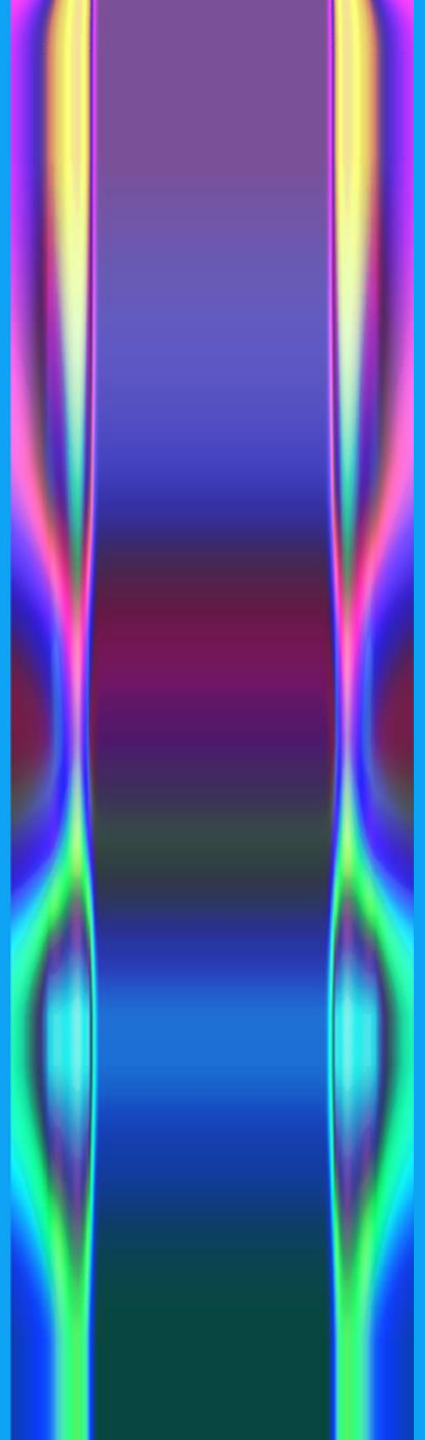
Vishak Dudhee

Head of Innovation

V-LAB



UKRI Innovate UK

BridgeAI

National Innovation Centre Data

AI-Powered VR Construction Training Environment and Platform

Dr Vishak Dudhee
BEng (Hons) MSc PhD CEng MEI FHEA
vishak@v-lab.uk

1st May 2025

V-LAB

About V-LAB

Smart Engineering Technology and Energy Consultancy

- Commercialisation of academic research
- Tools and processes for net-zero economy
- Engineering and energy consultation






Energy | Digital Twin | Simulation | Extended Reality | BIM | Aerial Survey | Artificial Intelligence | Internet of Things

Collaboration:

acocks greener | Cambridge Professional Development | TWI | Redcar & Cleveland Borough Council | NTU Nottingham Trent University | TRICORE Technical Services | European Commission Joint Research Centre | ...

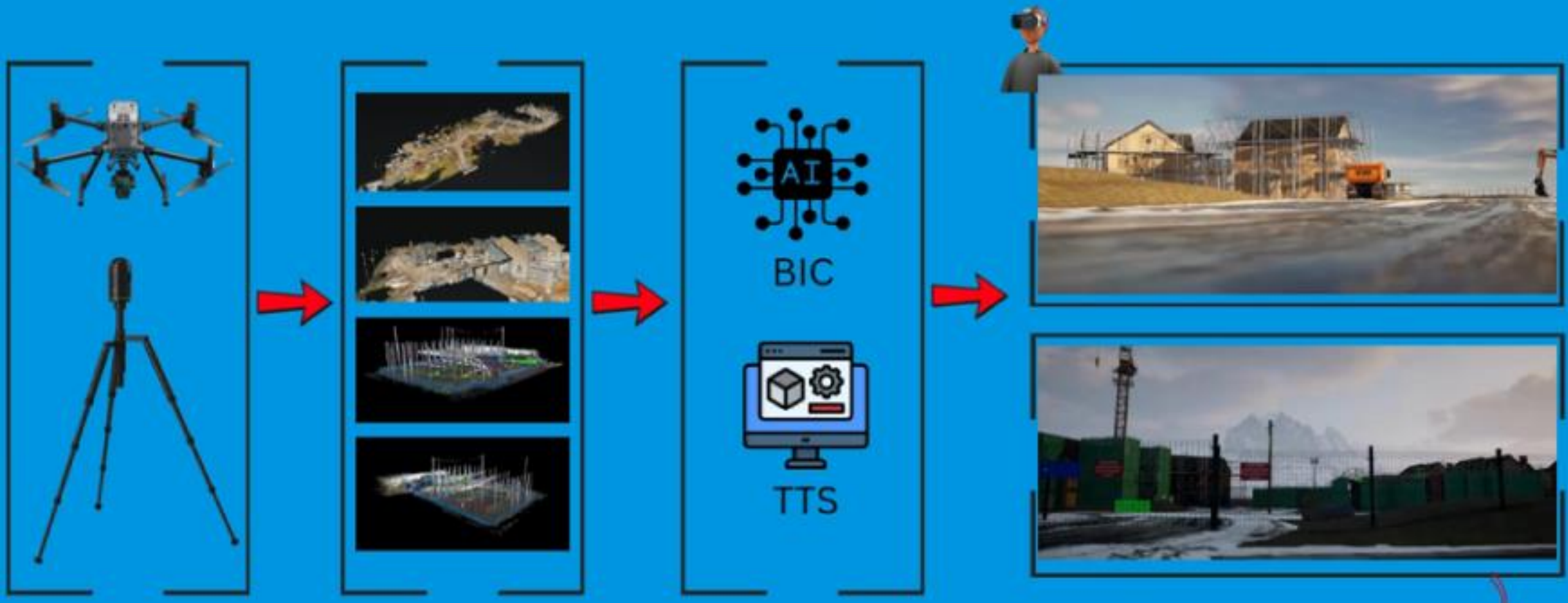
About SafeXtend

Addresses the urgent need for scalable, skills-targeted training solutions in the **construction industry** through an innovative AI-powered Virtual Reality platform

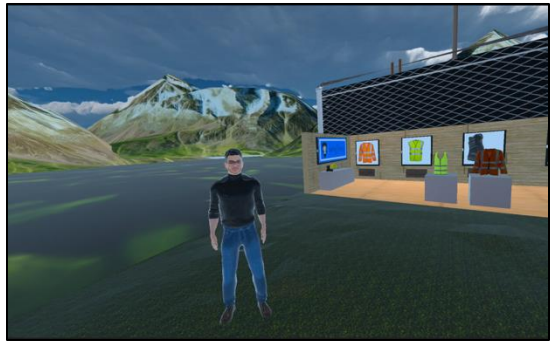
- 3D Scanning of Construction Sites
- AI-Driven Scenario Generation
- VR-Based Training Simulation
- Customised Learning Experience
- Continues Improvement and Adaptation

