A smart robotic system for smart farms

Small Robot Co (SRC), a British agri-tech start-up for sustainable farming, announced the successful conclusion of its Smart Farms collaboration with Strathclyde University (UoS), Agri-EPI, and Chinese Partners (CP).

The project successfully developed a prototype for robotic micro-spraying for pests and diseases integrated with SRC's commercial Tomv4 robot, a major technology milestone for Small Robot Co.
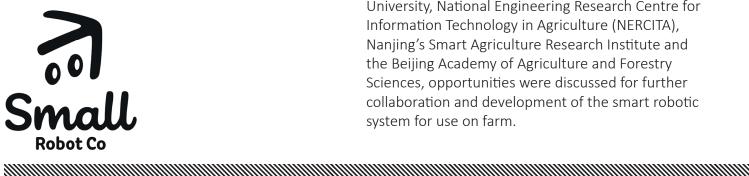
Launched in June 2021, the two year Innovate UK project developed an adept robotic system for monitoring, analysing, and treating pests and diseases in maize and wheat crops to proof of concept stage.

The design of sprayers and algorithms for pest detection was led by Strathclyde University, while Small Robot Co provided the robotic hardware and integrated the algorithms into its Wilma AI system. Agri-EPI's industry-leading expertise aided the analysis, development, and optimisation of data collection.

With the sprayer boom design set for completion this year, the robotic platform is poised for commercial field trials.

Project details

The project's IUK funding bolsters collaborative efforts to deepen insights into wheat and maize-related pests and diseases, alongside refining detection, and precision spraying systems. This heightened precision yields substantial environmental and commercial advantages. Moreover, the project's potential expansion into Chinese/Asian markets augments global innovation and market growth.

To aid in this potential expansion, Agri-EPI's Head of Agri-Tech (Crops), Claire Hodge and Content & Communications Executive, Tatiana Boyle, led workshops and meetings with the project's Chinese partners in Nanjing and Beijing on a recent visit to China. On visits to Nanjing Agricultural University, National Engineering Research Centre for Information Technology in Agriculture (NERCITA), Nanjing's Smart Agriculture Research Institute and the Beijing Academy of Agriculture and Forestry Sciences, opportunities were discussed for further collaboration and development of the smart robotic system for use on farm.

Ben Scott-Robinson, CEO at Small Robot Co., said:

"Micro-spraying could be game-changing for the industry. Pressure is increasing from regulators, leaving farmers short of options. Precision spraying could enable a new generation of spot treatment chemicals, reduce costs, and significantly reduce the impact on biodiversity,"

PerPlant Farming Milestone: Modular Robotic Platform

In a major milestone for SRC, for the first time it has integrated a third party tool to its commercial Tomv4 robotic platform. This demonstrates the versatility and potential of SRC's modular robotic platform, accelerating deployment of robotic PerPlant action across the agritech industry.

SRC's modular robotic platform has been designed and developed to be a robust tool which can carry payloads to complete various actions in the field, such as scouting, micro-spraying or non-chemical weeding. With this successful IUK project, SRC's robotic platform capabilities for third parties have now been proven in the field. This means that third party companies can now integrate agritech tools with SRC's robots to deliver more precise infield action.

Claire Hodge, Head of Crops at Agri-EPI, said:

"The technical advancements since the project started are helping both UK and Chinese companies deliver products on farms which improve efficiency and can reduce labour. With shared challenges, the collaboration of expertise can help us progress farm technology faster."

Small Robot Co is reimagining farming with robotics and AI, making it more financially and environmentally sustainable. By providing field-scale actionable insights at a per plant level, spray technology can be optimised to reduce chemicals and waste. This PerPlant data enables farms to transition to regenerative practices safely and profitably. This aligns with the global vision of farming that promotes biodiversity and strives for Net Zero.

"This is a big technology milestone for our small robots with huge transformative potential. We can now integrate third party tools to our commercial Tom robot. This opens up robotic precision action for multiple use cases across the agritech industry," Ben Scott-Robinson concluded.

