Find the right AI technology for your unique business needs

Melanie Cassley Innovate UK Business Connect

February 2025



Agenda

	10.00	Introduction and Overview Mel Caselov IIIK Rusiness Connect							
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	10:05	AI Technologies for Operational and Energy Optimisation in Transportation, Joseph							
		Zubizarreta - Atera Analytics							
	10.25	AL in Agriculture: Sustainability and Innovation Dr Chang Liu - Extend Robotics							
	10.20	A many and millovation, Dr Chang Lid – Exterior Robotics							
	10.45	Technology Selection Challenges and Culture in the Creative Sector Lawrence							
	10.10	Broadbent - Aralia							
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	11:05	Q&A							
	11:20	Closing Remarks & Next Steps							
	11:25	Close							
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Overview

What this webinar will give insight on how to:

- Select the right AI tools
- Overcome challenges
- Optimize operations
- Engage with experts

Al Labs – a more in-depth dive into onboarding Al in your business



Technologies for Operational and Energy Optimisation in Transportation

Joseph Zubizarreta - Atera Analytics





ATERA ANALYTICS

BridgeAI Webinar: Aligning AI Technologies with Business Needs

Al Technologies for Operational and Energy Optimisation in Transportation

5 February 2025

DATE

Company Purpose

Our company is becoming a top innovator on the field of Planning Energy Infrastructure for Electric Vehicles and optimising the resources around this ecosystem. Our technology approach merging network planning, Al and energy planning capabilities have been awarded grants through Innovate UK and Private Companies Support. We got strong interest of further developing our data analytics capabilities from 3 different industry participants:

- 1. Multi-modal Transport Provider covering the entire UK transport network and EVs.
- 2. Strategic NetZero finance partner working with leading car rental and retailer companies.
- 3. Remotely Controlled and Semi Autonomous Electric Vehicles



Derator.

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Context - NetZero for the EV Charging Infrastructure



EV wide adoption in UK is constrained by power charging and navigation experience



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30 Million EVs

In UK by 2030, 20x at least for rest of the world

80% in 2030

Of vehicles to be Free from Fossils Fuels Power Engine

35% Global Average

Annual increase on sales of EVs and infrastructure

85% of drivers

Find EVs charging and mileage as key constraints

Unstructured Data

Real time sensor, user content is a challenge.

Problem

Under the UK Zero Emissions Mandate there is an unprecedented growth of demand of ZEVs (Zero Emission Vehicles) and the infrastructure to provide them of electricity through charging points. At +20% annual growth rate of ZEVs registrations according to the Department of Transport, there are clear constraints to reach the 2035 goals of 100% of non carbon emission vehicles in UK.

Currently the information about vehicle performance, reliability, location of charging points, carbon emissions reduction and driver trends is highly sparse preventing consumers and organisations to reach the vehicle adoption proposed by 2035 targets same for UK and Europe. Once this data is integrated, powerful AI models can be built for increasing efficiencies in energy consumption, RT route <u>monitoring optimisation and EV planning infrastructure</u>.



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Aggressive Net Zero Targets

2035 goals of 100% of non carbon emission vehicles in UK and leading countries in Mainland Europe.



IMPACT ON BUSINESSES

Automaker industry spends billions of dollars each customising and improving net Zero Vehicles Technology and Data.



IMPACT ON CONSUMERS

Vehicle consumers need further education and advice towards which is the right vehicle to rent or purchase. 70% of consumers are unaware of long term savings and benefits these vehicles represent.

Approach

Combine advanced AI & APIs for dynamic data modelling, transfer and interoperability.





Application Programming Interface

• Focused on providing explainable insights on netZero energy usage and navigation.

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• The Interface is designed to **facilitate integration with client data**.

The Key reasons for selecting these technologies:

- Al allow us to evaluate the data quality and predict issues.
- APIs facilitate the standardisation of different data sources.



Enabling a full EV connected ecosystem

Business Use Case A – EV Planning & Infrastructure

Our Solution AteraEV is focused on Developing an End to End Real Time Software Application. T

- □ Solution focused on EV Route Planning and Infrastructure development.
- U We have integrated the AI, API and Network Optimisation Platform.





Current Solution on EV Route Planning and Infrastructure



Kia Niro EV with Several Sensors previously, used for autonomous driving to be setup with all tools



Sensing Equipment For Data Collection equipment for EV performance and Geo Data



Front End Showing Benchmarking of EVs wrt to Routes and Overall Cost of Operation



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Business Use Case B – EVs Benchmarking

Under the UK Zero Emissions Mandate there is an unprecedented growth of demand of EVs and the infrastructure to provide them of electricity through charging points.

