

SmartHort 2019

From automation to horticulture

Harnessing new expertise

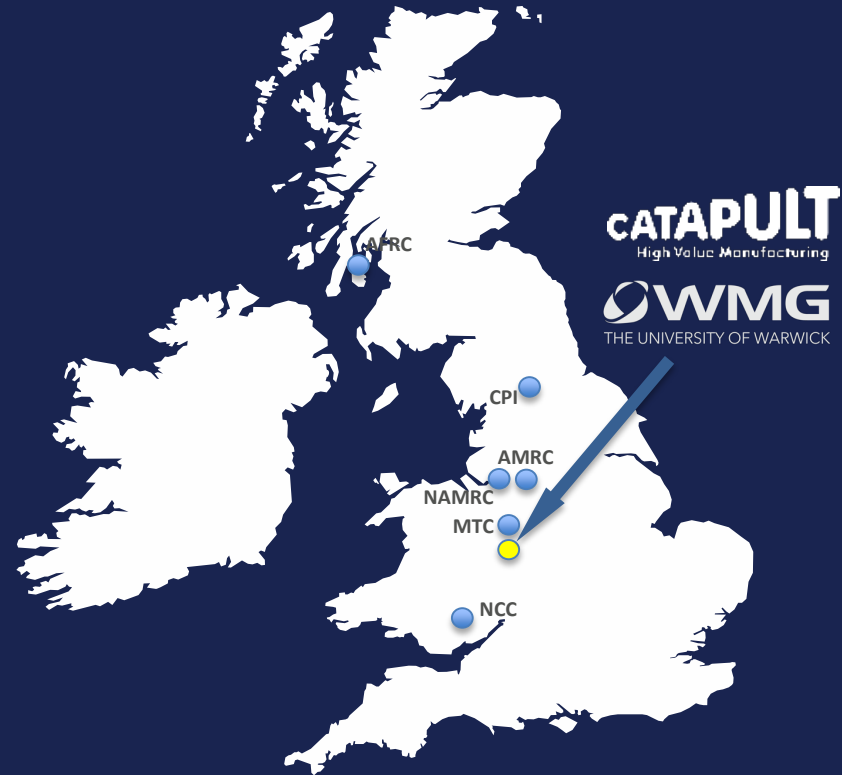
Robert Harrison

Automation Systems Group, WMG, University of Warwick

robert.harrison@warwick.ac.uk

WMG

- ▶ Department within the University of Warwick
- ▶ High Value Manufacturing Catapult Centre
- ▶ Provides education, research and knowledge transfer
- ▶ Works across sectors in multi-disciplinary teams








SmartHort

Automation Challenge

Matches WMG, engineering experts at the University of Warwick, with a UK business to develop an applied solution to a real problem in horticultural production.



WMG Research Teams

| | | |
|---------------------------|--|--|
| ▶ Design |  | Experiential Engineering |
| | | Visualisation |
| ▶ Materials |  | Engineering Materials and Manufacturing |
| | | Science and Technology of Steel Products and Processing |
| | | Nanocomposites |
| | | Sustainable Materials and Manufacturing |
| ▶ Manufacturing |  | Electrochemical Engineering |
| | | Net-shape Manufacturing |
| | | Metrology |
| | | Automation Systems |
| ▶ Systems |  | Digital Lifecycle Management |
| | | Energy and Electrical Systems |
| | | Advanced Propulsion Systems |
| | | Biomedical Informatics, Imaging, and Healthcare Technology |
| ▶ Business transformation |  | Cyber Security |
| | | Service Systems |
| | | Supply Chain |
| | | E-Business |
| | | Digital Media and Innovation |

WMG target sectors

Extensive experience in the automotive industry is being successfully transferred to other sectors



