

AUTOMATION SYSTEMS GROUP

EXPERTISE - CAPABILITIES - PARTNERS
AND HOW WE WORK WITH INDUSTRY

 **WMG**
THE UNIVERSITY OF WARWICK

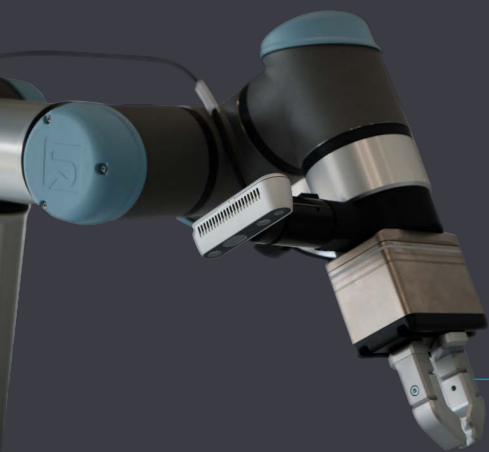
WHO ARE WE?

THE UNIVERSITY OF WARWICK IS A GLOBALLY RENOWNED RESEARCH UNIVERSITY WITH INTERNATIONALLY RECOGNISED EXPERTISE AND FACILITIES.

WMG is both an academic department of the University of Warwick, and one of the UK's High-Value Manufacturing Catapult (HVMC) centres. UK Catapults are world-leading specialist R&D centres, helping to drive technology development and accelerate and de-risk innovation for UK industry.

The WMG Automation Systems Group (ASG) focuses on research and development related to digitalisation and Industry 4.0, impacting on and supporting the life cycle of automation in industry today and in the future.

From Aerospace to Agritech, the ASG team works to support, advise and collaborate with industrial partners across different sectors and across the supply chain to deliver impact and innovation to businesses. See overleaf for our core capabilities.



OUR CORE CAPABILITIES



DIGITALLY AUGMENTED MANUAL OPERATIONS

Deployment of digital systems to ensure operational efficiency and consistency through advanced human-machine and human-process interfaces. Empowerment of operators via guidance and continuous training systems. Guaranteeing operator safety and monitoring well-being for a better and socially sustainable workplace.



AUTOMATION & ROBOTICS

Development of advanced automation solutions. Focuses on rapid and semi-automated engineering and validation process through automatic control code generation from virtual validation environment. Development of smart controls system with built-in production data capture, capabilities and integration interfaces.



DATA ANALYSIS & ARTIFICIAL INTELLIGENCE

Development of data-driven processes, and data-centric solutions for industry; ensuring efficient and easily deployable data pipelines from the operational level to the IT and cloud layer in the organisations. Development of result-driven data processing and analytics methods and software solution to deliver production monitoring at all levels of the organisation.



DIGITAL REPRESENTATIONS, SIMULATION & LIFE CYCLE ENGINEERING

Modelling and simulation methods to support the creation and use of digital models throughout the virtual life cycle of production systems. Development of digital models (e.g. process planning, DES) integration platform to guarantee consistency of digital capabilities across the organisation. Direct deployment of control and monitoring capabilities from a common life cycle engineering model.



MANUFACTURING SCALE-UP

Supporting scale-up of production capabilities (increased volume, quality, product customisation, etc.), physically via the deployment of automation solutions, and virtually, by implementing multi simulation and process validation models at machine, station, area, line and factory levels.



AUTOMATED LOGISTICS & AUTONOMOUS MOBILE ROBOTS

Integration of multiple state-of-the-art smart automation solutions (mobile, autonomous collaborative robotic systems) into robust, scalable and modular automated solutions for internal logistics operations.



COMMS AND SYSTEMS INTEGRATION

Integration of digital systems across all layers of the organisation, from shop-floor OT, to organisation IT, with external/cloud/supply chain level systems, and across the entire production systems life cycle, from engineering to commissioning and operation.