Watch the video

Funding opportunities

Farming Equipment and Technology Fund Grants

The Farming Equipment and Technology Fund is part of the Farming Investment Fund.

It offers grants for specific items of equipment to increase productivity, boost environmental sustainability and improve animal health and welfare.

Farmers, foresters and growers in England, including contractors to these sectors, can apply for a grant between **£1,000** and **£25,000**. Grants go towards the cost of specific items from a prescribed list.

Grants guidance
The Farming Equipment and Technology Fund 2023 is split into 2 themes:

Productivity and Slurry grant

> The items in this list improve agricultural sustainability and horticultural and forestry productivity, helping farmers use less inputs, reduce emissions and cut waste.

Find out more about this grant

Animal Health and Welfare grant

> The items in this list offer improvements in the health and welfare of livestock, potentially helping farmers improve biosecurity or decrease environmental stress.

Find out more about this grant

Funding competition

Farming Innovation Programme: Research Starter round 4 - EoI

Farming, growing or forestry businesses based in England can apply for a share of up to £850,000 for feasibility projects to improve productivity, sustainability resilience and move the agricultural sector to net zero.
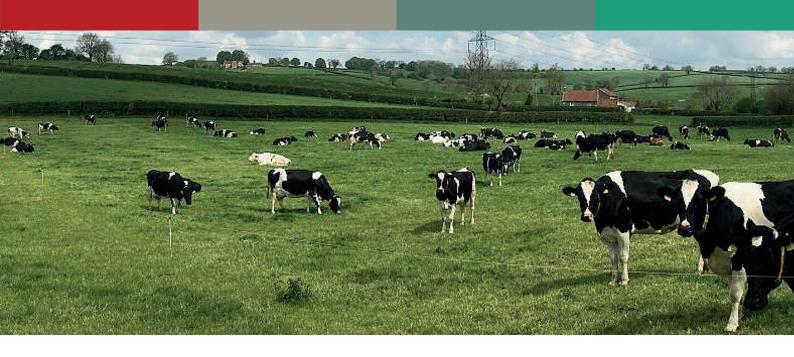
The aim of this competition is to:

> Investigate early-stage solutions with the potential to substantially improve overall productivity, sustainability, resilience and move existing agricultural sectors to net zero

> Prioritise solutions that have positive outputs for farmers, growers or foresters in commercially relevant situations

> Accelerate development of effective new agricultural solutions by working with end-users and collaborating with the wider UK research community in the innovation process

This funding competition is provided by The Department for Environment, Food and Rural Affairs (Defra).

Department for Environment Food & Rural Affairs

AI-enabled tool developed to enhance grassland management

Agribot, an artificial intelligence and climate technology firm and Agri-EPI Centre, with funding from Innovate UK, have joined forces to develop a grassland modelling solution to provide grass growth measurements with accuracy that was unattainable in previous technology—saving farmers' money and bringing environmental benefits.

Working with Cumbria farm network and a dairy farm in Leicestershire, the "Grasslands Modelling for Improved Utilisation" project distinguishes itself from previous grass growth forecasting methods as it combines innovative Synthetic Aperture Radar (SAR), a form of radar that can easily pass-through clouds with a novel two-week probabilistic weather model. The result is year-round reliable data on the dry matter mass cover in an identified field. Farmers will be able to use the data to make informed decisions about their own fields, enhancing farm productivity and lowering the carbon footprint of dairy herds.

Chris Knight, founder of Agribot says:

"With the world experiencing increasingly erratic weather patterns, and with 40% of English agricultural land dedicated to temporary and permanent grasslands, this technology is now more essential than ever—cutting time, costs, and carbon emissions.

"Our app is helping to change this by addressing the problem in three stages: using real time satellite radar data to find out what's happening now, creating a 2–3-day weather forecast and finally a 2–3-week growth forecast for grass based on our long-range weather and localised climate models."