- Optimised Energy Efficiency Analyse real-time data from the EVs to improve battery performance, energy efficiency, and route optimisation, reducing unnecessary power consumption.
- Enhanced Range Prediction Provide more accurate estimations of driving range based on real-time conditions such as temperature, driving behavior, and terrain, reducing range anxiety for EV users.
- Competitive Market Insights Our benchmarking enables consumers to compare EV models, get budget implications on battery technology, energy management, and vehicle design

Delivery



Atera Analytics platform contrasting the performance of different vehicles for fleet enablement and energy benchmarking.

Results

This solution effectively contrasts the performance of different EV vehicles based on the proprietary data. This is based on the platform and sensors presented in the EV Platform slide.



Business Use Case C -Real Time Monitoring of Road Infrastructure

Through continuous data streaming capabilities we have enabled technology to monitor in Real Time road, mines and complex infrastructure to identify critical scenarios and reduce the impact of unforeseen circumstances and condition monitoring.

Through the usage of different algorithms with Deep Learning and distributed systems, we have the tools tools:

- Reduce the risk of significant traffic jams
- □ Forecast the short term state of critical infrastructure such as roads, train lines and motorways.
- Identify in real time the count of vehicles by class, nonmotorised transport and pedestrians at any available observation point.
- Redirect traffic and main flows across alternative routes with long term planning.



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Delivery



Examples of real time monitoring of infrastructure already applied in previous industrial engagements, applied on roads condition monitoring and vehicles identification.

Results

Real time monitoring of highway and relevant intersections, counting the number of active vehicles in transit, pedestrians and non motorised transport. Reduce false positives of object detection by 96% and reduce the impact of congestion by 38%.

Business Use Case D – Multimodal Transport Pricing & Rescheduling

Multimodal transport organisation in the UK implemented an adaptive AI platform.

- **G** Focused on integrating data representing operations from large freight vessels, ports, train operators and last mile delivery fleets.
- Integrated the data with an adaptive AI platform using probability estimations of vessel arrival time, cross correlate with weather and seasonality

patterns and forecast the availability of spaces at train level.



Results



Price optimisation leading to better revenue and profit forecasting, this based on customer preferences, and set windows of delivery.

Simplified Architecture EV Planning and Benchmarking

Transport and Energy Grid Data	DAFNI Infrastructure DB Weather Data EV Data UK			Proprietary Features Layer	Energy Supply Data EV & Operations Rules
Turo uo oo ut	EVS, Charge Point Locations and UK infrastructure		Data Transformation Network Layer	Demand Model	Feature Generation
Platform Data Integration	Sensing Data Acquired through our EV platform	Ø	Route planning and Machine Learning a	d charging locations mode and Optimisation Cloud Database +	elling -

Business Data & Insights



Q&A + Call to Action



Let's transform together the EV and Transport Ecosystem with Data & AI!

Support

We are keen to get your support and advice for commercialisation of AI solutions in Transport and Energy.

Investment

We are looking for funding to hire additional team members, and scale up our tools.

Contact us

joseph.zr@atera-analytics.co.uk admin@atera-analytics.co.uk



www.atera-analytics.co.uk





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Appendix

Net Zero Guidelines

Use common terms within Data Assets, Metadata and supporting information.

We have built several Data Dictionaries to speak under the same terms.

Enable potential Data Users to understand Data Assets by providing supporting information.

Set up the relevant content and documentation according to data analysts and engineers. Describe data accurately using industry standard Metadata.

Followed methodologies and terms from the IEEE and UK Energy guidelines.

Treat all Data Assets, their associated Metadata and Scripts used to process Data Assets as Open.

Worked with Open guidelines on metadata and software development.

NZ Data Users



Identify the roles of stakeholders of Data Assets.

We have identified our present stakeholders as ZEVs rental services, energy planners and their IT managers.



Learn and deliver to the needs of current and prospective Data Users

Structured project's requirements based on user stories.



APIs - Make Data Assets discoverable for potential Data Users.

Fully Documented API and guidelines for different users to come.

Source: https://www.ukri.org/publications/innovate-uk-net-zero-living-data-guidance/





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Thank You

date February 2025

Al in Agriculture: Sustainability and Innovation

Chang Liu, Extend Robotics





Al in Agriculture: Sustainability and Innovation

Dr Chang Liu | CEO & Chief Designer of Extend Robotics

Examining the role of collaboration and innovation in advancing the application of cutting-edge technologies across the agricultural landscape



Extend Robotics

2024 Intro Video Link

Extend Human Capabilities Beyond Physical Presence

A Robotics Software Solution Amplify the World's Labour Productivity, through Immersive Tech, Robotics and Artificial Intelligence.





