

DEAKIN UNIVERSITY

RESEARCH AND DEVELOPMENT IN INFORMATION TECHNOLOGY

ONTRACK SUBMISSION

Pitch an Idea

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Task Outcomes	Supports
TLO1 Demonstrate engagement with the following unit learning outcomes (legacy)	ULO5 Persuade and justify outcomes

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Task 8.2HD - Pitch an Idea: SafeRoute AI

Video link:

<https://deakin.au.panopto.com/Panopto/Pages/Viewer.aspx?id=07d6b59c-5d4a-4e4d-bc05-b44f00781d2b>



SafeRoute AI

Real-time road crash risk prediction
for Melbourne Metro



Live data: VicRoads • Bureau of Meteorology • CrashStats



Model: CNN-XGBoost Ensemble



Prediction latency: 0.8 seconds



Presented by:

Thi Thu Suong Ngo



SafeRoute AI

1.19 million

People killed on roads every year – worldwide (WHO, 2026).

Victoria alone **records hundreds of fatalities annually (TAC, 2023)**

- Authorities respond to crashes – they cannot predict them
- No existing system provides real-time, location-specific crash risk forecasting

What if we could see the crash before it happens?



SafeRoute AI

The Problem

Our roads are dangerous. Our systems are blind.

- Current intelligent transport systems are mostly **reactive**, responding after crashes occur instead of forecasting risk.
- Most crash-prediction models are trained on **static offline datasets**, disconnected from live traffic, weather, and road-condition feeds (Kotsyubynska et al., 2026; Girija and Divya, 2024).
- Real-time, location-specific crash-risk forecasting remains a major operational gap in road-safety systems (Sivakoti, 2025).

The technology exists. It just **has not been connected** – until now.



SafeRoute AI

Real-time road crash risk prediction
for Melbourne Metro



Live data:



Bureau of
Meteorology



CrashStats



Model:

CNN-XGBoost
Ensemble

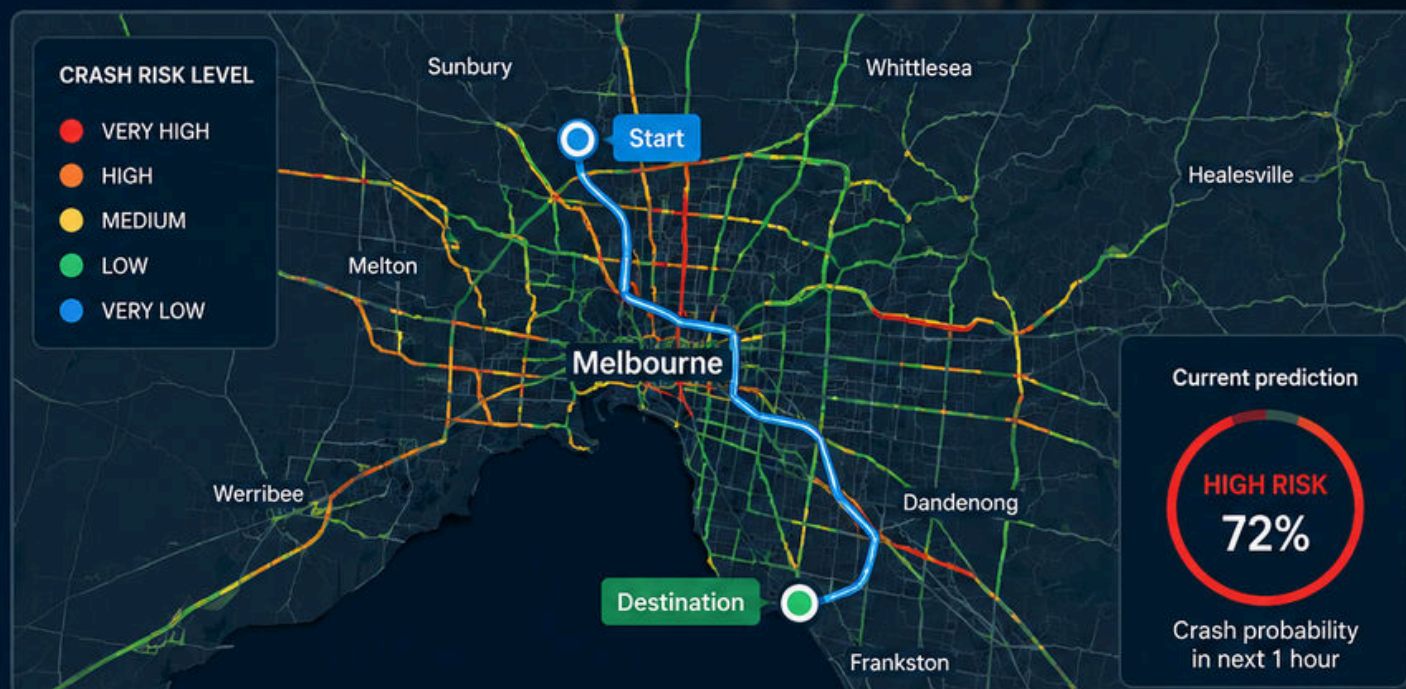


Prediction latency:

0.8 seconds

CRASH RISK LEVEL

- VERY HIGH
- HIGH
- MEDIUM
- LOW
- VERY LOW



Current prediction

HIGH RISK
72%

Crash probability
in next 1 hour



AI-powered insights • Safer routes • Smarter cities

**SafeRoute AI - Predict. Prevent.
Protect.**

Introducing SafeRoute AI

A real-time road **crash risk prediction system** for Melbourne Metro, powered by machine learning.

- **Live Data** - VicRoads · Bureau of Meteorology · CrashStats Victoria
- **Model** - CNN-XGBoost Ensemble (multi-class severity classification)
- **Speed** - 0.8s average prediction latency



SafeRoute AI

SafeRoute AI - Live Dashboard Demo



- **Model Accuracy: 92.4%** target benchmark
- **Critical alerts with active levels:** Critical, High, Moderate
- **Live heatmap:** Active hotspots across Melbourne Metro
- **Severity split:** Minor, Serious, Fatal



Research finding	Relevance to SafeRoute AI
SMOTE oversampling improves sensitivity for rare fatal-crash cases (<i>Kotsyubynska et al., 2026</i>).	Supports class balancing in the SafeRoute AI data pipeline
CNN models can learn complex spatial traffic and road-risk patterns (<i>Girija and Divya, 2024</i>).	Validates the CNN component for spatial feature extraction
Ensemble deep-learning approaches improve crash prediction performance (<i>Sivakoti, 2025</i>).	Supports the CNN-XGBoost ensemble design
XGBoost performs strongly on structured crash-severity and environmental data (<i>Khamar et al., 2026</i>).	Validates XGBoost for severity classification
Real-time operational integration remains a key research gap (<i>Kotsyubynska et al., 2026; Sivakoti, 2025</i>).	Defines the exact gap SafeRoute AI addresses

Evidence by Grounded in Peer-Reviewed Research

SafeRoute AI



SafeRoute AI

Thank you so much

We seek government partners, transport authorities, and industry collaborators to pilot **SafeRoute AI** across Melbourne Metro – turning live crash-risk prediction into real-world road safety action.

 SafeRoute AI

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References

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Kotsyubynska, Y. et al. (2026). 'Machine Learning and Deep Learning for Predicting Traffic Crash Injury Severity: A Systematic Review and Meta-Analysis (2014–2025)', *Journal of Road Safety*, 37(1).

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