincoln.ac.uk

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**Who can submit a proposal?**

A PhD project can be proposed by members of academic staff authorised to supervise PhD students within the AgriFoRwArdS CDT at the Universities of Lincoln, Cambridge and East Anglia. To become an AgriFoRwArdS Academic, please complete the [Supervisor Request Form](https://agriforwards-cdt.blogs.lincoln.ac.uk/files/2021/08/AgriFoRwArdS-Supervisor-Request-Form-2021.docx).

**How will we match students to the project?**

Current AgriFoRwArdS students: AgriFoRwArdS students study the MSc RAS at the University of Lincoln during their first year. They then progress onto a 3-year PhD. During the MSc year, Supervisors will be given the opportunity to pitch the projects to students. This is a competitive process and is just one of the ways that AgriFoRwArdS sources projects for PhD students. Proposals may be pitched to students alongside projects sourced from elsewhere and it is likely that there will be more proposals than AgriFoRwArdS students available.

Students applying to study with AgriFoRwArdS from Oct 2022 onwards: As part of the student shortlisting process, the panel assesses the research interests of the applicants. If a successful project is identified as a potential match, the supervisor will be invited to be a member of the interview panel. If the applicant is appointable, the supervisor will decide whether to supervise the student through the MSc and PhD research.

Whether working with an existing or incoming student, please note that proposals may need to be slightly adapted to align with the research interests of the student.

**On what topic?**

AgriFoRwArdS addresses fundamental challenges in RAS technologies for both agriculture and food production. The project should be influenced by a real-world industry need and focus on one of the following RAS component technology areas, including but not limited to:

Mobile Autonomy

Manipulation and Soft Robotics

Sensing and Perception

Fleet Management

Human-Robot Collaboration

Further information on potential research areas can also be found in the §UK-RAS White Paper on the Future of Robotic Agriculture [[1]](#footnote-1)

**Proposal Content**

Proposals should demonstrate that the student will be engaged on a rewarding and relevantresearch project that will provide them with a first-class research experience.

* The proposal should have clearly articulated aims, objectives and focus.
* The research methodology should be appropriate and well defined
* The proposal should demonstrate scientific rigour in its approach
* The project should clearly enable the student to demonstrate a level of independence and originality, to test ideas and hypotheses, and to make a contribution to learning that would be potentially worthy of publication.
* The proposal should detail industrial participation, including agreed financial contributions.
* Only proposals with a letter of support from an industry partner, that includes agreed financial contributions, will be considered.

**Suitability & Feasibility**

The project should be well-suited to a PhD. It will have clear aims that provide opportunities for intellectual challenge whilst having a reasonable element of “security” in that due progress can be made within the time constraints, and by a student who may be undertaking research for the first time.

* The project is feasible within the given resource limitations (including financial constraints).
* The project is achievable within the given time frame.
* Risks to the completion of the project are identified, and robust contingency plans described that would allow the student to successfully conclude a programme of doctoral level research in the event of delays to, or failure of, the original work plan.

**Industry Collaboration**

Only proposals with a letter of support from an industry partner, that includes agreed financial contributions, will be considered. Industry Partners must be willing to commit to co-funding the studentship in advance. For further details on the required financial contribution, please discuss with the CDT Project Lead at the respective institution.

Supervisors will find securing funding from industry easier if the project is co-created. Supervisors may find it challenging to present a solution before an industry partner has highlighted a challenge or identified an area of focus.

Supervisors who have an existing relationship with an industry partner are very welcome to communicate directly with that contact.

Supervisors who do not yet know with whom they could collaborate should view the AgriFoRwArdS Industry Partner list (LINK) for more information. The AgriFoRwArdS team would like to be as supportive as possible, and so please contact Kate Smith if you require more information. Marc Hanheide and Greg Cielniak are also available for further support.

AgriFoRwArdS has a pitch document, for Supervisors to use, during discussions with industry. The pitch document gives information regarding AgriFoRwArdS; the benefits to industry for engaging with the CDT; and it provides details of the financial contributions required. Please go to **Appendix 1**, at the end of this document, for the ‘Benefits of Engaging with AgriFoRwArdS’ pitch document.