History of Milestones



Physical Presence Has Limits

Different from Factory Automation (such as automotive assembly robot arms), Real-world tasks are highly variable, multi-purpose, in dynamic and unpredictable environment. Making traditional automation impractical.

Embodied generative AI is an opportunity to enables human-like intelligence for robotics, capable of working in real-world.

Factory Automation

Real-world Automation

- Repetitive tasks
- Single purpose
- Static environment
- Controlled scenarios

- Variable tasks
- Multiple purpose
- Dynamic environment
- Unpredictable
 scenarios





Today's Factory Automation Cannot Keep up with Rapid Labour Shortage



The worldwide manufacturing ecosystem is facing the challenges of workforce shortage

It is estimated that the current trends may result in **2.4 million manufacturing jobs unfilled by 2028** [32].

While closing the global skills gap could add US\$ 11.5 trillion to global GDP by 2028 [33].

Due to:

- 1) Aging workforce,
- 2) Outdated workforce planning and education,
- 3) Poor perception of manufacturing among the young generation, and
- 4) Changing nature of work in hard to access and harsh environment [31].

[33] World Economic Forum, "The Future of Jobs Report 2020 OCTOBER 2020," World Econ. Forum, no. October, p. 163, 2020, [Online]. Available: https://www.weforum.org/reports/the-future-of-jobs-report-2020?fbclid=lwAR3EXdpArwyKI_VPpJ7Tlf2juGfXwV7LsYNi5NOU_YbzA9uellVUUncNtlQ#report-nav.

^[31] I. Nääs et al., Advances in Production Management Systems. Initiatives for a Sustainable World: IFIP WG 5.7 International Conference, APMS 2016, Iguassu Falls, Brazil, September 3-7, 2016, Revised Selected Papers, vol. 488. Springer, 2017.

^[32] G. Li, C. Yuan, S. Kamarthi, M. Moghaddam, and X. Jin, "Data science skills and domain knowledge requirements in the manufacturing industry: A gap analysis," J. Manuf. Syst., vol. 60, no. April, pp. 692–706, 2021, doi: 10.1016/j.jmsy.2021.07.007.

Solution

AMAS: An Intuitive VR App to Operate Robots for Live Control, or Supervise & Train Al

Accessible to All

Extended Reality (VR/AR/MR) based; gamified application accessible to everyone regardless of skill

World ClassWorld's Leading 3D Graphic & Streaming Engine
(4 Granted Patents: GB2600527)
Dexterous Gesture Interactions with digital twin

Affordable
StandardConsumer Extended Reality Equipment
standard network (WiFi, 5G) Standardised
Wide range of 3rd-party Commercial Robots

AI & DataCollect user demonstration data, structured
synchronised multi-modal
Directly from the same robot for inferencing



Who is Extend Robotics

Click video here



Vision

How will it work?



Deploy with Foundation AI

Pre-trained AI with Real World Knowledge



Fine-tuning for User Defined Task and Remote Supervision



Vision

Intuitive VR Interface Enabled Data Flywheel

VR Interface will unlock:

- Human Supervised Deployment of Robot in real world in day 1
- Continuous edge case data collection even after deployment of robot in the field
- Continuous improvement with imitation learning and augment synthetic data from Sim-to-real transfer



AMAS VR

Extend Robotics Capabilities Overview

Human-Robot Interface Combines Real-time Volumetric Telepresence with Interactive Digital Twin



3D Volumetric Telepresence

• Renders the remote workspace in 3D, with Audio

- Depth Perception for Teleoperation
- Flexible Viewing Angle
- Low latency & Low bandwidth
- Fusion of multiple cameras
- Bidirectional Audio
- Adjustable scale



Interactive Digital Twin

- Provides user gesture input to control any robots
- Support of 3rd party robots (ROS)
- Intuitive Gesture 20+ DoF
 Inputs
- Head, hand, finger, shoulder, elbow tracking & mapping to corresponding robots
- Support Force / Haptic Feedback
- Passthrough Mixed Reality
- Adjustable Scale



Automation Co-Pilot

- Automate any task remotely on-demand dynamically
- Compatible with 3rd Party Automation (ROS)
- Motion playback with snapshots and recording
- Advanced generative Al models (Action Chunking transformers, diffusion policy)
- Remote Supervision and Intervention



Fleet Management

- Monitor and Manage Multiple Robots remotely.
- Dynamically load and configure multiple robots and sensors
- Multiple digital twins and 3D sensor rendering in one interface
- Intervene and switch control between robots at any time in virtual environment
- Fleet robot tasks with synchronized movement automation



Cloud Infra & Data Management

- Easily access, store and utilize data from robot at high fidelity.
- Cloud Connectivity for realtime streaming
 Security and authentication of data
 Structured multi-modal
- Data Collection for Al Training
- Capture joints, RGB, Depth, audio, haptic information with 1 click

Vertical-specific Partnership Awarded: Viticulture

Grape Harvesting and Pruning- £1M collaborative project for 3 year

Video LINK

The project involves a collaboration between Extend Robotics (ER), Queen Mary University of London (QMUL) and a UK vineyard, Saffron Grange (SG).

