AGRI EPI CENTRE

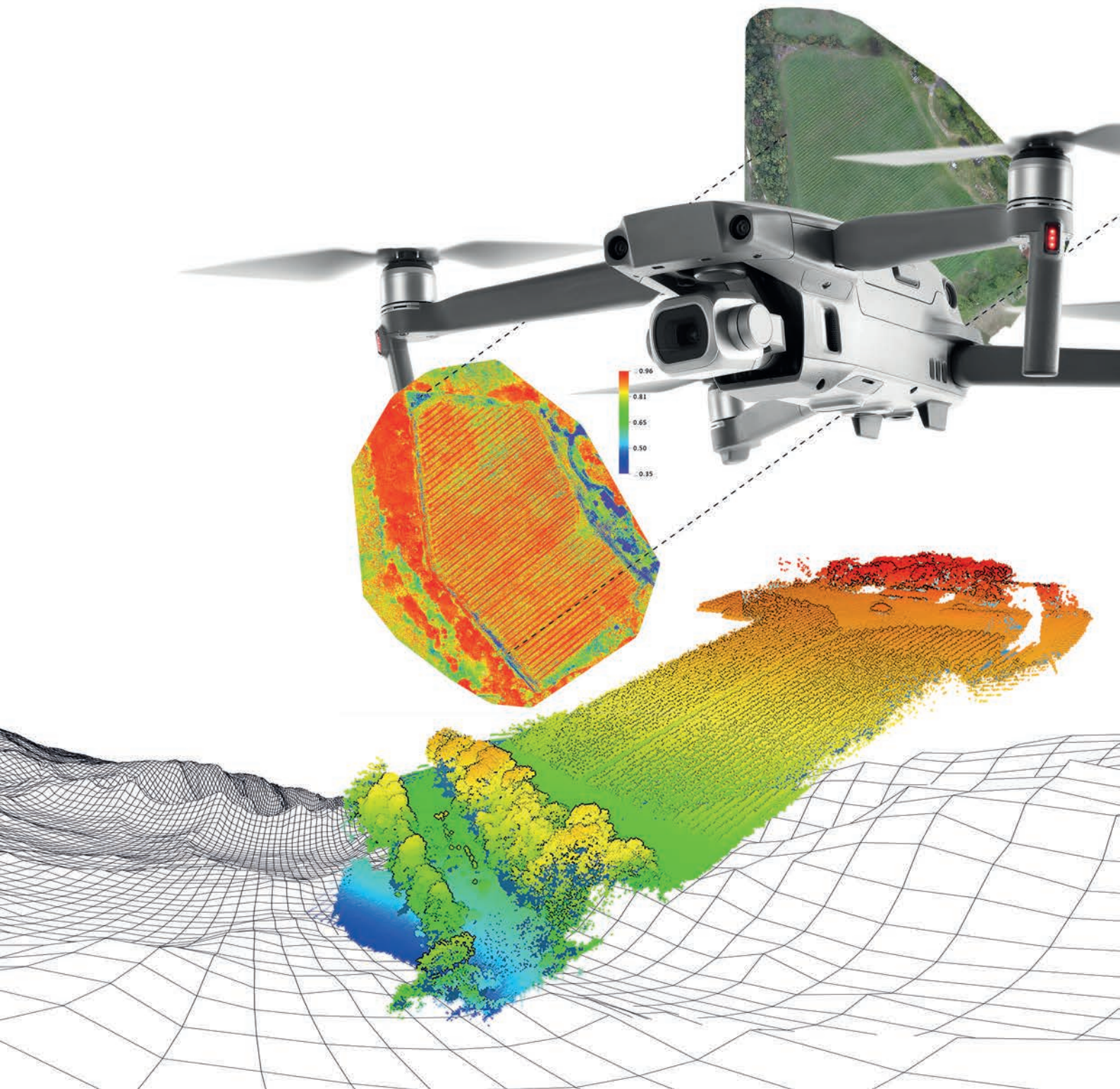Engineering • Precision • Innovation

Automation and robotics for agriculture

R&D Engineering Services

The first choice for agri-tech developers

" *Agri-EPI, the centre for precision innovation in farming, is a first choice for agri-tech developers, from start-ups right through to established companies, to help with creating robust and commercially viable agricultural solutions.*

Eliot Dixon Head of Engineering

Agri-EPI, the centre for precision innovation in farming, is a first choice for agri-tech developers, from start-ups right through to established companies, to help with creating robust and commercially viable agricultural solutions.

