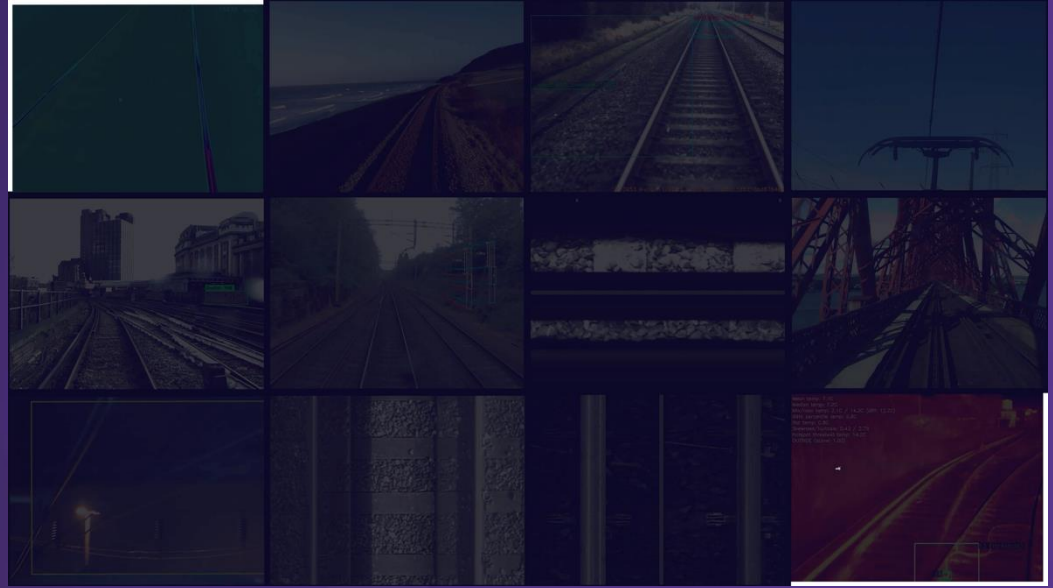




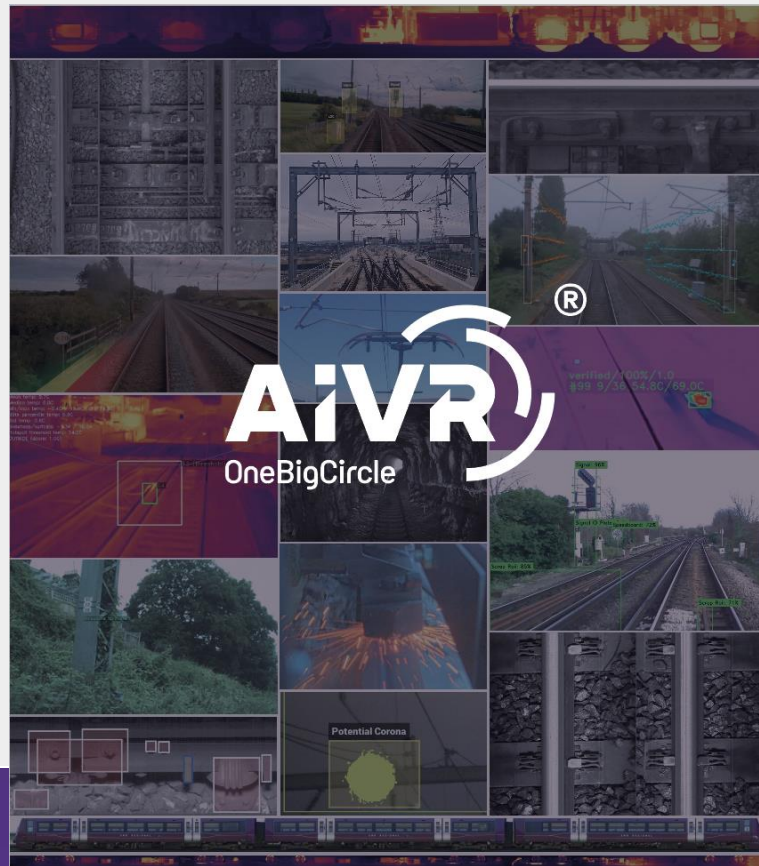
Supporting Your Digital Journey

For any questions contact:

enquiries@onebigcircle.co.uk

Thank you all for sharing your lunch with One Big Circle!

1. Introduction
2. Automated Intelligent Video Review
3. 'Supporting your digital journey'
4. Step 1 - Harness your data
5. Step 2 - Power up your data
6. Step 3 - Energise your workflows
7. Questions & closeout



One Big Circle

- ③ We are a Bristol-based SME with **120+ years combined experience** in video system design and installation, specialising in Intelligent Video, AI, Machine Learning and integration.
- ③ We develop both **Software and Hardware** systems in-house.
- ③ We work closely and **collaboratively** with multiple organisations including **Network Rail** and **Transport for Wales**.
- ③ We are the creators of the **multi-award-winning AIVR** technology.



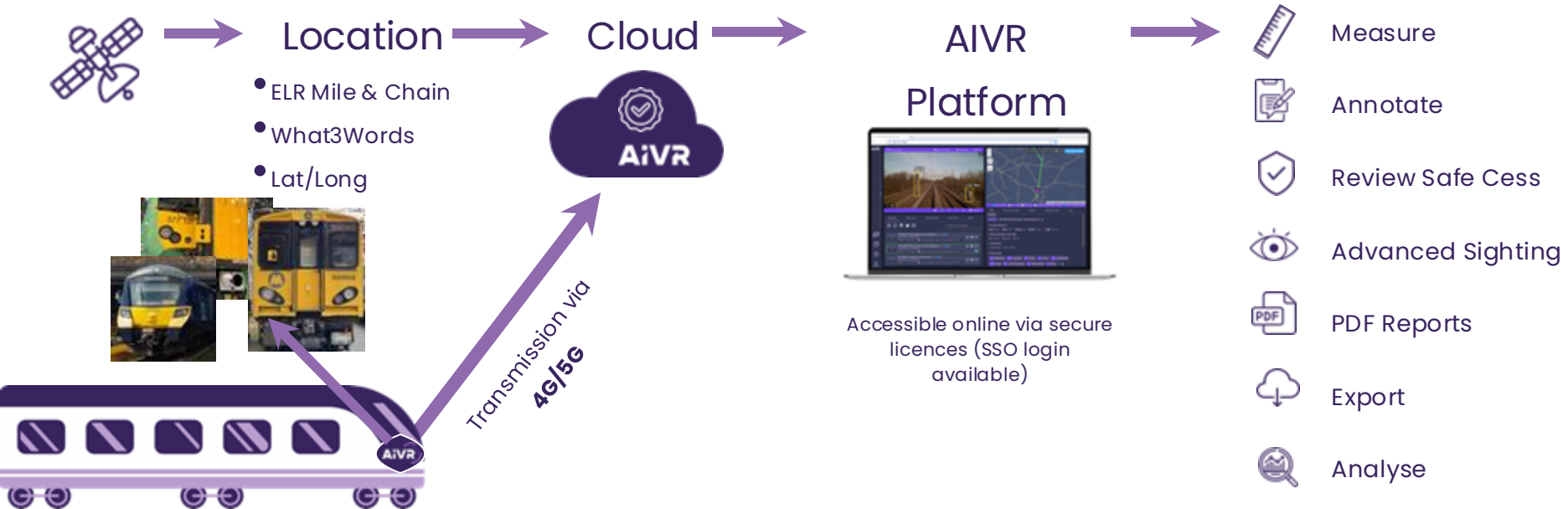
Automated Intelligent Video Review



Automated Intelligent Video Review

The **multi-award-winning** system that provides **digital inspection capability** and more, enabling experts from any rail discipline to **monitor the lineside environment remotely and safely**.