Underpinned by a broad range of digital capabilities

WMG Solution Provision

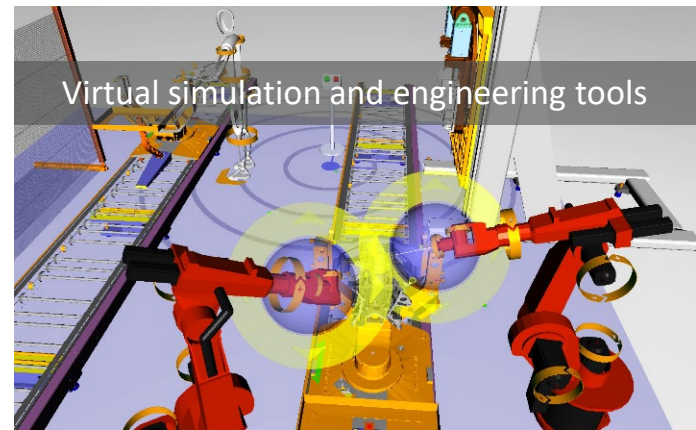
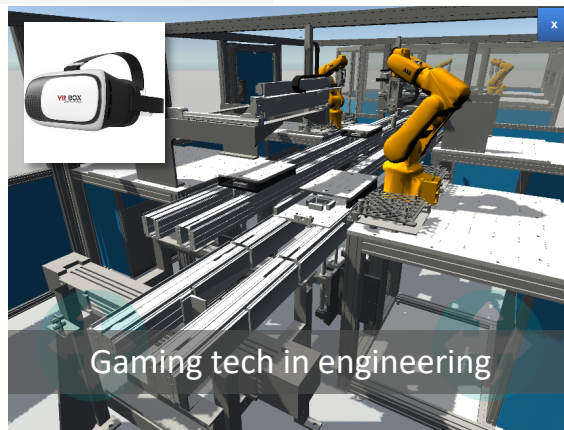
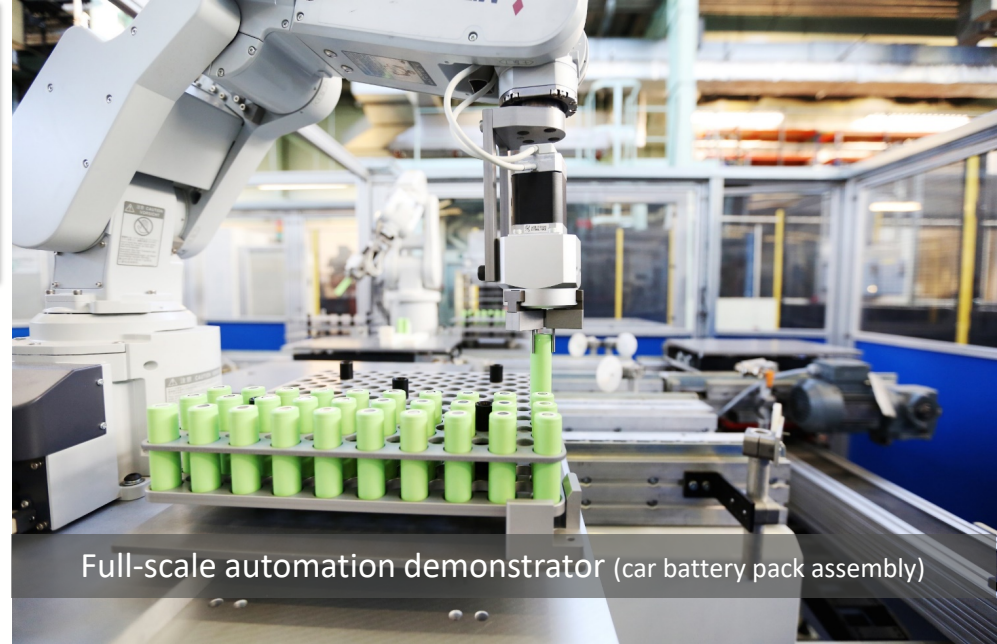