SKILLS TRAINING

Delivering a range of skills development and industrial training courses to support novices and experts in engaging and driving digital technologies and innovations. These industrial training courses will enable the UK workforce to develop the skills that are increasingly important to the growth, innovation, and resilience of the industry.



EXAMPLES OF PROJECTS AND IMPACT

DYNAMIC INTEGRATION OF AUTOMATION WITH LOGISTICS (DIALOG)

FUNDS: £470k
FUNDER: Innovate UK
PARTNERS: Atlas Copco, Lear Corporation Ltd and RARUK Automation

What was the problem: Inflexible automation systems that are not aligned to the vision of agile and reconfigurable manufacturing for the future.

How we solved it: DIALOG integrated manufacturing automation with autonomous logistics capabilities. To increase the reusability and interchangeability of AGV based logistic systems, DIALOG developed a framework to enable a plug and play approach, facilitating integration of AGVs based logistic systems with shop floor automation equipment, manual operation and manufacturing IT systems.

AEROSPACE MANUFACTURING CAPABILITY FOR ELECTRICAL MACHINES (AEROMC)

FUNDS: £14.8m
FUNDER: Innovate UK
PARTNERS: Safran Electrical & Power UK Ltd (Lead) and Manufacturing Technology Centre

What is the problem: Establishing a UK facility, as the equivalent global centre of expertise, for eVTOL and Hybrid Propulsion on new technology aircraft.

How are we solving it: The ASG team are working on both the Scalability and the Big Data analytics of the new manufacturing facility. Through virtual engineering analysis, process modelling and discrete event simulation, the team will ensure that the facility and the process flows are designed to be highly optimised and robust. The pilot line equipment will go through Virtual Commissioning in order to validate systems and enable reduced lead times to operational readiness. The facility will also benefit from as-is and future state business IT/ OT architecture reviews to enable Big Data analytics and actionable insights.

SMART TREE PRODUCTION SYSTEM (STPS)

FUNDS: £860k
FUNDER: Forestry Commission
PARTNERS: J & A Growers Ltd

What is the problem: J & A Growers relies on manual processes to grade 120-150k sapling trees each day, whilst economic pressure and globalisation makes recruiting people into the sector very difficult. In addition, UK Government objectives aim to protect biodiversity and increase woodlands from 15k to 30k hectare by 2025, increasing the need to plant more trees.

How are we solving it: The ASG team have assessed the process and identified opportunities for the introduction of technologies and data collection. The solution will be expandable and autonomous, utilising integrated vision systems, robotic arms, mechanical development and other automation to complete the grading system and align with government objectives. The potential impact is to reduce dependency on labour by 90% with a ROI of 3 years; with a solution which is expandable to every nursery in the UK, adding a value of £1.3M per year to the sector.

DIGITAL MANUFACTURING AND PROOF-OF-PROCESS FOR AUTOMOTIVE FUEL CELLS (DIGIMAN)

FUNDS: €3.5m
FUNDER: Horizon 2020
PARTNERS: Commissariat A L Energie Atomique Et Aux Energies Alternatives, Toyota Motor Engineering & Manufacturing Europe, Freudenberg Performance Materials Se & Co Kg, Intelligent Energy Limited and Pretexo

What was the problem: To reduce the unit manufacturing costs of Intelligent Energy's fuel cell technology in order for it to compete with battery EVs across the automotive sector.

How we solved it: The ASG team developed the production-line solution for the project. The team carried out conceptual design, implemented a proof-of-production system working closely alongside the machine builder, firstly creating a virtual model of the system, guiding its commissioning, and evaluating its production performance via advanced data collection and analysis. Through this work, IE reduced their cycle time on each station from 20-30 seconds down to less than 5, enabling them to meet their requirement of producing more than 50,000 fuel cell stack per annum.

AUTOMATION SYSTEMS GROUP (WMG)

TALK TO OUR EXPERTS

Get in touch today to find out how WMG's Automation Systems Group can support your business needs.

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