End-to-End System

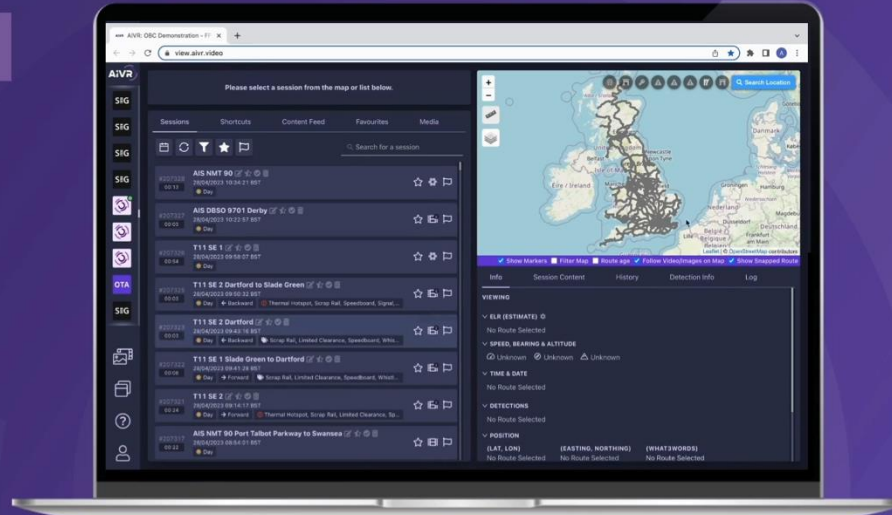


AIVR Platform

🔍 Search by Location

Search by:

- ELR Mile & Chain
- ELR Mile & Metrage
- ELR Mile & Yards
- Latitude/Longitude
- What3Words
- Assets
- Stations



Powered by  OneBigCircle

'Supporting Your Digital Journey'

Forbes

How AI Can Get Railways
On Track For
Transformational Growth

Rail Data Marketplace



Railway
Technology



Features

Digital Railway



The future of rail: automated object inspections

Article

Digital rail: why are we still
waiting?

Key takeaways

- The industry is increasingly moving towards data driven decision making
- Unwavering focus on improving safety and efficiency
- Maximise on existing technologies – ‘don’t reinvent the wheel’

£ 21m

“Our Infrastructure Monitoring programme is essential for us to drive a more efficient railway – from trains that use ultrasound to find faults within the rails, to those that monitor and record track geometry.”



Improved Use of Technology

Regions will work in partnership with the Technical Authority to develop and deploy new technologies from II and utilise the RD&I pipeline. Improvements to BAU operations and the network will be delivered at lower cost and more efficiently.

***“Delivering an Efficient Railway – Our National Efficiency Plans 2024-2029” – Network Rail*



Using Data & Technology from Trains & Infrastructure

We will use data and technology to better understand the condition of assets and reduce the time our people must spend on the network.

4

Leveraging Technology, Innovation and Smarter Working to Streamline Processes and Drive New Efficiencies – using smarter, more integrated approaches we will equip our front line staff with relevant data to allow more efficient management of our asset base.

What blockers does the industry face in moving towards digitalisation?



High Costs

Costs of acquiring new equipment, retrofitting existing systems, and ongoing maintenance and support.



Regulatory Hurdles

New tech must be compliant with regulations and safety standards from multiple regulatory bodies.



Integration Challenges

Legacy systems or infrastructure can be incompatible with new tech, requiring extensive modifications or even complete overhauls.



Supporting Your Digital Journey

Whether need an **off-the-shelf solution** or a **tailor-made technology**, AIVR is designed to support you **wherever you are in your digital journey.**



Supporting Your Digital Journey

Whether need an **off-the-shelf solution** or a **tailor-made technology**, AIVR is designed to support you **wherever you are in your digital journey**.



**Harness
your Data**



Supporting Your Digital Journey

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**Harness
your Data**



**Power up
with AI**



Supporting Your Digital Journey

Whether need an **off-the-shelf solution** or a **tailor-made technology**, AIVR is designed to support you **wherever you are in your digital journey**.



**Harness
your Data**



**Power up
with AI**

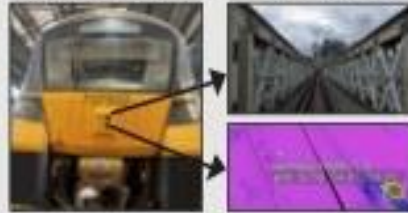


**Energise your
Workflow**

Step 1 – Harness your Data



Install permanent cameras & sensors for enhanced monitoring



Access data from your onboard CCTV system with ease



Aggregate and analyse data from multiple sources efficiently



Capture additional data of your area using lightweight devices



Portable, low-cost options

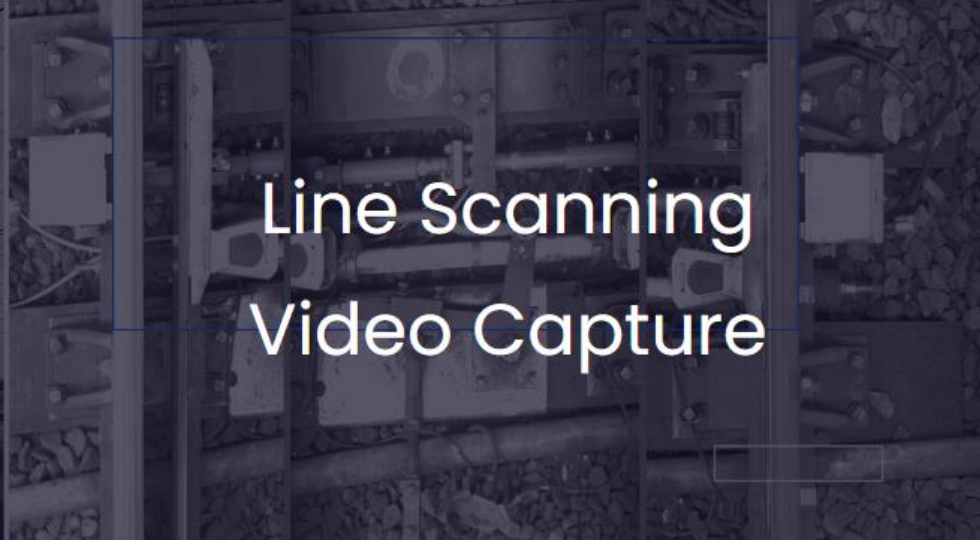


Premium, permanent installations

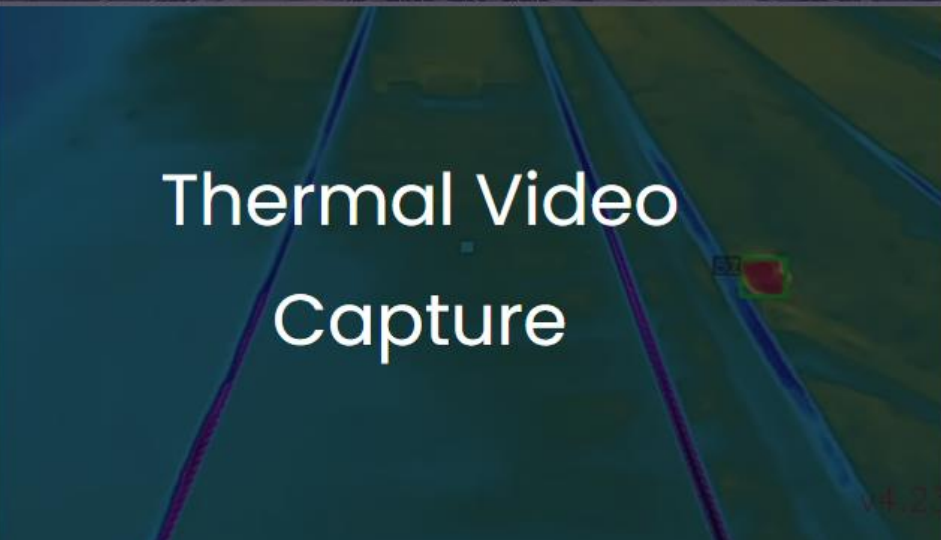


A perspective view of a railway track stretching into the distance, flanked by overhead power lines and support structures. The scene is captured from a forward-facing perspective, likely from a train or a vehicle moving along the tracks.