Our team believes that it is vital that new agricultural technologies are both relevant and robust, build on well described initial design goals created from a strong understanding of the needs of farmers and their operations. If that is not done, then there will be delays in the development of the product and eventually quality, which will have ongoing negative effects on the trust of farmers in the product. Short testing cycles compound that problem, so the data used to design and build the systems needs to be of very high quality.
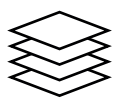
Our offer

Agri-EPI offers a wide-ranging set of facilities, equipment, and services. Our farm network is a key part of this, enabling the testing spaces and long-term interaction with farmers which we rely upon. Within the engineering team, we support the farm network and projects through our data engineering, data analysis and robotics specialisms.

Key resources include:

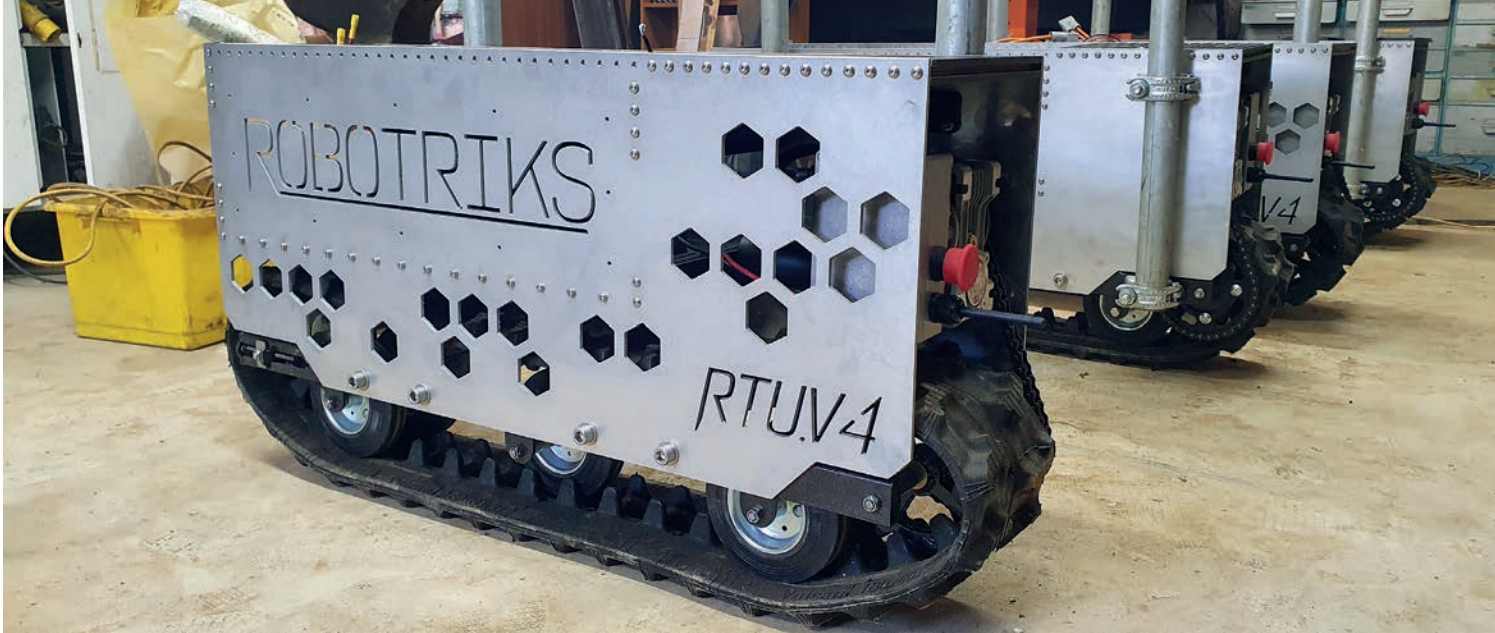| Multi-modal agricultural data | Spectral imaging and sensing | Agricultural data analysis | System simulation | Development / Robotic platforms | Data and robotics in agriculture consulting |

Our team

Our team is a resource that can be accessed as a service for any UK organisation who would like to join us in a commercial or research collaboration. We help in the development process through a combination of a strong team and a worldclass set of equipment and facilities. The team is made of specialists from multiple technical domains. Between them they have academic backgrounds in ground robotics, aerial robotics, computer science, physics, mathematics and spectral imaging, and have employment experience in academia, defence, automotive, aerospace, agri-tech and manufacturing.

Platforms and sensors

Agri-EPI's engineering services can broadly be split into two categories: platforms and data. Both sets of services operate from our hub at Cranfield University. We have invested in manufacturer-independent development platforms which allow sensors and end effectors to be created without needing to create a bespoke system or work directly with a platform developer. This allows collaboration with platform providers to happen only when the requirements of the sensors/end-effectors are fully understood. Our primary offers here are our UGVs and our multi-purpose UAV platform. These can be quickly adapted to almost any agricultural scenario and have the onboard processing power to unlock their full capabilities as a platform.