The AgriFoRwArdS Delivery Team will help facilitate communications between Supervisors and Industry. This is for two reasons:

* to control the amount of contact with our Industry Partners, to ensure that good relationships are maintained via a cohesive and joined up approach to Industry Partner communications; and,
* to prevent an internal race for securing industry support. The AgriFoRwArdS Delivery Team can facilitate conversations with the right person by providing supervisors with contact details and making the introduction.

**Before contact is made with industry**, (unless you have a pre-existing relationship with an industry partner) please advise the AgriFoRwArdS Delivery Teams (contact details below) of which industry partners you plan to contact. Delivery Teams can then advise whether talks are already occurring with other supervisors; and will be able to provide you with relevant information and support.

Lincoln: Agriforwards.cdt@lincoln.ac.uk

Cambridge: Agriforwards-cdt@eng.cambs.ac.uk

UEA: Agriforwards.cdt@uea.ac.uk

Supervisors will need to ensure that industry partners understand that this is a research project, and that the aim is not to have something to sell to market at the end of the project. It is also important to advise industry that this is a competitive process, and that there will likely be more projects than students available.

Please see the list of AgriFoRwArdS industry partners [here](https://agriforwards-cdt.blogs.lincoln.ac.uk/industry/).

**New industry partners with relevant interests in agri-food are also very welcome to join the CDT**.

**How to apply**

By sending the [Project Proposal Form](https://agriforwards-cdt.blogs.lincoln.ac.uk/files/2021/08/AgriFoRwArdS-Supervisor-Project-Proposal-Form-2021.docx) electronically to: agriforwards.cdt@lincoln.ac.uk.

Please download the current Project Proposal Form from the above link, or via the AgriFoRwArdS website.

In addition to the Project Proposal and industry letter of support, please also enclose, as main proposer, **a curriculum vitae**.

**Selection of projects**

PhD projects should align with at least one of the above RAS component technology areas, and be based on a real-world challenge, as defined in liaison with an industry partner. Project selection is subject to evaluation by the AgriFoRwArdS Scientific Board, followed by approval from the CDT Industrial Advisory Board. The Scientific Board is made up of AgriFoRwArdS Co-Investigators (based at the University of Lincoln), and the Advisory Board is comprised of representatives from AgriFoRwArdS industry partners.

Selection criteria will include the fit to the CDT objectives, scientific quality (originality, significance and rigour of the proposed research), industry partnership, and track record of the supervisory team, with priority given to early career researchers where possible.

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**Please also use this email address for queries or any additional support that may be required.**

**Appendix 1: Benefits of Engaging with AgriFoRwArdS**

# **The AgriFoRwArdS Centre for Doctoral Training (CDT) will create at least 50 leaders in robotics, who will aspire to change the world of agriculture, by finding solutions for real world challenges.**

**Robotics and Autonomous Systems (RAS) are set to transform the Agri-Food industry, and the AgriFoRwArdS goal is to create the largest cohort of RAS specialists focussed on the Agri-Food sector. There will be widescale engagement with industry; projects will be co-designed with industry partners, enabling research to be pushed rapidly towards real-world applications.**

**What is the EPSRC Centre for Doctoral Training: AgriFoRwArdS?**

AgriFoRwArdS is a UK Government Research Council funded initiative to create Agri-robotics leaders of the future, and to support agri-food sector businesses in their advancement of robotics-related projects, benefitting the UK agri-food industry. The initiative is aimed at solving particular technology challenges and thereby securing sector advancement.

Examples of some of the benefits that could be derived by customers within the sector:

* Improved sales and price
* Fewer distress promotions
* Improved reliability and confidence in supply
* Improved matching of supply and demand,
* Improved scheduling of labour
* Reduced on farm food waste

The AgriFoRwArdS Centre for Doctorial Training is a collaboration between the Universities of Lincoln, Cambridge and East Anglia, providing industry with the opportunity to work with experts leading in their fields and their extensive R&D facilities. AgriFoRwArdS brings together a unique collaboration between the partner Universities, PhD students and industry, by creating a unique community that identifies agri-food specific issues, and finds solutions using Robotics and Autonomous System (RAS) technologies.

There are a number of ways that industry and AgriFoRwArdS can work together, to include the co-creation of PhD projects that will feed directly from your business interests. As a sponsor, your return on investment will be derived from the benefits that your organisation will facilitate via the PhD project/s, and you will have the opportunity for wider engagement within the CDT community. The PhD student/s will benefit from leading University research supervision provided by the consortium, whilst working alongside industry expertise.