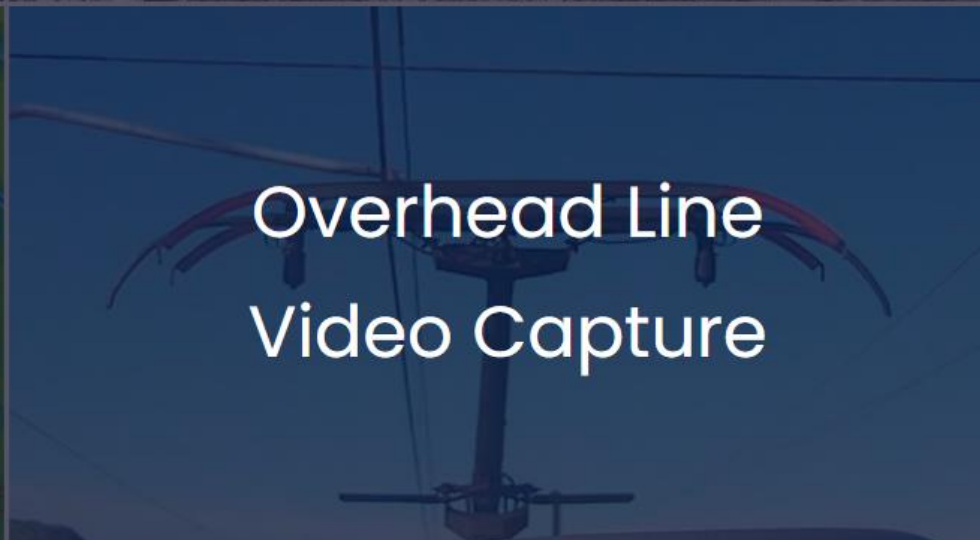
Forward Facing
Video Capture

A close-up view of the overhead power lines and support structures, showing the intricate details of the electrical equipment and the way the lines are suspended.

Line Scanning
Video Capture

A thermal image of the railway tracks, showing the heat signatures of the rails and the surrounding environment. The tracks appear as bright lines against a darker background, with a small red area indicating a specific point of interest.

Thermal Video
Capture

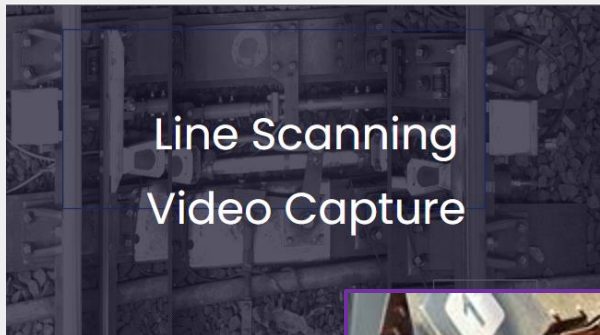
A view of the overhead power lines and support structures, showing the way the lines are suspended and the support structures are designed. The image is taken from a low angle, looking up at the lines and structures.

Overhead Line
Video Capture

Forward Facing Video Capture

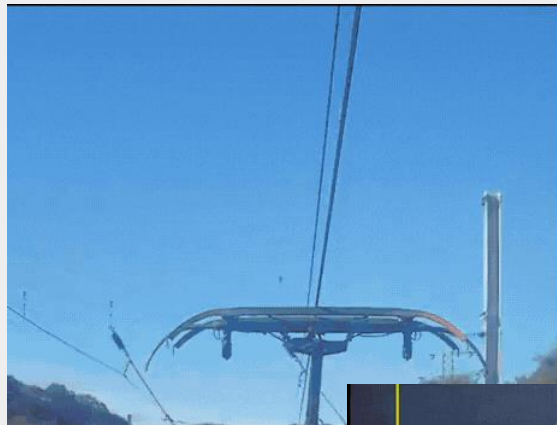
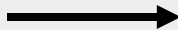
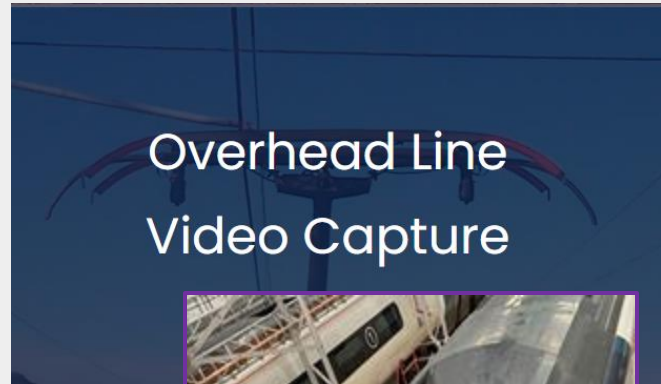






The screenshot displays the AIVR software interface, which is used for visualizing and analyzing railway data. The main view shows a 3D perspective of a railway track, labeled "THN track 1300 28.12 +5m". The track is flanked by a grid, and the interface includes a sidebar with various navigation and analysis tools. The sidebar contains buttons for "Detail rail images", "Take a snapshot", "Place a bookmark", "Annotate", "Content", "Detections", "Image adjustment", "Widgets", "Search for location", "More cameras", "Sperry viewer", "Magnifying glass", "Compare sessions", "Archive session", and "Report a bug". A settings panel on the right side of the interface allows for "Image Adjustments" and "Grid" settings. The "Image Adjustments" section includes a "Primary" tab, a "4ft" scale, and a "Reset" button. The "Grid" section includes a "Toggle Grid" checkbox, a "Grid Size" input field, and "Offsets" for X and Y coordinates. A timeline at the bottom of the interface shows the date and time: "07/09/2024 04:18:01 BST".

Overhead Line Video Capture



The screenshot displays the AIVR OLE software interface, which is divided into several sections:

- Top Bar:** Contains navigation icons for Close, Advanced Sighting, Quick Sighting, Annotate, Measure, and Zoom.
- Main Video Feed:** Shows a live video of a pantograph on a train, with a speed indicator at 100% and a video type selector.
- Map View:** Displays a map of the route from Penrith North Lakes to Carlisle, with a green line indicating the track and a purple dot marking the current position.
- Sessions List:** A table of recorded sessions, including session ID, date, time, and location.
- Session Details:** A sidebar showing detailed information for the selected session, including route position, speed, time, and environmental data.

