SALFO ENGINEERING & MANAGEMENT

COMPASS

Enhancing Road Safety with Connected Vehicles Data

A Proactive Approach to road safety

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BULGARIAN BRANCH ASSOCIATION ROAD SAFETY

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About
SALFO and Associates SA

Established in 1994 in Athens, Greece:

- Largest Greek Engineering Consultancy Firm
- Operating in SE Europe and the Middle East
- Consultant in all major Motorway PPP Projects in Greece

Road Safety Consulting:

المركز الوطني لسلامة الطرق
National Road Safety Center

- Establishment of the National Road Safety Center for Saudi Arabia
- Monitoring NRSC Operation

Panos Papamitropoulos, Head of Transport

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About
Compass IoT

Compass IoT (Compass) is a road intelligence company that uses connected vehicles to generate in-depth insights across transport networks. It is a new, innovative way of surveying roads, collecting data, and planning cities.

Collects data from private and public data providers directly from the vehicle sensors

Developed sophisticated algorithms to predict speed, volume, near misses, g-forces and maps braking, swerving and acceleration events

Has access to a large pool of anonymous vehicle data sources that provide a strong representation of road networks around the world

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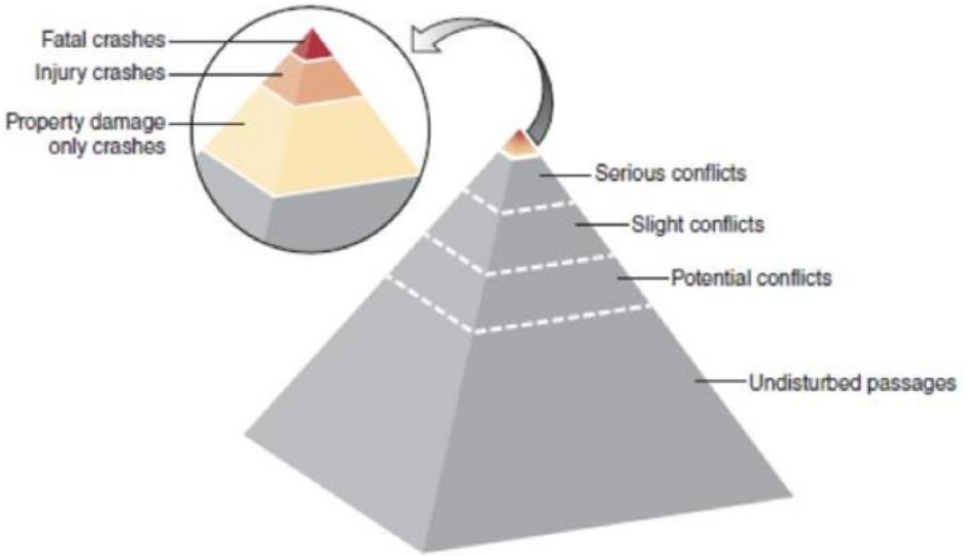
Change to Road Safety Approach

- Crash history is a poor indicator of underlying risk
- Relying on accident history is a reactive approach that does not align with the ethical philosophy of safe system approach
- Under-reporting is very common for all types of accidents. Mainly the non-fatal ones.

Identifying Near-Miss Sites

Compass IoT's Safepoint is a new Road Safety tool

- Processes data generated by connected vehicles
- Identifies emerging crash risk locations by aggregating vehicle data showing high g-force events (indicating braking, steering, acceleration and max event speed)
- Assists experts to understand the causes of accidents and near-misses (showing high–risk road network sites)
- Improves the existing reactive approach to road safety by providing near-miss causation insight. Allowing an ideal proactive approach by using live connected vehicle data



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Near-Miss recorded and mapped across Australia

Compass IoT
Safepoint – Survey – Brakepoint - Pavepoint

Safepoint reveals 'near misses' where a vehicle's braking and steering are represented directly from the connected vehicle.

Survey examines speeds and volumes where there is no need to apply infrastructure (tubes or cameras).

Brakepoint indicates dominant speed and g-forces throughout the whole network.