Automation Systems – Scope of Activity

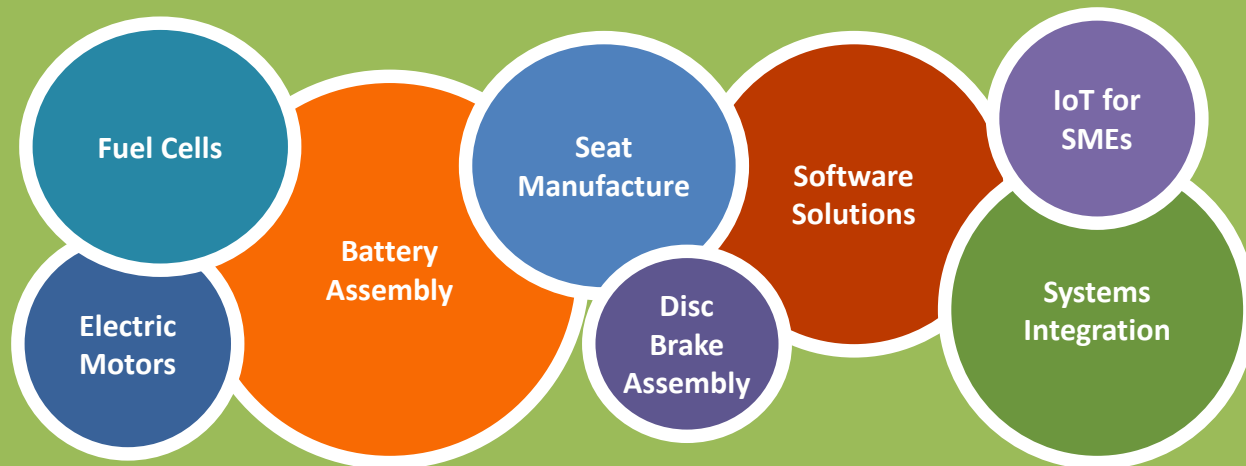
- Custom automation solutions
- Collaborative solution development
- Integration of robots, AGVs, vision, analytics
- Control software
- Simulation and modelling
- Systems Integration
- Digitalisation, Industry 4.0

Automation Systems Research





Example
application
projects &
partners



Example Collaborative Projects

- **Seat Finishing Analytics**
- **Smart Material Racking**
- **Goods-to-Person Assembly**
- **Material Transport to Line**
- **Ultra Low-Cost RFID**
-

Modular Goods to Man Assembly Station

Problem Statement

Large % of direct labour doing "select and collect" NVA movement to rack or warehouse pre-sequencing

Solution

- Small assembly
- Parts list presented
- Open access
- In-Camera

Benefits

- Zero select and collect waste
- Only correct part bin presented
- Integrated weigh scales and scanner option for confirmation
- Auto call for replacement cartons
- Replenishment and return of empties via AGC or tote conveyor
- Handles standard trays, independent of product
- With an Automated Warehouse, could be single carton touch between Goods in and

Material Transport to Line

Problem Statement

Current NVA Material feed to line by FLT, Tug, Hand Cart or simple AGC

Solution

- Innovation in AGV's could be deployed
- Key to success is the load cart and the design of the warehouse load and rack/unload systems within the constrained footprint

Benefits

- Reduction in NV
- Integration with Smart Factory
- FLT risks con

Cost

- Prototype & Development
- Hardware & Software development
- Target \$25,000

Annual Savings

- >75% reduction count

Smart Material Rack

Problem Statement

- Manual Scan to call for material
- Limited visibility of in-stock stock
- Manual receipting of OEE effect

Solution

- Add a detector to each bin location in a rack
- Battery free, wireless switch transmits a signal and off to remote receiver (Energy Harvesting Switches)
- Wireless Transmission
- Cam / Laser system for carton to activate switch

Benefits

- Data can be used to automatically call for replenishment on a 2 bin basis
- Andon Board can monitor & display status allow analysis and optimisation of material
- Link to automated AGC or conveyor material feed

Cost

- Prototype & Development c \$20-30k
- Target \$3000 / 12 carton Rack

Annual Savings

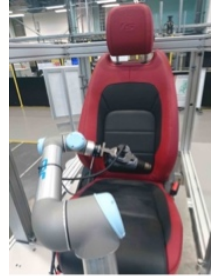
- 10 - 15% Material Line Feed in hour
- 20% improvement RFT material feed