Sessions	Issues	Shortcuts	Content Feed	Favourites	Assets	Media	QA
Search for a session							
PANTOGRAPH x Day x							
#371221	16/09/2024 16:07:00 BST	Day					
#371221	16/09/2024 16:12:53 BST	Day					
#371219	16/09/2024 15:59:28 BST	Day					
#371197	16/09/2024 15:14:34 BST	Day					
#371174	16/09/2024 15:14:34 BST	Day					

VIEWING

#371219 390136 695-C Pantograph Penrith North Lakes to Carlisle

ROUTE POSITION (ESTIMATE)

ELR: CGJ7 TRACK: 2100 (DOWN) MILE: 56 CHAIN: 58

SPEED, BEARING & ALTITUDE

125 MPH (GPS) North 136m

TIME & DATE

ENVIRONMENTAL DATA

DETECTIONS

No Route Markers

POSITION

(LAT, LON) 54.734927, -2.802958 (EASTING, NORTHING) 348395, 538068

WHAT'S WORDS

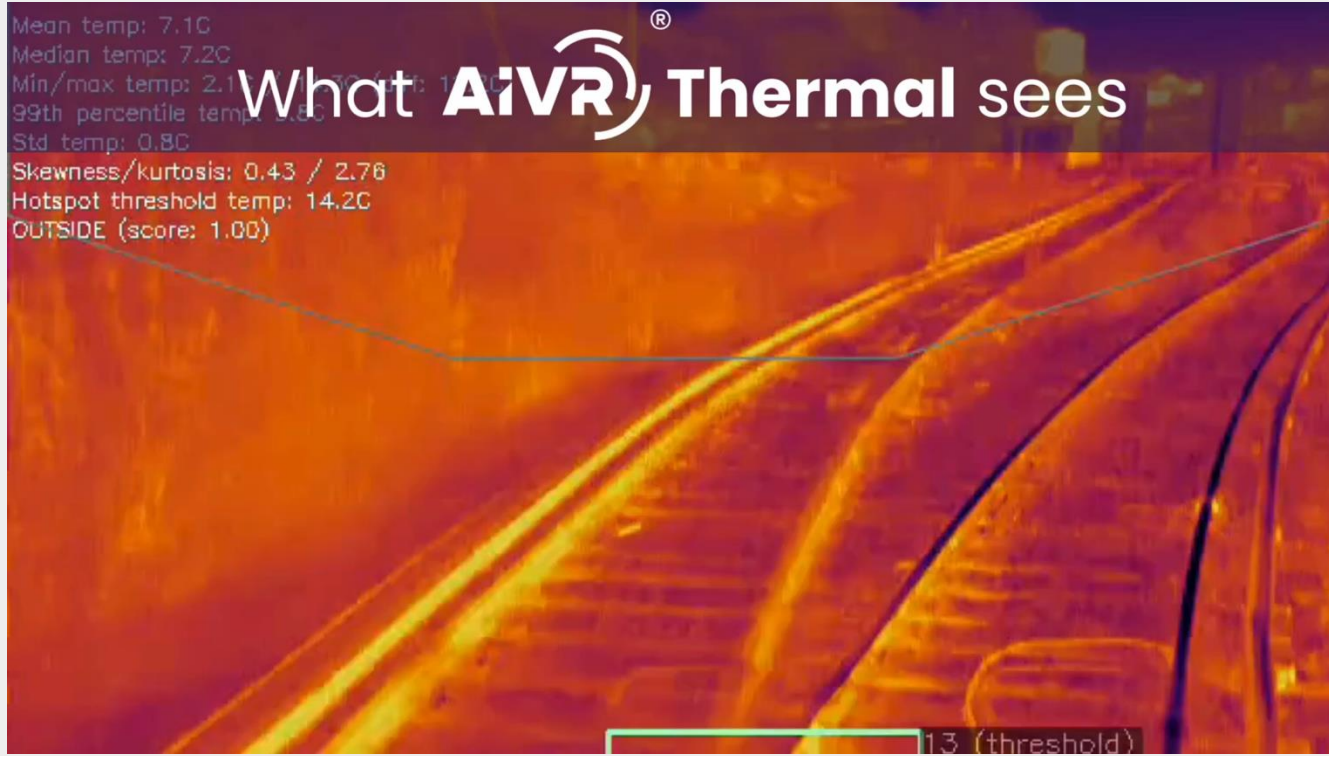
Pause video for W3W

(ASSETS)

Pause the video to calculate current position

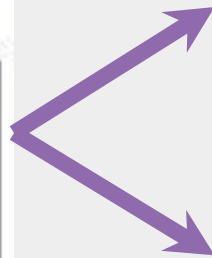
Thermal Video Capture





Step 2 – Power up your data

Power up your data



Apply bespoke AI to your data to monitor assets & their conditions



Stay informed with automated email alerts for detected assets



Gain comprehensive visibility across all disciplines



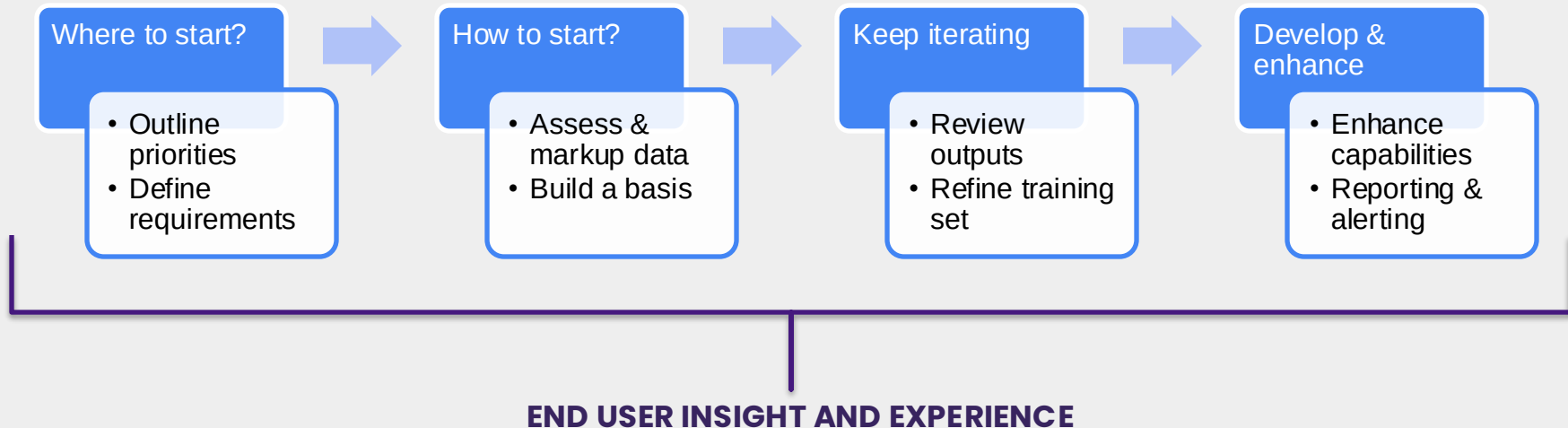
Integrate AI from multiple data sources for a holistic view