Competition: Collaborative AI Solutions to improve productivity in key sectors

Innovation



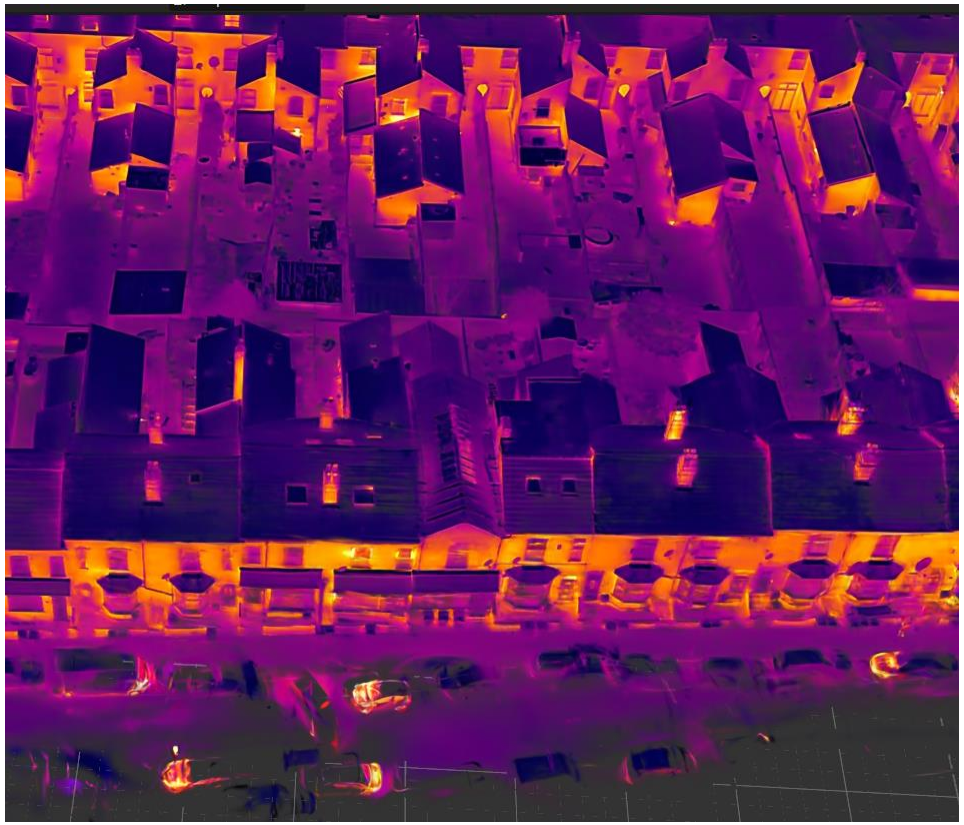
Use Cases – Pole Climbing Training Site



Use Cases – Construction Site

Additional Integration

- Treadmill Integration
- Augmented Reality Integration
- Thermal Capture



V-LAB

Treadmill Integration

Post Project

- **UK Construction Week, ExCel London, May 7-9 2025, London (Stand D704)**

  Designed to cater for the whole construction supply chain, and attracted over 18,000. It includes The Stone Show & Hard Surfaces. With leading construction products, all of the major construction professional bodies, international pavilions, industry and government leaders, and plenty of entertainment over 3 days, this is the must attend event for construction professionals from all over the UK and beyond.

- **Council for Aluminium in Building 'Building in the Future' Technical Conference 2025, May 15th 2025, Holywell Park, Loughborough University**

  The CAB 'Building in the Future' Technical Conference 2025 is a leading industry event hosted by the Council for Aluminium in Building. Following our webinar on SafeXtend, V-LAB and BIC have been invited to speak at this year's conference. This invitation reflects continued interest in our work and its relevance to the evolving needs of the industry. We will also have a tabletop presence throughout the day.

- **Engineering X: Skills for Safety series of webinars,** *Improving Construction Site Safety Training with Immersive Virtual Reality and Artificial Intelligence*

V-LAB

Thank you!

V-LAB | vishak@v-lab.uk

www.v-lab.uk

Steve Erdal

CSO

Wordnerds

UKRI Innovate UK

BridgeAI

National Innovation Centre Data

wordnerds


BIG BEAST
I LOVE MY JOB
I FEEL VALUED
UNI
COUNCIL
BAINBRIDGE'S
LUKE'S CACTI

What We Do

Customer Feedback Analytics Platform

Sainsbury's
B&Q
Atom bank
TRAFNIDIAETH CYMRU TRANSPORT FOR WALES
SOVEREIGN
Riverside
Department for Work & Pensions
NetworkRail
M&S
AUTOGLASS
phs Group
Dorchester Collection
one manchester
Town & Country Housing
Peabody Group
BritishRedCross
Hotelplan
true potential wealth management
sage
TRANSPENNINE EXPRESS
transportfocus
the guinness partnership
Plymouth Community Homes
yahoo!
AVANTI WEST COAST

Social Housing

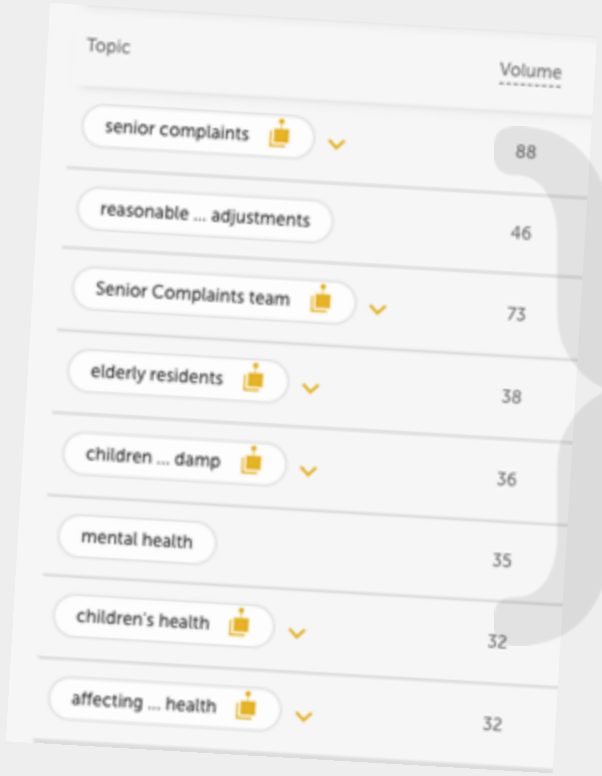
Financial Services

Retail

Travel & Hospitality

What We Do

1. Explore
2. Classify
3. Prioritise
4. Democratise



The Big Challenges…

…for mobility

Too much information in too many places

The difference between knowing if a passenger is safe, and knowing if they FEEL safe