Mechanical Development: Q3 2017
Software Interface: Q4 2017
SOP Potential: Q4 2017

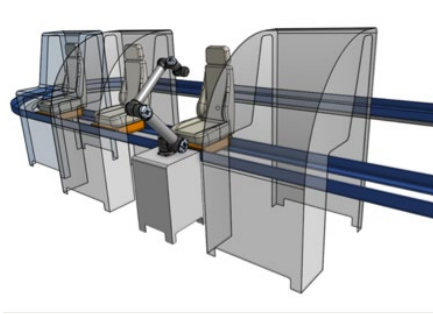
Example – Analytics & Automation



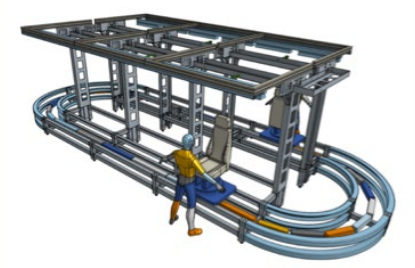
**Capture and
digitise defects
via vision and
machine learning**



**Automate and
integrate the
finishing and
inspection
processes**

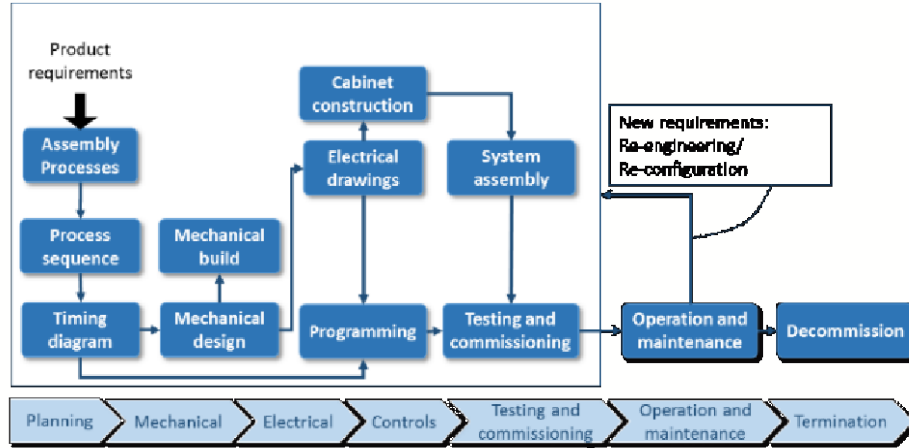
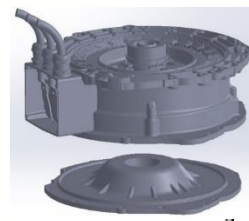


**Productionise
pilot systems
and evaluate
at scale**



**Integrate into the
smart factory utilising
data and optimise
performance in a
wider context**

EXAMPLE – SPECIAL PURPOSE MACHINERY HIGH-VOLUME E-MACHINE SUPPLY (HVEMS)





SmartHort Automation Challenge

- Matches WMG with a UK business to develop an applied solution to a real problem in horticultural production
- Do you have an area of your production you'd like to improve?
- An applied solution over a two-year project



SmartHort Automation Challenge

- A step in your current production system
- Could involve special machinery, robots, autonomous indoor vehicles, and vision systems
- Practical applied solution in at least prototype form
- Collaborative approach

Application process

Open to all growers

Project awarded on a competitive basis:

- Feasibility to deliver within two years
- Novelty
- Wider value
- Ability to input time, resource, trial areas
- Willingness to share progress with wider industry

Masters or undergraduate students at WMG may also work on some of the shortlisted projects.



How to apply

Simply fill out a short form to submit your entry. Please include photos or videos to help describe your entry if possible.

Applications close 29 March 2019.

To find out more about the challenge, please contact debbie.wilson@ahdb.org.uk.

Questions?

Robert Harrison

robert.harrison@warwick.ac.uk

wmg.warwick.ac.uk