Rob Morrison, Head of Dairy at Agri-EPI says:

"Armed with knowledge about rainfall patterns and grass growth, farmers can proactively manage resources, minimise waste, and significantly reduce costs. This not only bolsters their financial independence but also enhances their ability to withstand economic and climate-related shocks. Well-managed rotational grazing also helps restore and enhance grassland ecosystems.

"Overall, grasslands modelling provides resilience to the dairy farming sector and aligns with the UK's goal for net zero carbon emissions. For instance, an increased utilisation of 1% of grassland could increase the annual profitability of the UK dairy and livestock sector by £22 million. Our test farms as part of this feasibility study are already seeing the benefits of this and we will soon be engaging with the wider Agri-EPI network to increase adoption."

Accurate weather and growth forecasting is an increasingly valuable resource. The Grassland Modelling project not only forecasts the impacts of accelerated climate change but works to help mitigate them through effective farm management. Grassland can be a carbon sink in line with government and supply chain policies. Shorter grazing periods and longer rest periods for the grass allow for manure to decompose, allowing microbes to flourish and populate the soil, increasing the amount of carbon that the soil can sequester, removing carbon from the atmosphere.

Digital mapping project unlocks new future for vineyard production

A new project creating an open-source initiative for data integration paves the way for a new chapter in wine production.

In the rapidly changing landscape of modern agriculture, creating a standard for digital mapping is fundamental for deploying tech onto farms. Digital maps enable valuable decision-making support to structured farming environments.

Defra's Farming Innovation Programme and UKRI's Transforming Food Production Challenge is supporting a new project: Vineyard Information System for Technology and Automation, or 'VISTA'. This will create an open standard for digital maps of commercial vineyards in the UK and around the world, supporting the drive to deploy more automation and precision systems onto farms.

The project is led by a consortium of leading industry partners and will start by digitally mapping vineyards at the row and individual vine level, using JoJo's Vineyard in Oxfordshire as a first test site. The project includes collaboration between tech experts from Agri-EPI Centre, crop mapping specialists from Outfield Technologies, roboticists from Antobot, viticultural consultants from Vinescapes, and robotic mapping researchers from the University of Lincoln.

Eliot Dixon, Head of Engineering at Agri-EPI Centre, said:

"The agricultural industry has a strong need for increased data integration to unlock the true potential of precision agriculture across all sectors. As an industry which is inherently focussed on infrastructure, the key to getting this integration right is being able to communicate in a language-focussed infrastructure. This is what VISTA is all about as a project, creating a mapping standard for agriculture that allows robotics, drones, sensors and decision support tools to communicate, integrate their data and provide maximum benefit for farmers. Viticulture is just the start; we hope to see this basic principle being used in other sectors."

Drone, robot and in-field sensors will be used to monitor climate and weather, crop health, soil moisture, fruit counts, and fruit quality, with the VISTA map providing the digital backbone to process this data. In the second year of the project, the high-resolution VISTA map will then be used to drive precision spraying systems on the farm and to produce accurate pre-harvest yield maps for growers. These two use cases have been chosen to show what a flexible, high resolution mapping standard can bring to farms worldwide. The consortium is excited to explore many more applications in the future.

Ian Beecher-Jones, Co-owner of JoJo's Vineyard, said:

"JoJo's Vineyard is delighted to be the lead vineyard in the VISTA project. We have been developing precision viticultural technologies for the last couple of years and have a strong belief the project will continue the work we have achieved in the Innovate UK Viticulture 4.0 project, which highlighted the importance of establishing a robust digital infrastructure on which all other technologies can work efficiently and effectively."

Oli Hilbourne, CEO and Co-Founder at Outfield Technologies said:

"The VISTA Project is a great example of the strength of UK innovation funding, bringing together technology companies, growers and academic partners to solve specific industry challenges. The UK's wine industry is growing rapidly, learning best practice from other wine growing regions. With VISTA, the UK wine industry has an opportunity to set the international standard and export our knowledge to the rest of the wine growing world. We are really excited to get started on the project and work with UK vineyards to drive increases in productivity."