Ignoring public opinion can be disastrous

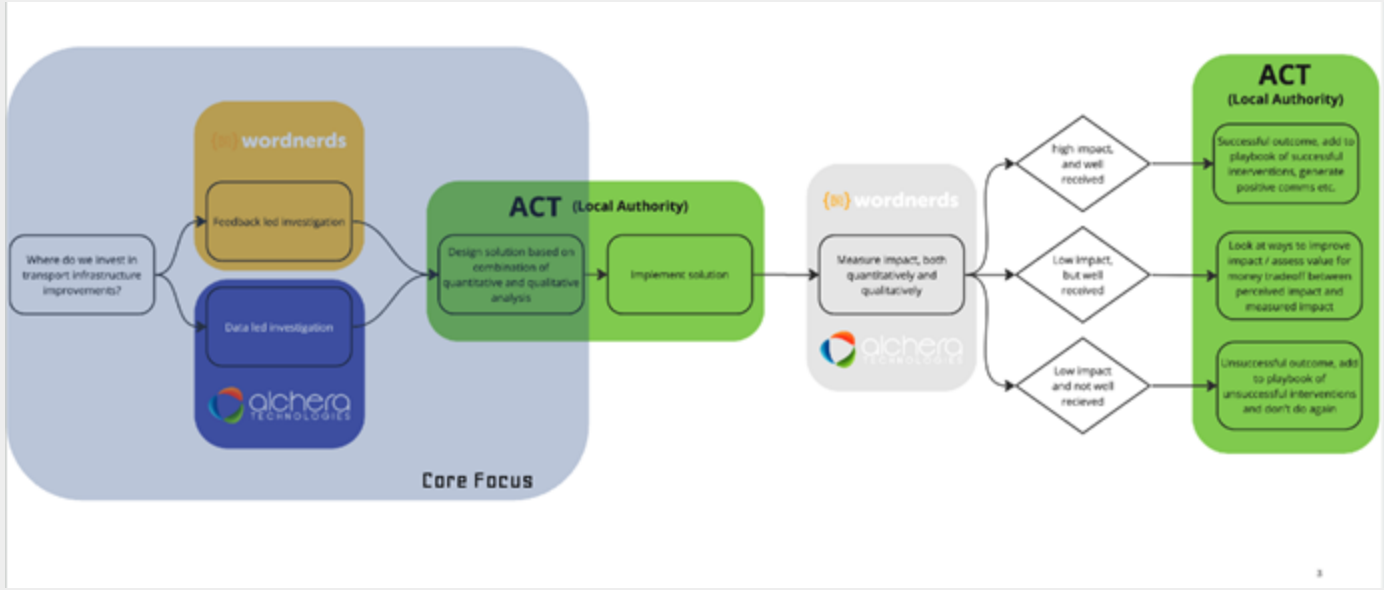
…for us

One part of a bigger puzzle

Nobody wants to be on another platform

Ignoring public opinion is common

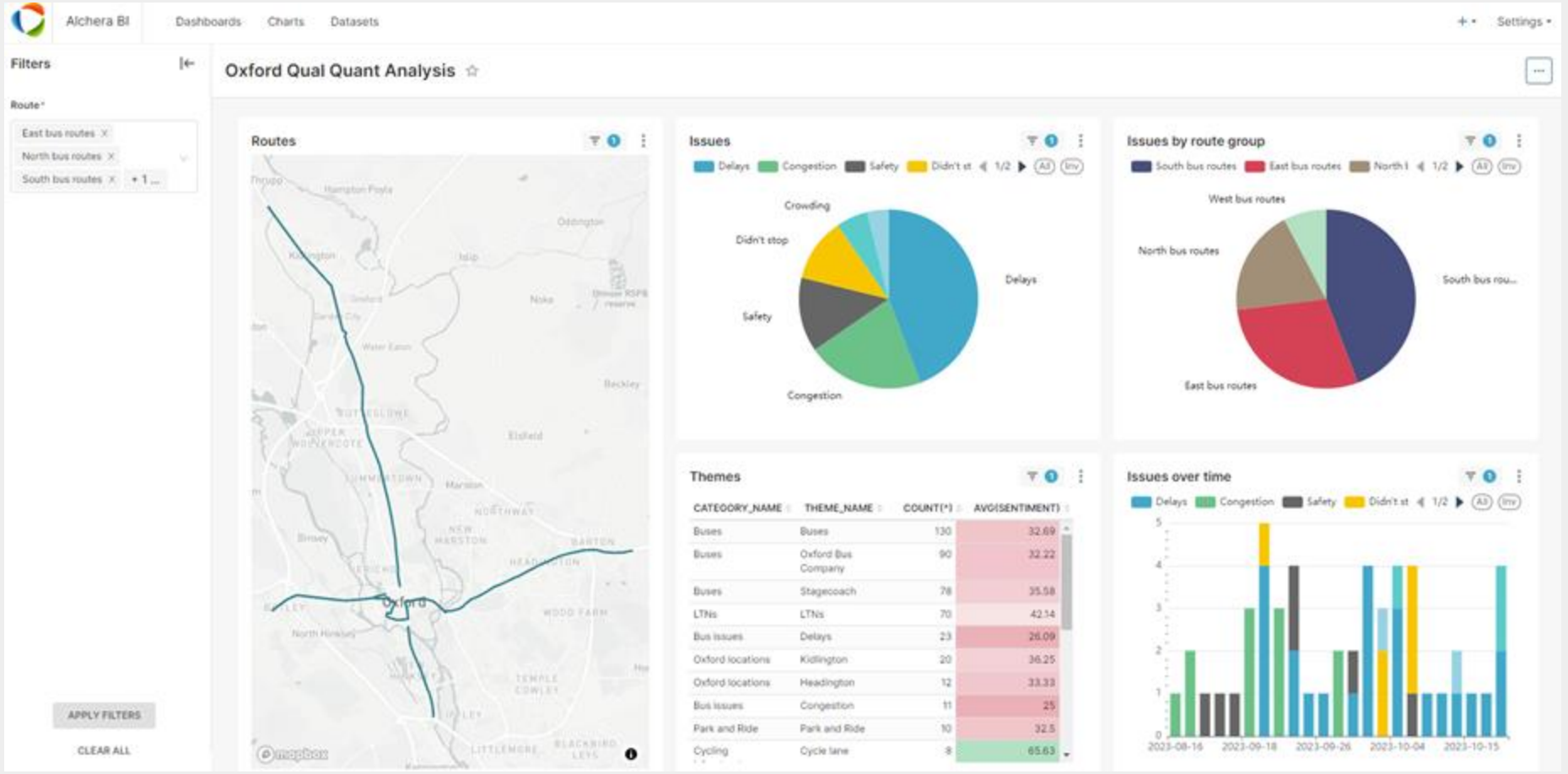
What We Did



Demonstrate technical feasibility by demonstrating technical steps:

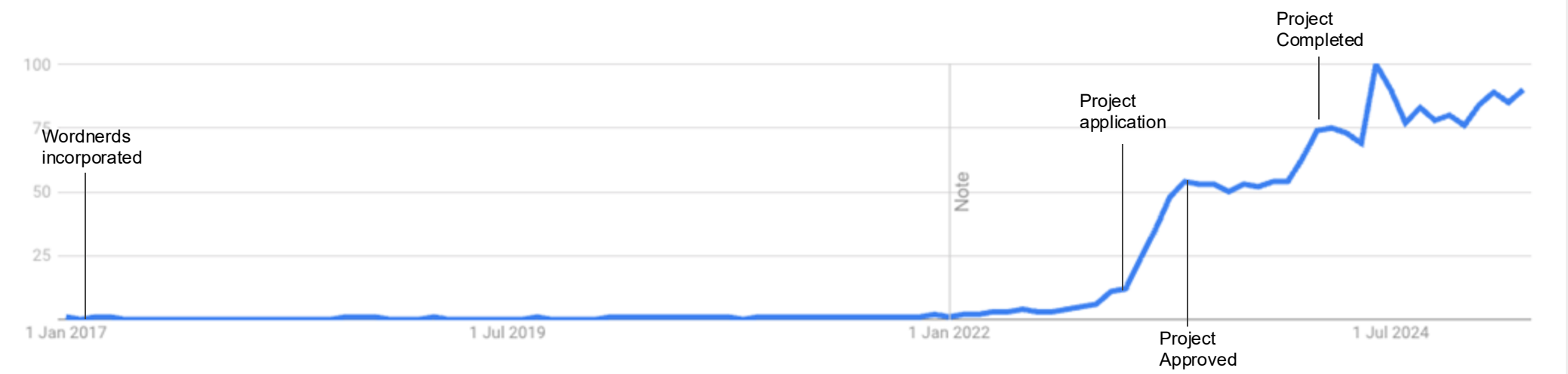
- Fusing disparate quantitative and qualitative datasets
- Extract insight which improves holistic understanding of impact

Demonstrate commercial feasibility by showing value-add for at least one Oxfordshire use case


Alchera BI
Dashboards
Charts
Datasets
Settings
Filters
Route*
East bus routes
North bus routes
South bus routes
+ 1 ...
APPLY FILTERS
CLEAR ALL
Oxford Qual Quant Analysis
Routes
Oxford
Issues
Delays
Congestion
Safety
Didn't st
1/2
All
Inv
Crowding
Didn't stop
Delays
Safety
Congestion
Issues by route group
South bus routes
East bus routes
North bus routes
1/2
West bus routes
North bus routes
South bus rou...
East bus routes
Themes
CATEGORY_NAME
THEME_NAME
COUNT(*)
AVG(SENTIMENT)
Buses Buses 130 32.69
Buses Oxford Bus Company 90 32.22
Buses Stagecoach 78 35.58
LTNs LTNs 70 42.14
Bus issues Delays 23 26.09
Oxford locations Kidlington 20 36.25
Oxford locations Headington 12 33.33
Bus issues Congestion 11 25
Park and Ride Park and Ride 10 32.5
Cycling Cycle lane 8 65.63
Issues over time
Delays
Congestion
Safety
Didn't st
1/2
All
Inv
5
4
3
2
1
0
2023-08-16
2023-09-18
2023-09-26
2023-10-04
2023-10-15

What Happened Next

Searches for Large Language Models over time



What Happened Next

Northstar Ventures

What we learned

Think about what the world needs and what you need as a business

You don’t have to do everything with one project

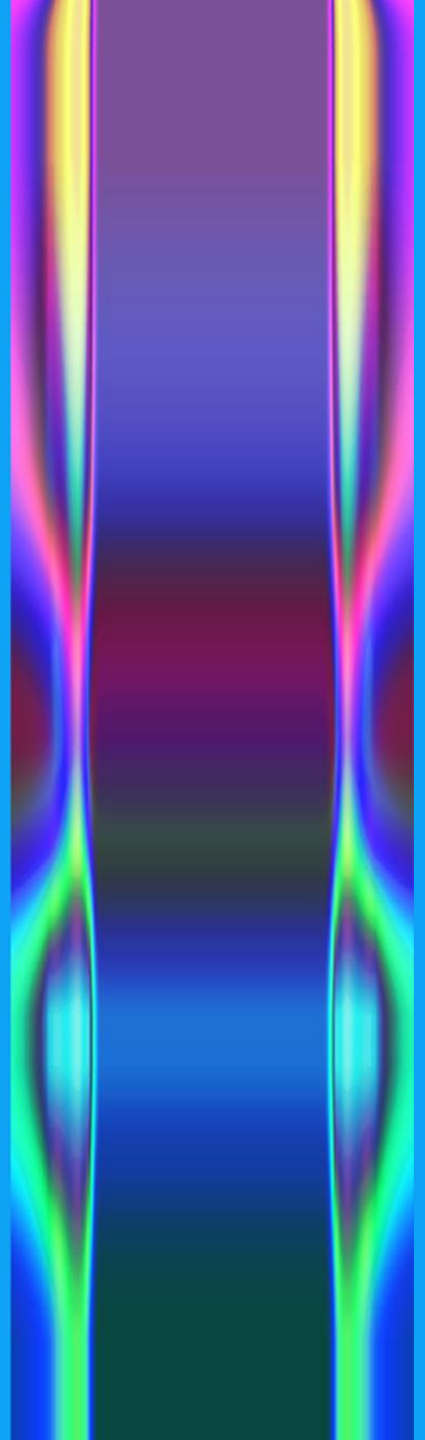
Assume whatever you have will be obsolete

Use innovation to create differentiation

Jenny Hudson

Managing Director

Transmission Dynamics



UKRI Innovate UK

BridgeAI

National Innovation Centre Data

RADAR: Rail Anomaly Detection and Reaction

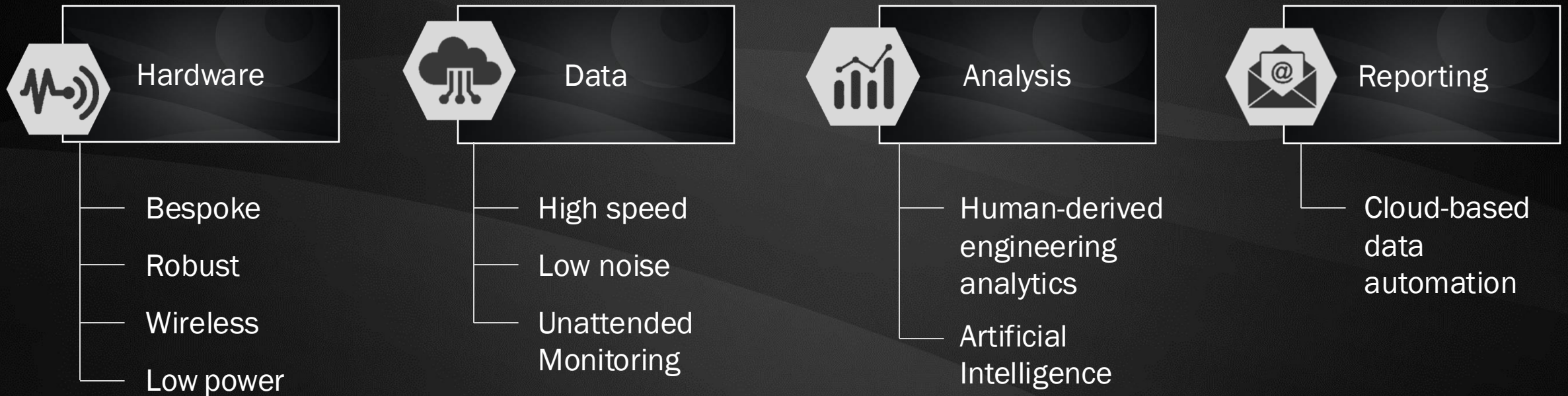
Transmission Dynamics®

Redefining the Status-Quo

Jenny Hudson
Managing Director

Company Introduction

- Established in 1996
- Multidisciplinary team of 70+ skilled individuals
- Specialise in Industrial Internet of Things solutions
- Focus on troubleshooting and remote monitoring solutions for high-value industrial assets
- Across many industrial sectors globally