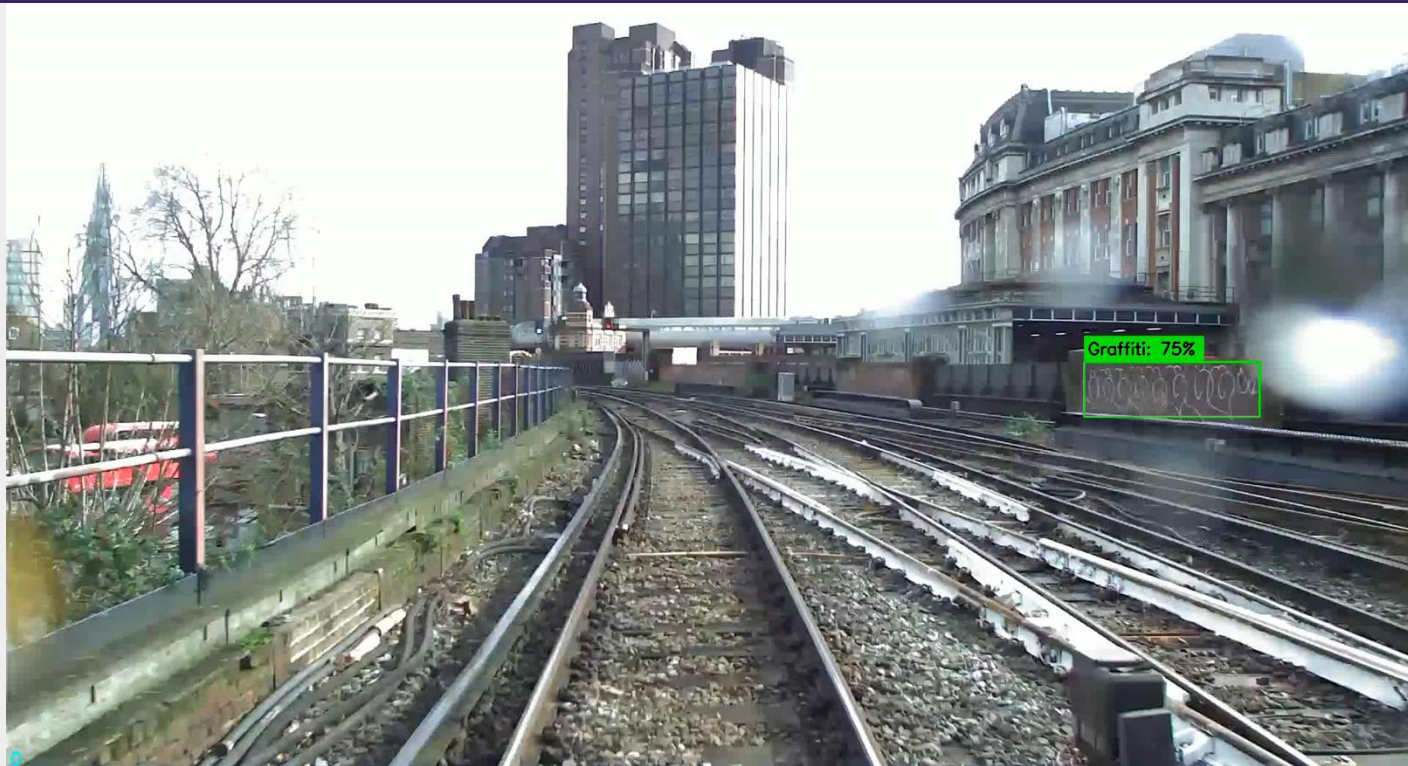




How we 'power up' using AIVR data

Harnessing data is the first step – **AI and Machine Learning** helps to **power up data to further enhance efficiency and safety.**



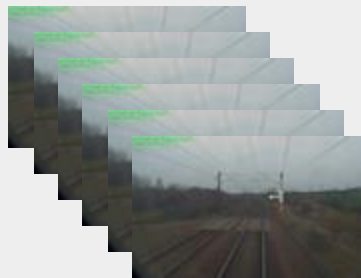


Example 1 – Balance weights

Frame Detections



Observations



Prediction Model



Measurement



Comparison



Location Mapped Issues



Example 1 – Balance weights

Balance Weight

New Issue

#3559

Enter a note

Observations: 4 (Last seen 28/2/23 at 09:04)

Green zone overflow: 55cm

Low

Medium

High

Acknowledge

Close



Observations

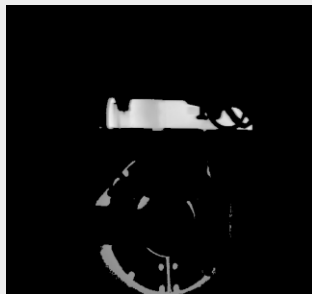
#1019080	Session: #193809	February 28, 2023 9:04 AM	
#1078030	Session: #155702	October 12, 2022 10:34 AM	
#1072937	Session: #155389	October 11, 2022 9:05 AM	



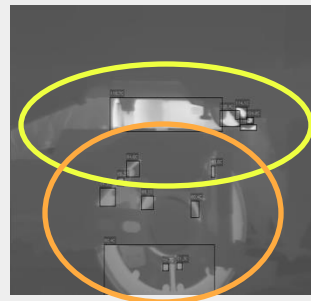
Example 2 – DepotMATE, detecting thermal hotspots



Original raw
temperature
information

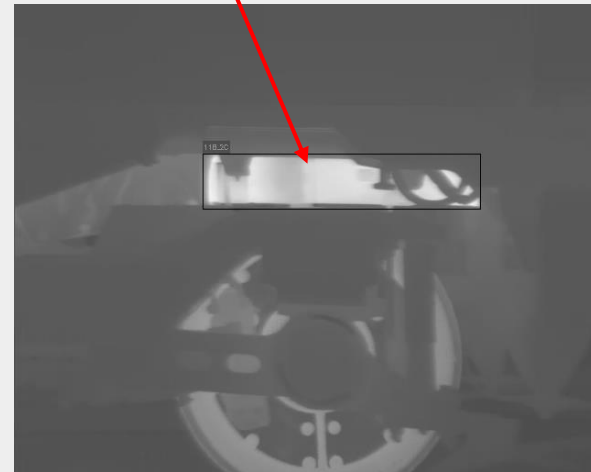


Isolate top 5%
hottest regions

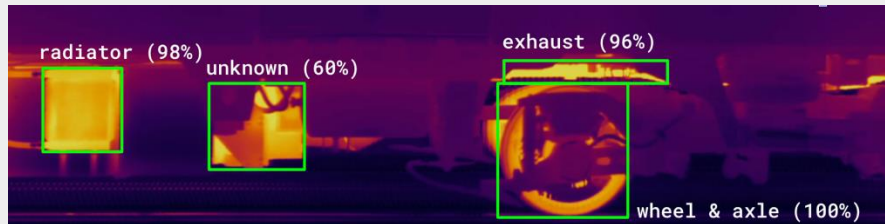


Find contours of
each hot section and
discard anything
below a temperature
threshold