Projects are largely funded by the UK government via their Engineering and Physical Sciences Research Council (EPSRC [www.epsrc.ukri.org/about](http://www.epsrc.ukri.org/about)). This means that any financial contribution, provided by your business, will be boosted and go further.

## Benefits of engaging with the CDT:

* The research will be heavily supplemented by EPSRC funding, significantly amplifying your return on investment.
* The studentship could be used as the first stage of a long-term employment / R&D engagement.
* Projects will have supervisors from across the consortium providing high levels of expertise tailored to the project.
* Your organisation will be invited to AgriFoRwArdS events, providing the opportunity to network/collaborate with leading stakeholders from across industry, academia and Government.
* Industry sponsors will be given the opportunity to put forward a specific industry challenge, for the yearly Summer School, at which all students collaborate to find a solution.
* Your business will be an acknowledged sponsor and will be given the opportunity to promote your company at conferences, events and via other resources such as the quarterly newsletter.

## Project timeline:

Students will undertake a 4-year research initiative. Firstly, they will complete an MSc programme in Robotics and Autonomous Systems, which includes a preliminary MSc project designed to feed directly into the PhD study. Having prepared the foundations in Year 1, Years 2-4 will advance full- time PhD research focussed on addressing business-related challenges in robotics and autonomous systems.

The AgriFoRwArdS Centre for Doctorial Training will recruit a minimum of 50 students, over five consecutive cohorts. The third cohort (13 students) will enrol in October 2021, and recruitment is due to commence for Cohort 4 due to enrol in October 2022.

## Financial Contributions:

The initiative involves significant funding support from government. The total cost of a 4-year studentship equates to more than £98,605, including a grant to defray living expenses, research travel costs, dissemination funding, and MSc/PhD fees. The CDT requests Industry Partners contribute £32,000 towards the total cost of a studentship, with the remaining 66% of the funding being provided by EPSRC.

AgriFoRwArdS is looking for industry-led projects for students who are due to enrol in October 2021, as well as for future Cohorts.

# Research areas addressed by AgriFoRwArdS

AgriFoRwArdS addresses fundamental challenges in Robotics and Autonomous Systems (RAS) technologies for both agriculture and food production. The project should be based upon a business need and focus on one of the following RAS component technology areas, including but not limited to (see also Figure 1):

1. Mobile autonomy: Agri-Food robots need to move in challenging dynamic, often GPS-denied and semi-structured environments with high precision. Autonomous mobility entails the integration of technologies for mapping, self-localisation and understanding of challenging farm and factory environments, dynamic path planning, precise motor control and locomotion, including safe operation in the presence of human workers.
2. Manipulation and soft robotics: Manipulators are needed for a range of tasks, replacing dexterous human labour, reducing costs and increasing quality. Handling of delicate, unstructured objects such as food products requires new approaches to compliant and flexible manipulation. Example PhD topics might include vision- and tactile-guided handling and grasping tasks, and advanced functional materials for soft sensing and actuation.
3. Sensing and perception: Machine vision and other modalities are needed for analysis of food products and sensor-guided control of robotic systems. Objectives might include classification of crops and weeds; phenotyping; quality analysis of food products; yield prediction; state estimation and modelling of farm or factory environments; detection, identification and tracking of human workers; etc.
4. Fleet management: The true potential of robotics in agriculture and food production will be realised when different types of robots and autonomous systems are brought together in a systemic approach. Holistic approaches to fleet management are required, which fully integrate component methods for goal allocation, joint motion planning, coordination and control, as well as research on their integration and scaling to applications in agri-food.
5. Human-robot collaboration: Many robotic applications will augment rather than replace human

workers. Research may be needed into collaborative robotic systems or ‘co-bots’ that can work alongside human workers, for example, robots for fruit transportation working alongside human pickers, and to improve the safety of human-robot interactions in food production environments.

## Please email the AgriFoRwArdS Delivery Team should you have any queries.

**Email:** **agriforwards.cdt@lincoln.ac.uk**

1. <https://www.ukras.org/wp-content/uploads/2018/10/UK_RAS_wp_Agri_web-res_single.pdf> [↑](#footnote-ref-1)