- Reduce reliance on seasonal labour (offshore global labour)
- Reduce input and labour costs (24-7)
- Increase yields.
- Reduce emissions and environmental impact.
- Improve overall crop quality.



Jueen Mary

Extend Robotics Vineyard Trial

Click video here



High Variability Tasks, Struggling with Human Labour

Hazardous Environments

Liberate humans from dangerous tasks

- Reduce 'costly' injuries in workspace
- Reduce operation cost (facility downtime, PPE, Access) 10x



C AtkinsRéalis

Nuclear Hazardous Material Handling



AIRBUS

Space Infrastructure Service & Maintenance, and Exploration

Labour Productivity

Outsource Global Labour and Al

- Offsite decentralized outsource labour, 24/7 global shift
- Accelerate adoption of robotics & AI in high variability tasks 10x





Addwerk

Manufacturing Tending Industrial 3D Printing Parts (small patch orders) Agriculture Viticulture Grape Picking and Pruning

ENGLISH SPARKLING WINI



Extend Robotics Human-inthe-loop Embodied AI





Adaptable and flexible with Intelligent AI



Easy to setup and train with intuitive interface



Max reliability and transparency with human in the loop



Mobility and dexterity with hardware agnostic solutions, without vender lock in



Ready to scale with fleet monitoring and management

Productivity Progress of Extend Robotic Al



-> Fully automated

Level of Automation

Task space

How we Help with Your Automation Challenges



Feasibility evaluation

In-house prototype use case validation

Robotic capability evaluation

3-6 weeks



Simulation PoC

Nvidia Issac Lab building realistic scenario

Data collection, training and inferencing in simulation 1-3 months



Robot PoV deployment

Hardware full solution integration

Al Model fine tuning from physical robot

KPI and ROI validation in real operating environment

3-12 months



Scale-up deployment

Solution & supply chain optimisation for scaled production

Use case process automation

Commercial Partnership

6-24 months

Talk to us about your automation challenges, research interest, and investment

Extend Robotics

Dr Chang Liu | CEO & Chief Designer Chang.liu@extendrobotics.com Mobile: +44(0)7859400775



Improve operational Cost Efficiency and Safety in Electric Car Production and Recycling



Vertical-specific Sales & Partnership: Nuclear

Gloveboxes for nuclear material handling (video demo)









- Problem: handling hazardous material within a glovebox can be inefficient and carries many risks.
- Solution: The solution to the glovebox challenge requires integration of robotics and Al. Manipulators, graspers or other end effectors, and specialised platforms that can fit through a glove port can be controlled remotely via VR, or AR.
- Savings, Increased safety of operations, Accelerated deployment time etc.
- Link to more project details
- Scenario details:
 - Nuclear decommissioning is an inevitable by-product of the rise of nuclear energy: estimated to be worth £50 billion per annum by 2020. In the UK alone, mostly at Sellafield, the total cost is estimated at £60 billion, among which 20% will be spent on RAS technology (by National Nuclear Laboratory). Estimated £132 billion budget to decommission UK nuclear site for the next 120 years.
 - Mostly in glovebox but also including inside decommissioning facilities.
 - Mostly cutting, pick & place tasks



Vertical-specific Sales and Partnership: Space In-Orbit Servicing and Manufacturing (video demo)



AIRBUS @esa



Immersive teleoperation interface to complement limitations of existing automation solution, we can

- Avoid the cost of manned missions
- Safer and faster, allowing astronauts to perform complex handling task in craft
- Subject matter experts from earth to perform assembly and servicing in space







Technology Selection Challenges and Culture in the Creative Sector

Lawrence Broadbent, Aralia







Bridge AI

Technology Selection Challenges and Solutions A Creative Sector Focus

Laurence Broadbent - Aralia Systems Limited



About us

Aralia is a technology SME based in the UK and the USA.

Founded in 1997, we create products that incorporate automated image interpretation We are engineers who provide solutions for image processing tasks.

Who are we?

Aralia is focused on the provision of tools that convert 2D images into accurate 3D reconstructions.

We use new techniques in AI to make our products affordable and accessible to SMEs.





