

Safer Analytics For Enhanced Road-safety using AI (SAFER-AI)

SAFER-AI develops an ethical, explainable artificial intelligence (AI) platform using open road safety data to predict collision hotspots, support policing decisions and improve practitioner data literacy.

Key details

Lead institution	Scottish Policing Academic Centre of Excellence (SPACE)
Principal researcher(s)	space@napier.ac.uk
Police region	Scotland
Collaboration and partnership	• Police Scotland
Level of research	Professional/work based
Project start date	August 2026
Date due for completion	August 2027

Research context

Road traffic collisions remain a significant and potentially preventable source of serious harm in Scotland. Although extensive road safety data is publicly available, proactive deployment of road policing resources continues to draw substantially on officer experience and retrospective analysis rather than integrated, data-driven risk intelligence.

Several relevant data sources already exist, including Stats19, the national road collision dataset, Road Safety Scotland open data, Traffic Scotland sensor information and publicly available weather records. However, the application identifies an opportunity to integrate these different sources

systematically to provide more useful intelligence for operational policing.

The Safer Analytics For Enhanced Road-safety using Artificial Intelligence (SAFER-AI) project will address this gap by developing an ethical and explainable AI platform. The platform will combine open-source datasets and use analytical methods to identify collision hotspots and patterns associated with risky driving behaviour. The resulting intelligence is intended to support, rather than replace, professional police decision making.

Aim

The aim is to develop and validate an ethical, open-data AI platform for road safety policing.

Objectives

The project has three main objectives:

- to integrate publicly available road safety data and develop and validate machine learning models for predicting collision hotspots and classifying risky driving behaviour
- to develop an interactive, map-based dashboard that translates model results into accessible operational intelligence
- to co-design training materials that help policing practitioners understand the application, value and limitations of AI and predictive analytics in road policing contexts

Research methodology

The project will use a data-driven, machine-learning and co-design approach, delivered through three integrated phases. Stakeholder engagement with Police Scotland will be embedded throughout to ensure that the research addresses operational needs and that the resulting tools are understandable and practically useful.

Phase one

Systematically review publicly available road safety datasets and assess their analytical potential. Stats19 collision data, Road Safety Scotland open data, publicly available weather information and road network data will be cleaned and integrated into a common data environment. Workshops with Police Scotland and relevant stakeholders will identify priority use cases and validate the

operational relevance of the selected data.

Phase two

Develop and test machine-learning models. Methods will include spatial clustering to identify geographical patterns, gradient-boosting decision trees for collision-hotspot prediction, time-series analysis to identify patterns over time, and a graph neural network – a machine-learning method capable of modelling relationships within connected road networks. Models will be validated using held-out data that were not used during model development. Outputs will also undergo bias and spatial-fairness assessment.

Phase three

Translate the findings into an interactive, browser-based decision-support dashboard providing map-based risk visualisations and plain-English summaries. The dashboard and accompanying practitioner training materials will be iteratively tested and refined with Police Scotland through demonstrations, co-design activities and feedback sessions.

No personal data will be collected or processed. The research uses anonymised, publicly available datasets, and a bias and fairness audit will assess whether model predictions could unintentionally reinforce spatial inequalities.

Research participation

The project primarily involves Police Scotland personnel and other relevant policing stakeholders, particularly those working in road policing and analytical roles. Their involvement will focus on ensuring that the AI tools and training materials developed through the project are relevant, understandable and useful within operational policing.

During the first phase, Police Scotland and relevant stakeholders will participate in engagement workshops to validate the relevance of the selected road safety data, identify priority operational use cases and help define requirements for the project.

During model development, Police Scotland participants will contribute through structured co-design and validation sessions. These sessions will help the researchers refine how model results are presented, improve their interpretability and assess whether predictions could provide

actionable information in real-world policing contexts.

Police Scotland personnel will also act as end users during development of the browser-based dashboard. Participants will take part in pilot demonstrations and feedback sessions examining usability and operational relevance. A final stakeholder workshop will bring together Police Scotland road policing and analytical staff to review findings, see the dashboard demonstrated and provide structured feedback.

The application does not specify a fixed participant sample size. It states that engagement will be monitored using measures including the number of workshops, participants and stakeholder groups involved.