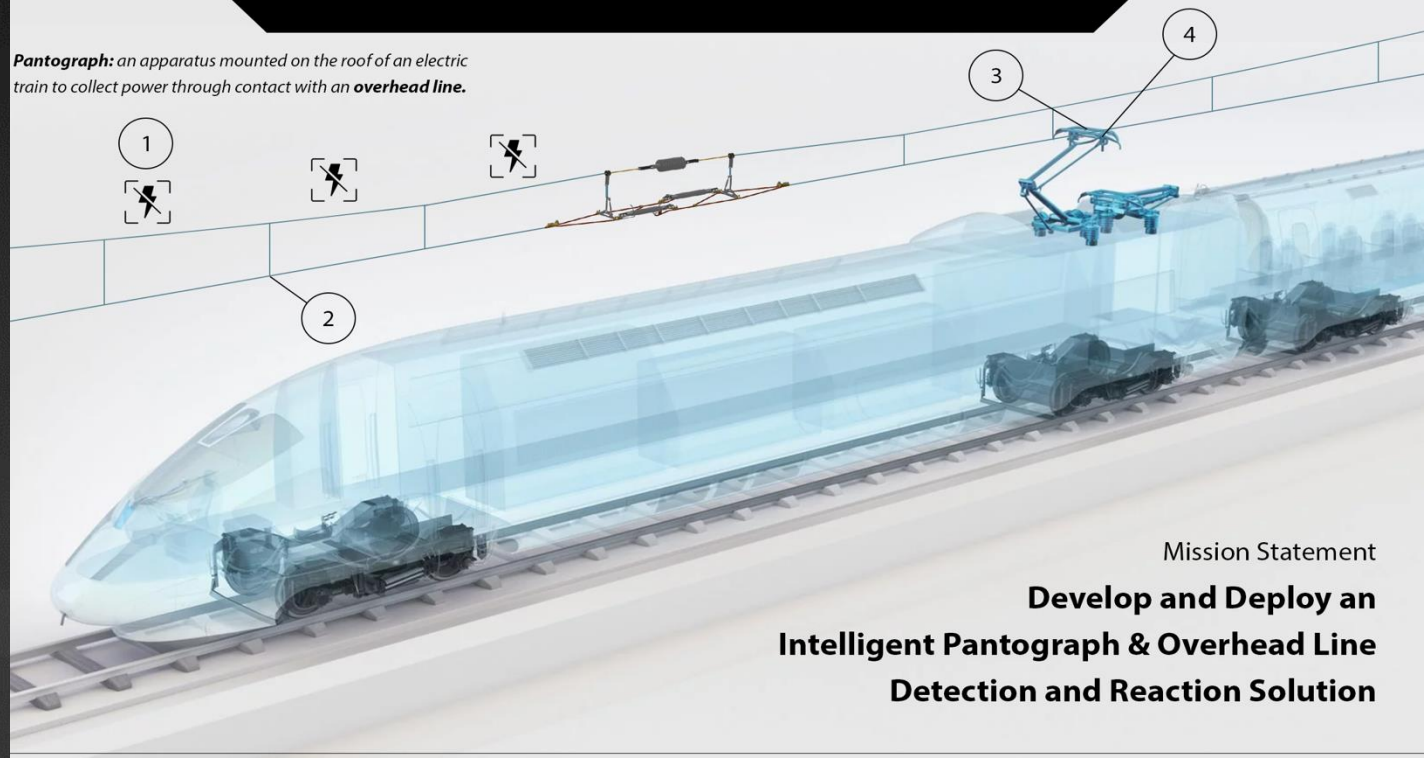
RADAR Project:

- 12-Months to revolutionise pantograph and OHL monitoring
- 6 x Organisations - Project Board
- Deliver 5 x Anomaly Detection solutions
- 1 x AI-based GUI
- 1 x Revolutionary reaction concept
- Utilising existing hardware:
  Muti-award winning
  PANDAS-V® system

RADAR

Rail Anomaly Detection And Reaction

Pantograph: *an apparatus mounted on the roof of an electric train to collect power through contact with an* ***overhead line.***



Mission Statement

Develop and Deploy an Intelligent Pantograph & Overhead Line Detection and Reaction Solution

Step 1: Automatic Anomaly Detection

Development and deployment of sophisticated self-learning ML/AI models and edge processing, enabling automated detection, classification and reporting of rail asset and infrastructure anomalies.
(Work Packages 1-6)

Step 2: Autonomous Alerting

The system will streamline the triage of alerts through an AI-based interface, ensuring the rapid routing of notifications to the appropriate department at Network Rail for swift fault resolution; averting dangerous, costly scenarios.
(Work Packages 1-7)

Step 3: Fault Reaction

Direct integration with pantograph Auto-Drop Device (in depot and non-passenger service) to instigate pantograph drop to stop oncoming trains causing potential catastropic damage, delays, costs, and risks to life.
(Work Package 7)

Project Board

Transmission Dynamics	KOMODO	NetworkRail	angel Trains	AVANTI WEST COAST	ALSTOM
Advanced Wireless Monitoring Technologies	Digital Products & Services	Infrastructure Owner & Operator	UK Largest Rolling Stock Leasing Company	Train Operating Company	Train Maintenance and Depot Owner

PANDAS-V®:

- 12-Month IUK project
- Roof mounted camera
- Synchronised Wireless Accelerometer
- Edge processing & real time reporting
- Reliable quality footage with zero maintenance