Scope

AI has a broad range of applications within the Creative Industries

We discuss ways that creators can establish a competitive advantage with AI

Presentation Content

- Creative Industries
- Al techniques
- Retaining Creativity
- Quality Metrics
- Summary



The Creative Industries

The creative industries focus on innovative, artistic, and intellectual property-driven activities.

They span design, media, entertainment, advertising, publishing, heritage, architecture and technology. From music to museums, creative industries span diverse fields powered by imagination and innovation.

They are at the forefront in applying AI to support creative processes such as the production of graphics, augmented reality and the recording and presentation of heritage information.



Technology

Al Techniques

The complexity of strategies to capture the process from the training data has increased in step with reduced computational costs

- DNN Deep Neural Networks
- GAN Generative Adversarial Networks
- Diffusion Diffusion Models
- TNN Transformer Neural Networks



Current Suppliers

The large investments required to create and operate AI has resulted in the consolidation of service providers Popular process models for various applications December 2024:

• DNN Neuralangelo (NVidia)

- Diffusion DALL E 3 (Open AI)
- TNN/Diffusion SORA (Open Al)

 TNN (Open Al)

Chat GPT 4



Al Techniques

🔿 Meta Al



Transformers: Used for text, images, music, and video.

Examples:

- GPT-4 (text)
- MusicGen (music)
- VideoPoet (video).

Diffusion Models: Generate high-quality images and videos by iteratively refining noise.

Examples:

- DALL·E 3 (image)
- Stable Diffusion (image)
- Sora (video).



Generative Al



GANs (Generative Adversarial Networks):

Used for image and video synthesis.

Examples:

- StyleGAN (image)
- MoCoGAN-HD (video).



The risks of AI adoption

"To be a joint author, one must make a copyrightable contribution."[59]

"A person who merely describes to an author what the commissioned work should do or look like is not a joint author for purposes of the Copyright Act."[60] Open consultation **Copyright and Artificial Intelligence** Published 17 December 2024

Contents Copyright and AI: Consultation Ministerial Foreword A. Overview B. Copyright and Artificial Intelligence C. Our proposed approach D. AI outputs

🔒 Print this page

Copyright and AI: Consultation

Presented to Parliament by the Secretary of State for Science, Innovation and Technology by Command of His Majesty

December 2024

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Copyright and Artificial Intelligence, Part 2 Copyrightability Report

https://www.gov.uk/government/consultations/copyright-and-artificialintelligence/copyright-and-artificial-intelligence



Copyright

Improve the functioning of the internal market and promote the uptake of humancentric and trustworthy artificial intelligence (AI). EU AI Act



EU AI Act

Proposal for a

Regulation of the European Parliament and of the Council Laying Down Harmonsed Rules on Artificial Intelligence (Artificial Intelligence Act) and Amending Certain Union Legislative Acts

2021/0106 (COD)

Copyright applies "only in relation to a subjectmatter which is original in the sense that it is its author's own intellectual creation" UK Court of Appeal

European Commission

> https://artificialintelligenceact.eu/high-level-summary/ https://ial.uk.com/important-copyright-originality/



Retaining Creativity

"The appeal [of Wallace and Gromit] is seeing the artist behind the work" –Nick Park

- Al should assist the creative process
- Prioritise human intent and artistic vision
- Human refinement ensures uniqueness and originality
- Utilise AI for rapid experimentation
- Infuse personal style and imperfections



Business Models for SMEs

Processing vs Training Data



Quality Metrics

User metrics add value to the model generated and help to secure copyright.



None of the popular AI products generate quality metrics for users.

In some applications, holding these metrics separate from published data greatly reduces the value of the data than can be scraped from internet sites and is a mechanism for retaining copyright.

Data-Driven Al



Capture of Creative Expressions

Al-driven photogrammetry is used to capture complex expressions of creativity.

Integration with Media Production

These reconstructions are then integrated into traditional media production.

Quality Metrics

Each reconstructed model comes with an associated quality metric at every point

Copyright is retained by the artist



Elata Aralia's 3D scanning smartphone attachment

Low-cost attachments extend the utility of smartphones.



Summary

Creative Industries are set to have greater flexibility for Business Models that embrace Al

- AI Tools for the creative industries are set to fall in price
- There will be more suppliers offering greater choice
- The cost of AI hardware for targeted markets will no longer be beyond the resources of SMEs.
- The industry is beginning to pay attention to AI quality and efficiency
- Copyright is a highly contested subject in AI



Thank you.





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Q&A Session



Wrap-up & Close

BridgeAl Team

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Hartree Centre



The Alan Turing Institute



BridgeAl