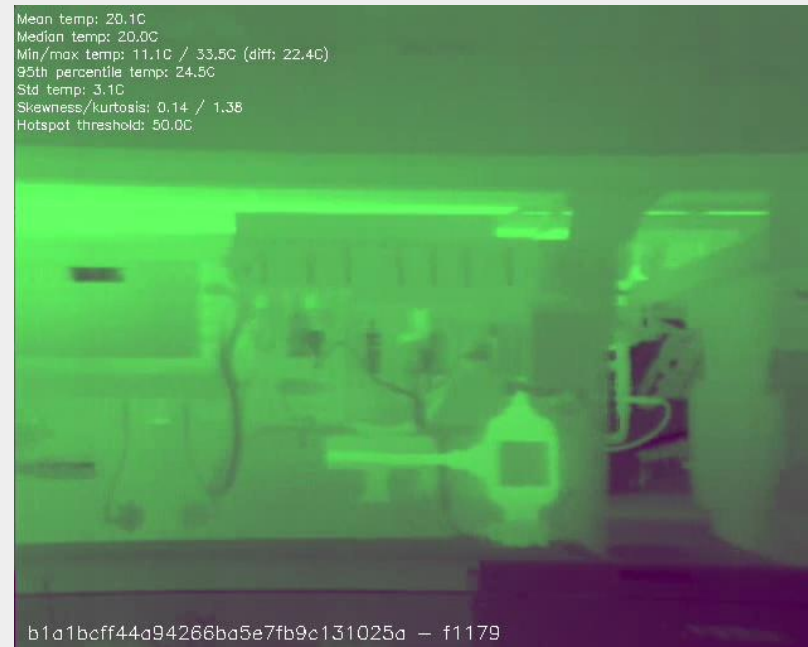
Final detection



Example 2 – DepotMATE, detecting thermal hotspots



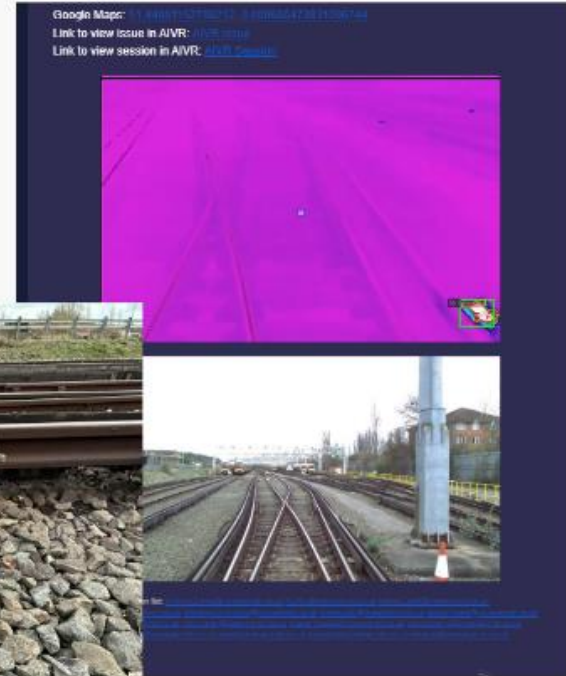
Mean temp: 20.1C
Median temp: 20.0C
Min/max temp: 11.1C / 33.5C (diff: 22.4C)
95th percentile temp: 24.5C
Std temp: 3.1C
Skewness/kurtosis: 0.14 / 1.38
Hotspot threshold: 50.0C



Case Study – AiVR Thermal

Thermal defects: Detection of welded hook switch

- AiVR Thermal captured and automatically detected hotspot
- Emailed alert sent to specific users with images and location details
- Fault reported to track engineering team who attended site and found hook switch had overheated and welded which prevents track being isolated.





AIVR Focus – Track Inspection AI

AIVR

Workspace: S&C - Class 153 VIU 1 #347507 LAT: 53.3863444 LNG: -1.4363251 ELR Mile & Yards NUJ2 track 2100 42m 0538.66y speed 8 MPH (Tachometer)

^ Navigate Up
v Navigate Down
▶ Play

1719603827,789000000
Fri, 28 Jun 2024 19:43:47 GMT
MWV Data: 29/06/2024
L
NUJ2 track 2100 42m 0540.78y
1719603827,519000000
Fri, 28 Jun 2024 19:43:47 GMT
MWV Data: 29/06/2024
L
NUJ2 track 2100 42m 0539.71y
1719603827,243000000
Fri, 28 Jun 2024 19:43:47 GMT
MWV Data: 29/06/2024
L
NUJ2 track 2100 42m 0538.66y
1719603826,962000000
Fri, 28 Jun 2024 19:43:46 GMT
MWV Data: 29/06/2024
L
NUJ2 track 2100 42m 0537.59y
1719603826,673000000
Fri, 28 Jun 2024 19:43:46 GMT
MWV Data: 29/06/2024
L
NUJ2 track 2100 42m 0536.53y
1719603826,379000000
Fri, 28 Jun 2024 19:43:46 GMT
MWV Data: 29/06/2024
L

Settings

Image Adjustments

Primary

4ft

Reset

Grid

☐ Toggle Grid

Grid Size

1

Offsets

X: 0 Y: 0

Reset

1 filter(s) applied

Don't show this message again

28/06/2024 20:43:46 BST

MAC3

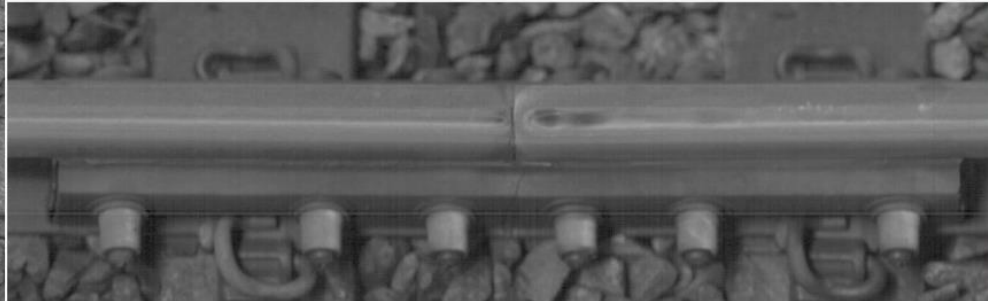
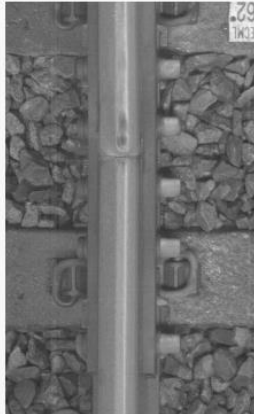
SPD3

NUJ2 42m 0533y 51m 1270y 61m 0252y 70m 0989y 82m 0027y SPD3 82m 0986y

Case study – AiVR Focus

Track defects: Detection of a cracked IBJ

- Track geometry showed a dip angle at the position of a joint
- Synchronised inspection imagery of the joint showed a crack
- Fault reported to track engineering team, who imposed an emergency speed restriction and welded the joint



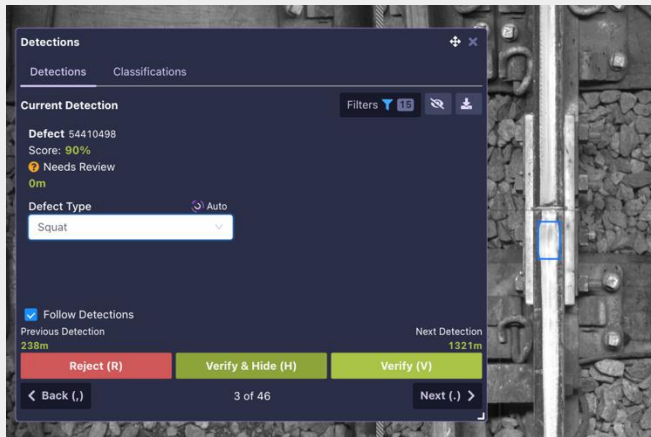


Build Data Intelligence

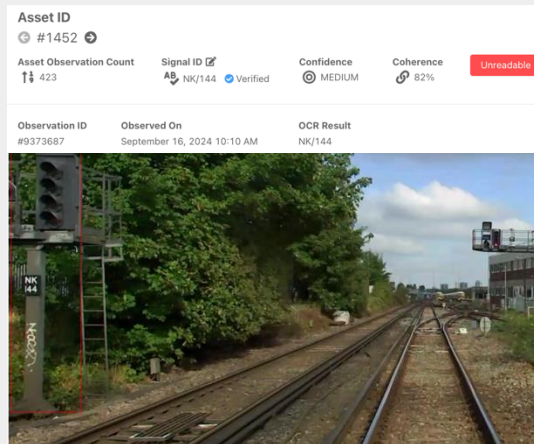
The benefits of 'powered up' data



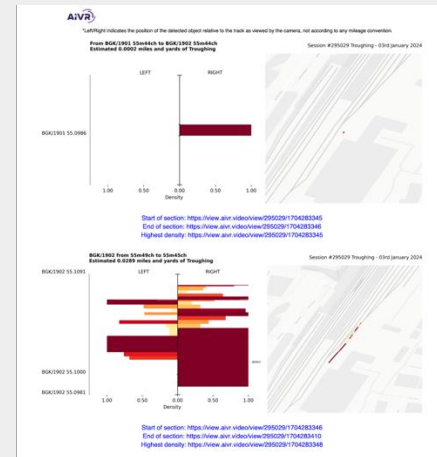
Find and resolve issues quickly and efficiently