The team is aware that some sensing technologies which might be extremely useful for agri-tech development are a very large investment in terms of equipment cost and personnel. This investment can be difficult for developers to justify even if the returns can be large. For this reason, we continue to invest in our sensing capabilities and our ability to analyse that data, and we share that resource as a common capability for UK Agri-Tech. We provide high quality sensing across a broad range of technologies, including hyperspectral, SIF imaging, multi-spectral, ground penetrating radar and LiDAR. These sensors are useful for creating data sets used in machine learning training, agronomy, simulations, and system validation. The sensor data is backed up by a range of operational and IoT data sources which are centralised in our geospatial data platform to create a high density layered data repository.

We offer a service provision from creation of the initial testing plans right through to a delivery of analysed data. Planning of operations is conducted in-house, especially in the case of our UAV mounted systems, and we also undertake post-processing of sensor data using the spectral imaging expertise of the team and a suite of industry leading software.

Our team of platform and spectral imaging experts uses our fleet of sensors and specialist software to deliver a range of sensing products such as ground truthing for AI model generation, or the creation of digital twins. We offer UAV and UGV platforms as a means to test novel sensors and end-effectors without the need for a bespoke vehicle. And through working closely with our innovation farm network, we are creating a heavily layered source of evidence for developers using our farm network to design and test their innovations.

> " Our team is a resource that can be accessed as a service for any UK organisation who would like to join us in a commercial or research collaboration.

Engineering Specialisms

Spectral Imaging and Data Processing

> Spectral imaging (i.e., multispectral, hyperspectral imaging) specialist, providing technical support on sensor application in agricultural sector

> Generation of data product and analysis reporting from multiple UAV sensing systems, including RGB, multispectral, hyperspectral, LiDAR, and GPR

> Exploitation of cutting-edge technology applicable in agriculture, e.g., SIF

"As a spectral imaging specialist, I believe that combining this core specialism with other sensing capabilities creates an incredibly strong data and analysis resource. By harnessing the power of light and other sensors, we can uncover hidden information that contributes to a more sustainable and efficient agricultural industry."

Yingwang Gao GIS Data Analyst

Equipment Development and Maintenance

> Looking after all the deployable assets that are in service to the company, including maintenance, asset tracking and deployment, and organising the logistics

> Collecting raw data from various sensors during operations and support post processing

> Researching and comparing the market before procurement of new assets

"As an R&D equipment technician, my role is to ensure that all deployable assets are maintained, tracked, and deployed efficiently, and that logistics are organized seamlessly. I work closely with a team of engineers and agronomists to collect and process raw data from a variety of sensors used during operations, allowing for better data-driven decision-making in the field. Additionally, I conduct extensive research and analysis to compare the market and determine the best procurement options for new assets. Through my work, I contribute to the development of cutting-edge technology in precision farming, empowering farmers to produce more with less and making agriculture more sustainable for our planet."

Aditya Jadhav R&D equipment technician

Data and Software Engineering

> Leveraging the measurement resources of the centre to create high quality dataset and support systems

> Working on creating tools and code to enable the automation of data collection from a wide variety of sources available to Agri-EPI Centre

"There is a large pond of data within the Agricultural sector, which can provide useful insights that may lead to the improvement of practices and growth of the sector. Through Data and Software Engineering we dip into this pond to produce analytics and monitoring systems that provide solutions to farmers and other stakeholders, that enable the optimisation of their operations and improves sustainability."

Panagis Tzivras GIS Software Engineer

Data analysis and system modelling

> Interpreting what data can say about the performance of a system and how it can help the problems being faced by the agri-tech sector

> Working on projects related to the health and wellbeing of cows, specifically by reformatting farm datasets to be sent out for analysis

"I've been applying my background in maths to numerical data analysis, particularly for farm systems modelling. I've also been helping to create a self-hosted data annotation system and upgrade the data services Agri-EPI can provide."

Aidan Robertson Graduate Data Analyst

Mobile robotics

> Enabling robots to understand and react to their environment

> Integrating various sensors to enable autonomy

> Using robots to deploy the sensors and assets to collect data

> Collaborating with partners to integrate their technology with the robotic platform

"Agricultural robotics is at a tipping point from research into farming. In our projects we try to ensure that it moves in a way which is fair to farmers and completely sustainable commercially, agriculturally and socially."

Eliot Dixon Head of Engineering

If you are an agri-tech developer who has a particular interest in robotics, or you require assistance collecting and analysing agricultural data, then we would love to hear from you.

AGRIEPICENTRE
Engineering • Precision • Innovation

Agri-EPI Centre
Easter Bush
Roslin EH25 9RG

T: 0131 239 7100
E: team@agri-epicentre.com
W: www.agri-epicentre.com

UKRI Innovate UK