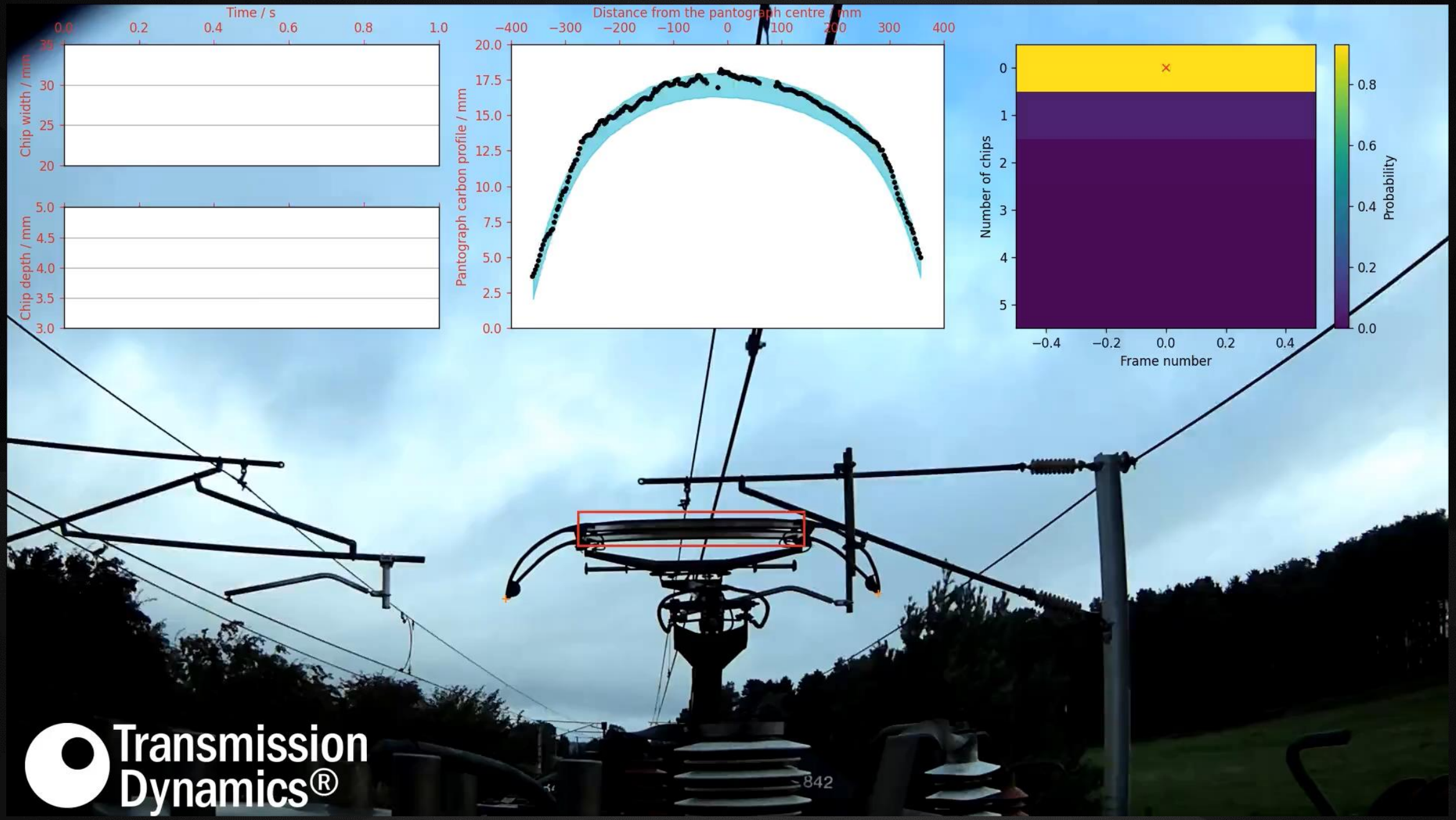
1. AI Dropper Wire Fault Detection

Pre-project stats:

- NW&C region alone (c25% of UK Rail Network)
- Reported 518 dropper wire incidents over 5yrs
- Detected via manual inspections
- Caused 51,307 delay minutes
- £5.7m of associated costs
- Potential de-wirement risk (£1.5m each)