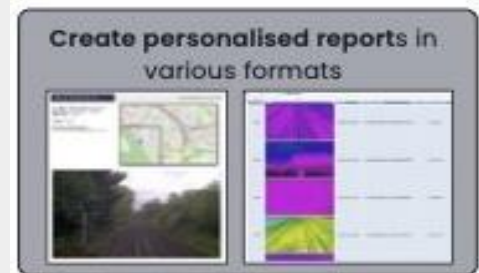
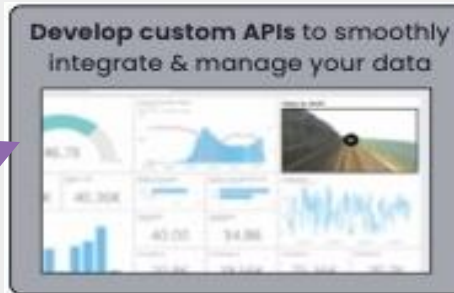
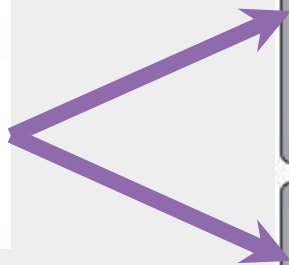
Automatically map network infrastructure



Enhance knowledge and inform existing practices



Step 3 – Energise your Workflow



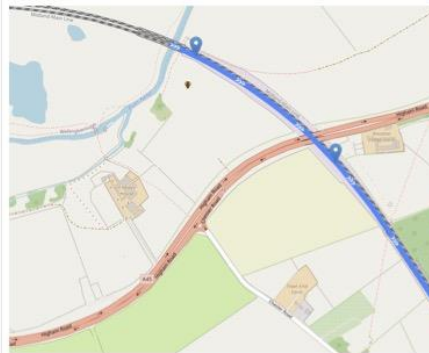
Personalised Reporting

- The AIVR interface enables users to create personalised reporting forms
- Collate asset information and 'work arising' information in one visual output
- Feed in critical details from up-to-date imagery into workflows

AIVR Video Export Summary Network Rail	
Title	MML, of route IM AIVR Go East Midlands 5 Wellingborough to Bedford
Author	lydia.parsons@onebigcircle.co.uk
Video	Download
Duration	The length of the export period is 44s from a total 13m 27s .



Map Overview



Point of Interest 1 of 2

2024/09/05 11:59 UTC

ELR SPC2 63 mile 58 chain (estimated)
Lat/Long: 52.295656, -0.650457
Map Link: [Google](#)

Labels: Debris Vegetation

Markup Contributors:
lydia.parsons@onebigcircle.co.uk

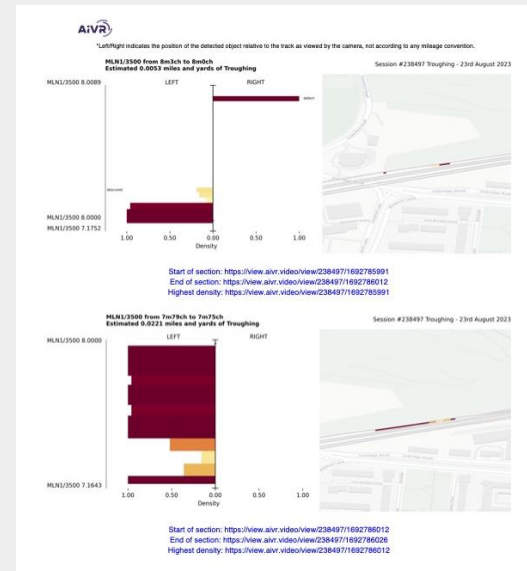


Personalised Reporting

Ballast condition monitoring report

A	B	C	D	E	F	G	H	I
From (Miles, Yards)	To (Miles, Yards)	Start Timestamp	End Timestamp	Amount of Low Ballast (Miles, Yards)	Severity Score (max: 100)	Highest Scoring Image (with hyperlink)	Second-Highest Scoring Image (with hyperlink)	Third-Highest Scoring Image (with hyperlink)
BOKS/2100/0.1149	BOKS/2100/0.1187	2024-08-13 17:05:00.334	2024-08-13 17:05:05.427	0.0030	15.1			
BOKS/2100/0.1422	BOKS/2100/0.1485	2024-08-13 17:05:09.827	2024-08-13 17:05:11.327	0.0012	12			
BOKS/2100/0.1213	BOKS/2100/0.1332	2024-08-13 17:12:24.457	2024-08-13 17:12:25.123	0.0009	12.6			
BOKS/2100/0.1196	BOKS/2100/0.1401	2024-08-13 17:12:35.408	2024-08-13 17:12:35.742	0.0005	6.6			
BOKS/2100/0.1140	BOKS/2100/0.0440	2024-08-13 17:12:43.490	2024-08-13 17:13:26.428	0.0502	31.3			

Rail troughing condition report





Bespoke Interface Development

Digitalised workflows

The screenshot displays the AIVR interface for reviewing patrols. At the top, a 'Work in Progress' banner states: 'This system is in development and under evaluation. Patrol definitions, imagery and system functionality are not final. Your feedback is appreciated. Please contact us at support@onebigcircle.co.uk with suggestions and issues.'

Below the banner, there are filters: 'Awaiting Review' (selected), 'All Users', 'Scheduled Date of Patrol', and a search bar 'Search for a patrol'. There are also toggle switches for 'Only show incomplete' and 'Show Archived Patrols'.

The main section is titled 'Due Patrols' and lists three patrol entries:

- #749**: NE05F, Scheduled DOP: 16/02/24, 15/02/24 - 15/02/24. Status: Awaiting Review (99.9%).
- #752**: NE05C Issue 1 23.08.2023 v3.1 - 02-03-2024, Scheduled DOP: 02/03/24, 28/02/24 - 01/03/24. Status: Awaiting Review (checked).
- #755**: NE05D Issue 1 23.08.2023 v3.4 - 02-03-2024, Scheduled DOP: 02/03/24, 28/02/24 - 01/03/24. Status: Awaiting Review (checked).