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Eliot Dixon, Head of Engineering at Agri-EPI Centre

Revolutionising agriculture with AI: Project Insight's autonomous strawberry scouting robot

Join us on a journey to Place UK, just outside of Norwich in Norfolk, where we delve into the ground-breaking Project Insight. This innovative project introduces an autonomous robot designed to scout strawberry crops, working tirelessly 24/7 to provide accurate yield estimations.

Harnessing the power of a 3D camera and AI, the robot navigates through narrow polytunnel rows, capturing images and detecting different stages of strawberry growth, from flower to fully ripe. This cutting-edge technology allows growers to gain a comprehensive understanding of their crop's maturity, helping to eliminate waste and increase returns.

Project Insight is a game-changer for the supply chain, offering precise data to aid in planning and forecasting. The robot collects three types of raw data: the number of strawberries, their replenishment level, and their size. This information is crucial in determining when the berries will be ripe for harvest, ensuring they are picked at the right time to prevent spoilage.

This project is a collaborative effort involving Agri-EPI Centre, Antobot, Place UK, and the Universities of Bedfordshire and Essex. Together, we're exploring how to best utilize the data collected by the robot to improve farm operations, yield prediction, pricing, sales, logistics, and even reduce carbon emissions.

Stay tuned for updates as we continue to refine this technology and plan for larger-scale trials. We're excited to share our progress and the potential of this technology to revolutionize the agri-food industry, not just for strawberries, but for other crops as well. Together, we're driving sustainability and innovation in agriculture, one strawberry at a time.

Watch the video

Combatting rural crime with Arixian's 'digital guard dog'

Rural crime prevention is not working. There are just too many factors running against the farmer and for the criminal. Farming equipment has become more sophisticated, more expensive, and more desirable to criminals. Rural crime officers do their best but simply lack sufficient resources, and police response times are so long in rural Britain that the window of opportunity for criminals is wide open. Existing security systems are too passive. They only trigger once a crime is in progress, and current 'smart' cameras produce so many false positive notifications you are lucky to get any sleep.

Contrast that with what is arguably the ultimate deterrent- the guard dog. Guard dogs anticipate and protect what's important and will bite any criminal foolhardy enough to try and cross them. When Arixian reimagined how to protect rural and isolated properties, the ability of dogs to not only warn but actively defend property is what inspired us to create a totally modern security approach.

Our design principles were to create a perimeter around what must be protected and provide the system with the 'teeth' to respond to perceived threats. Arixian watches over a property 24/7 by connecting to existing security cameras and can understand what it sees. Unlike existing security systems, Arixian doesn't collapse during rain, snow or fog and won't jump at shadows. Its brain has been developed to analyse situations and detect threats, differentiating between normal activity and suspicious behaviour.

Automatically detecting threats is no easy task; it takes powerful artificial intelligence (AI). Arixian's core AI is a hierarchy of specially trained machine-learning models and expert systems, each responsible for different aspects of threat detection. Tracking models watch all CCTV camera feeds simultaneously and track people and vehicles moving between camera views. Higher-level models ingest the tracking data and decide if a person's actions are suspicious. Other models monitor people's responses to countermeasures and handle continual learning to adapt Arixian to the idiosyncrasies of any location. Taken altogether, the Arixian AI can recognise threats with high fidelity and continually learn so that it always gives the best protection.

Of course, Arixian wouldn't be much of a dog if it didn't bark, so when Arixian detects a threat, it moves from watching to 'barking' and eventually to 'biting'. Using escalating countermeasures it will challenge an intruder. If the intruder doesn't respond or back off, it will scale up by triggering lights and sirens. At its extreme, Arixian can deploy sound bombs and strobe lights designed to create total disorientation and draw maximum attention. A rural crime officer who experienced the full effect was "blown away" by Arixian's abilities.

Our digital guard dog is fully autonomous. There is no human watching or deciding actions; it can alert you via your phone that something is happening, but it doesn't need you to take action. If you are interested in finding out more or would like to become part of the test program, you can contact the founders at info@arixian.io