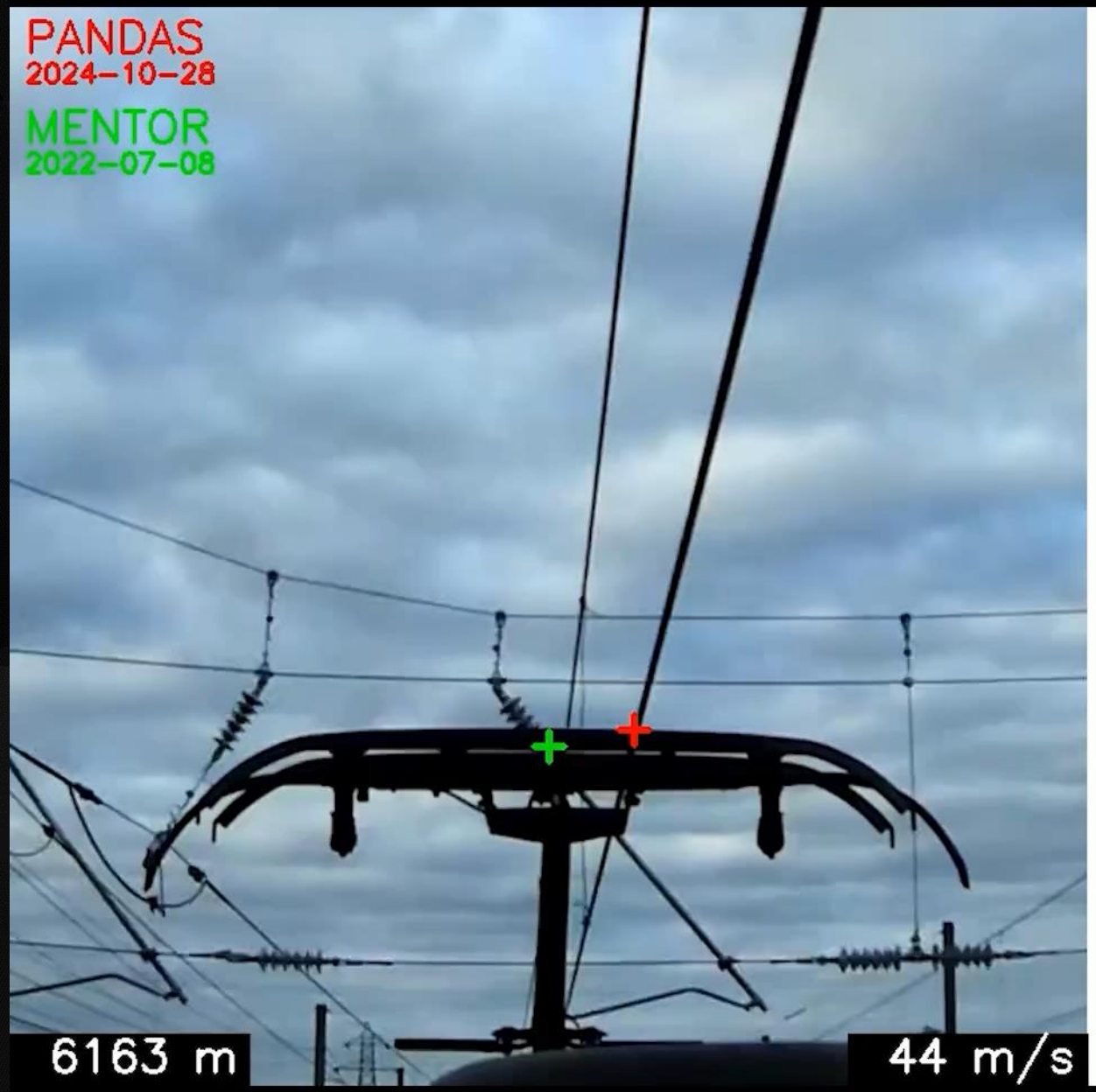
1. AI Dropper Wire Fault Detection

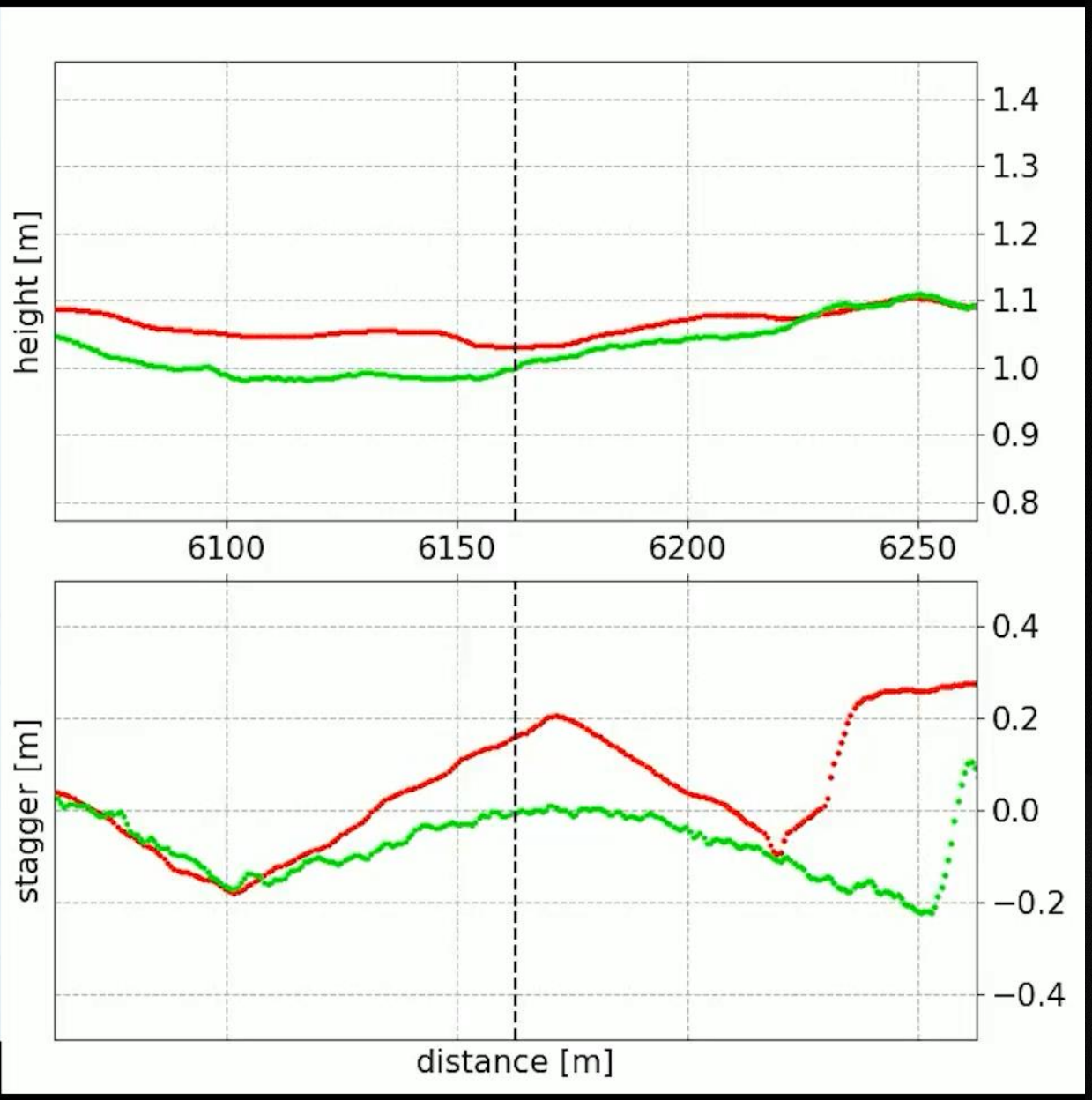
2. Carbon Chip Detection



3. Foliage Detection

4. Pantograph Height and Wire Stagger Monitoring

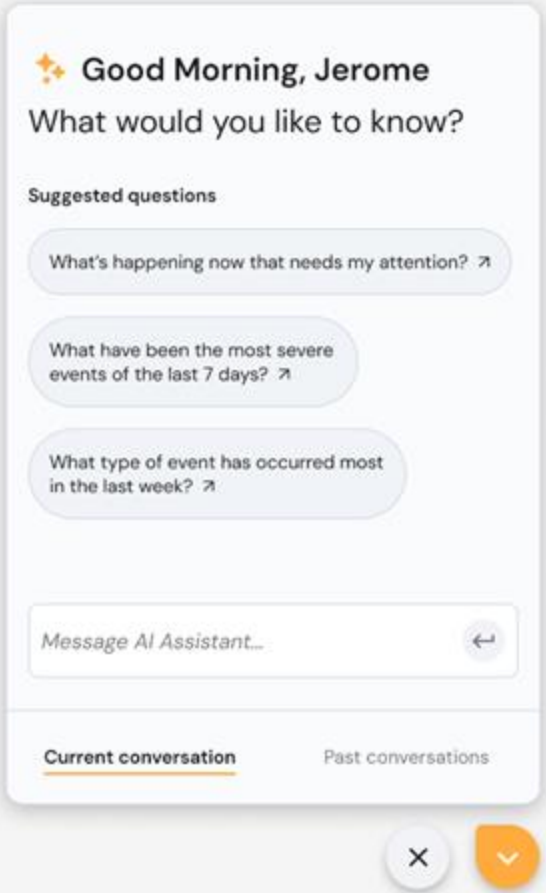


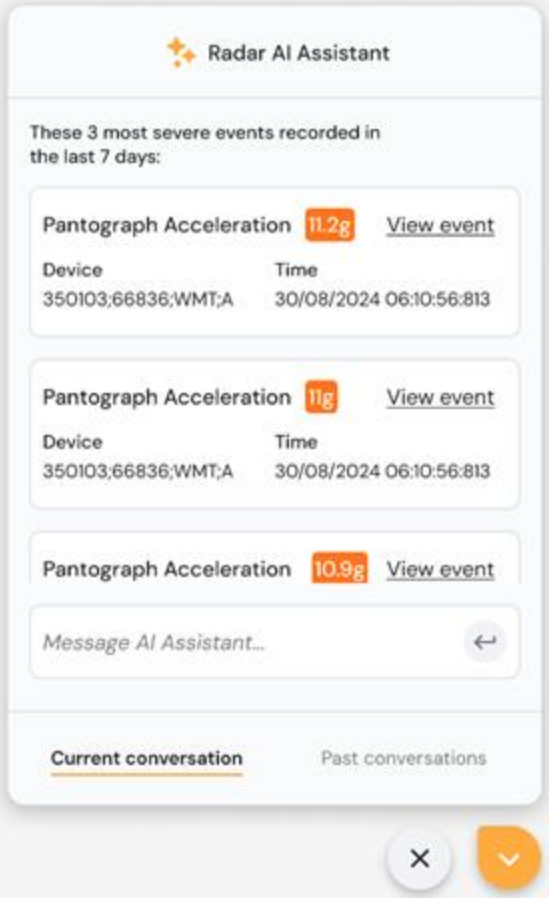


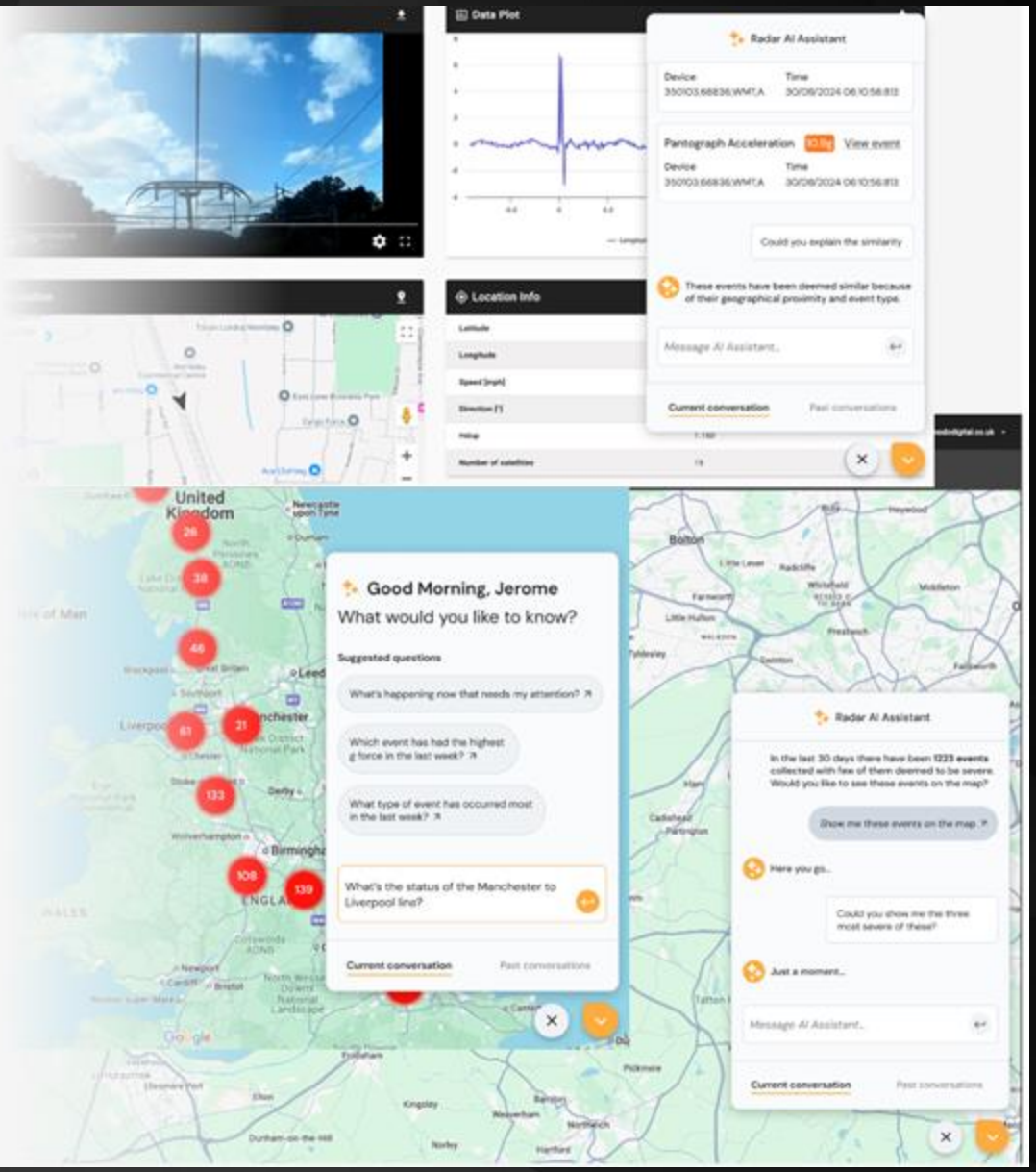