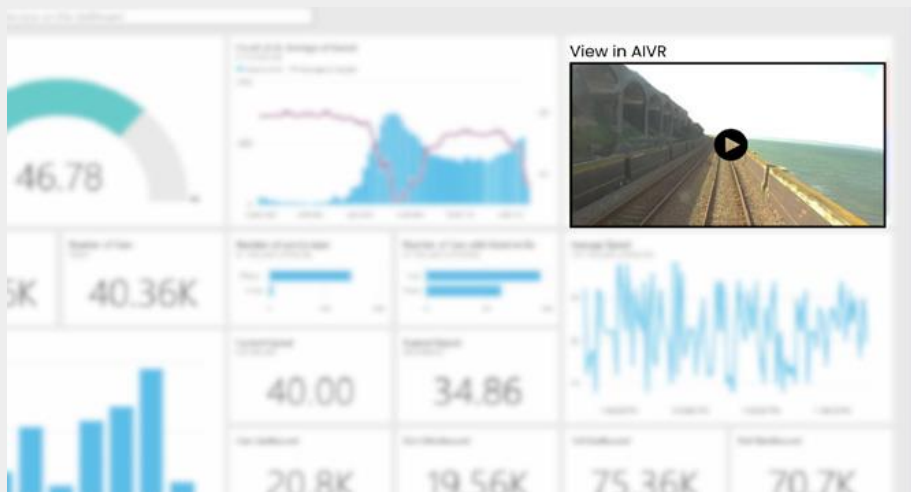
Each entry includes a progress bar, a user name 'Ashley Brown', and a status button 'Awaiting Review'. The interface also shows a date filter for '03/05/2024' and a partial entry for '#783'.



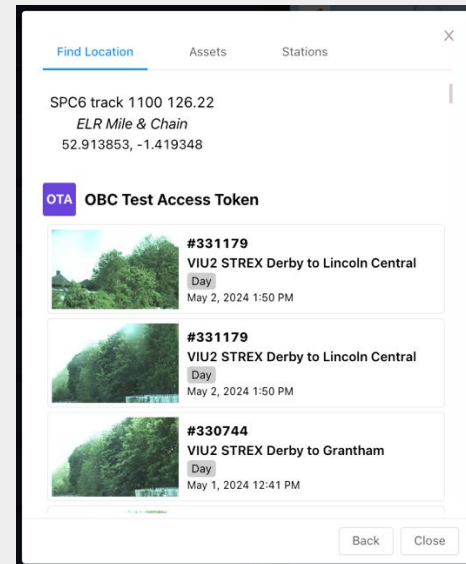
Seamless Integration

Integrate into your existing software portfolio

Widget & API provision of AIVR data



Set up 'find links' to link out to key data outputs



In conclusion...



Futureproofing the Industry



Cost Saving



Virtual Track Access



Reducing Boots on
Ballast



Carbon Saving



Increasing Safety and
Efficiency



Climate Resilience



Automated
Infrastructure
Monitoring



Collaboration



Open approach to Data



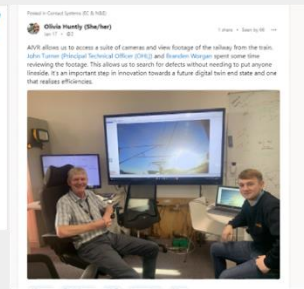
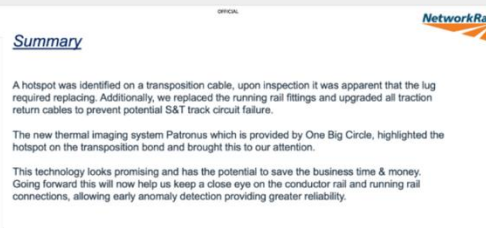
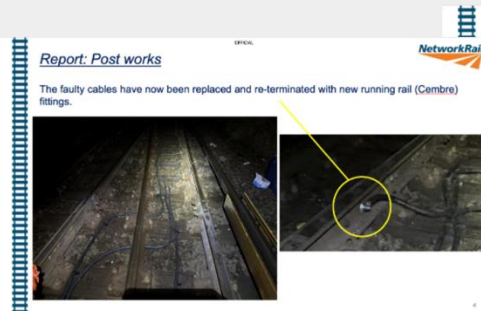
Online & Secure



Digital Twin



OneBigCircle



AIVR by One Big Circle has enabled our planning and site teams to gain a better understanding of site conditions and layout before attending the location, due to the availability of regularly updated high quality footage. Being able to download and use the footage in whiteboard briefings ensures everyone attending site has some degree of familiarity, which in turn helps to maintain our safety record.

Senior Planning Manager

AIVR Customer Success Stories

“ We have used [footage to identify and confirm vegetation [affecting electrical equipment] reported by a 3rd party without having to attend site. ”
ESP

“ The AIVR footage of highland mainline reduced my need to visit every bridge on the route. ”
Structures

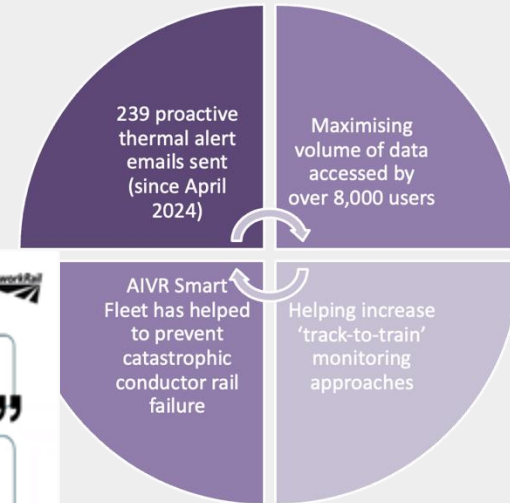
“ We have used the AIVR footage regularly to review progress of cable route installation and snagging works where progress on a linear asset is best viewed by video footage rather than photos. ”
Signal & Telecoms

“ It has helped me show pictures of a new work site to the COSS without needing to go on track. ”
Section Management

“ Identified vegetation on one of our DC electrical sections from the AIVR footage and shared with the wider DU staff ”
Technical Officer

“ I am involved in 11 signal sighting projects and in the last 18 months I only visited site once due to the clarity of the footage on AIVR. ”
Signal Sighting

Page 10 Putting passengers first





Here to support your journey!

If you'd like to find out more...

Visit us at InnoTrans!



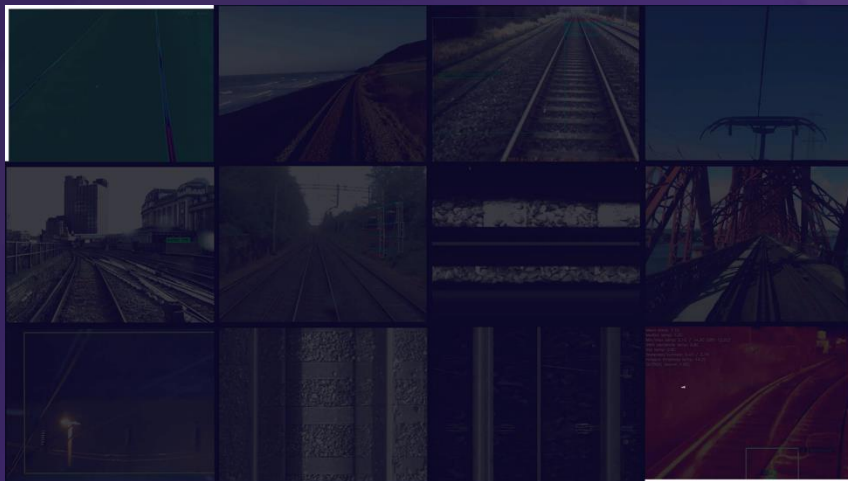
InnoTrans 2024
24 – 27 SEPTEMBER · BERLIN



HALL 2.2
UK PAVILION
K- 560

As of /Stand: 2024-07-19
Subject to alterations
Änderungen vorbehalten

Thank you for Listening!



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