5. Infrastructure Anomaly Detection

AI Based Chat Assistant:

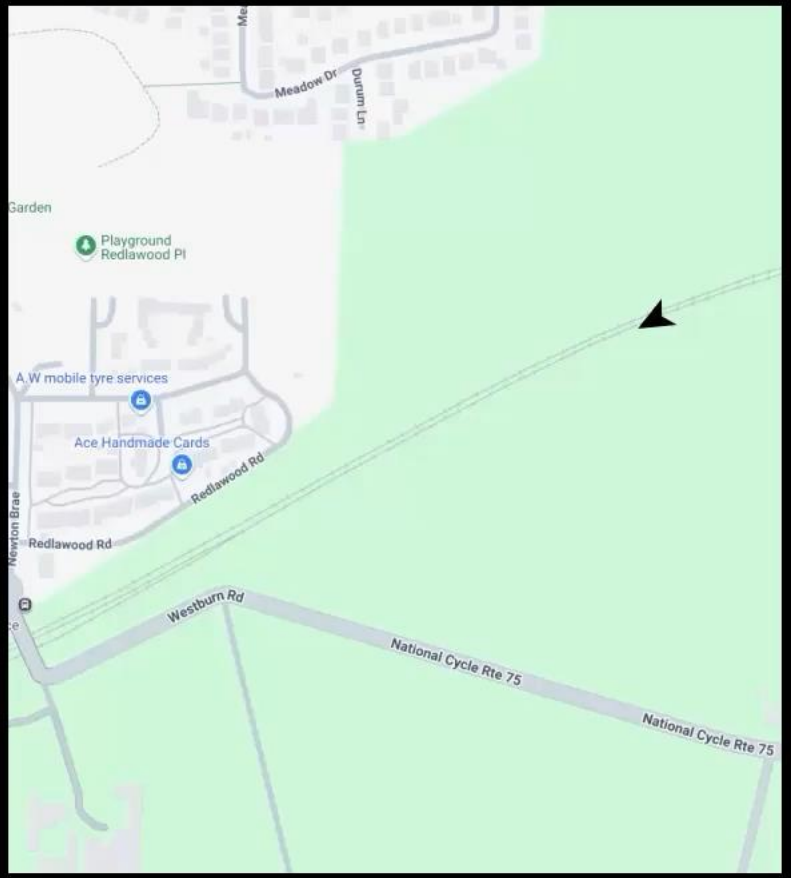
KOMODO







Intelligent Pantograph Network



Transmission Dynamics®

Redefining the Status Quo
with thanks to

UKRI Innovate UK

www.jrdltd.co.uk
T: +44 (0) 191 58 000 58
E: support @jrdltd.co.uk

Company registered in England no.: 3284935