Pavepoint – Is an "Artificial Intelligence – driven road roughness profiling tool and vehicle riding quality application which provides frequent, accurate and up – to -date road roughness and road pavement condition indicators. The platform uses a 6 -axis gyro data, pitch / roll / yaw in addition to the x/y/z data indicating road roughness and road riding quality.

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Safepoint

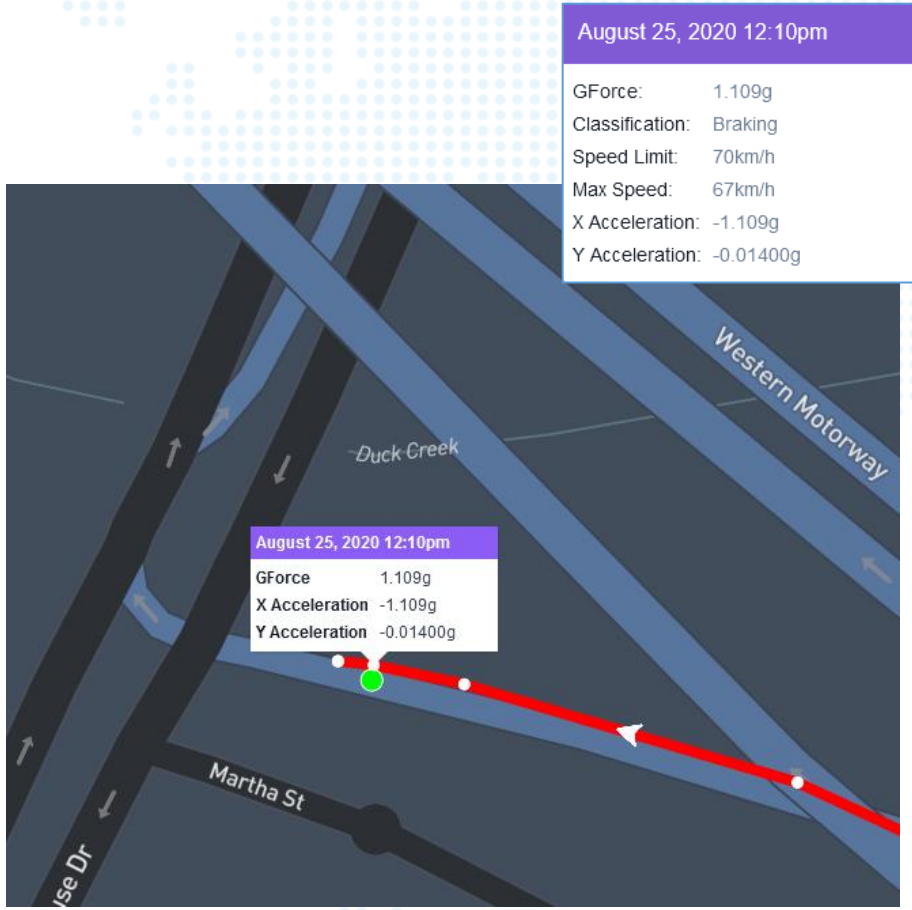
What is a Near-Miss?

Statistically significant event:

- Speed
- g-force

Event categories

- Braking
- Steering
- Combined



Driving Maneuver	Target g-force
Cornering	
Mild Left	0.2 - 0.3 G's
Moderate Left	0.3 - 0.4 G's
Hard Left	0.5 - 0.6 G's
Mild Right	0.2 - 0.3 G's
Moderate Right	0.3 - 0.4 G's
Hard Right	0.5 - 0.6 G's
Braking	
Mild	0.4 - 0.5 G's
Moderate	0.5 - 0.6 G's
Hard	0.6 - 0.7 G's
Acceleration from stationary position	
Mild	0.2 G's
Hard	0.3 - 0.4 G's
Turns	
Mild Left	0.2 - 0.3 G's
Moderate Left	0.4 - 0.5 G's
Hard Left	0.6 - 0.7 G's
Mild Right	0.2 - 0.3 G's
Moderate Right	0.4 - 0.5 G's
Hard Right	0.6 - 0.7 G's

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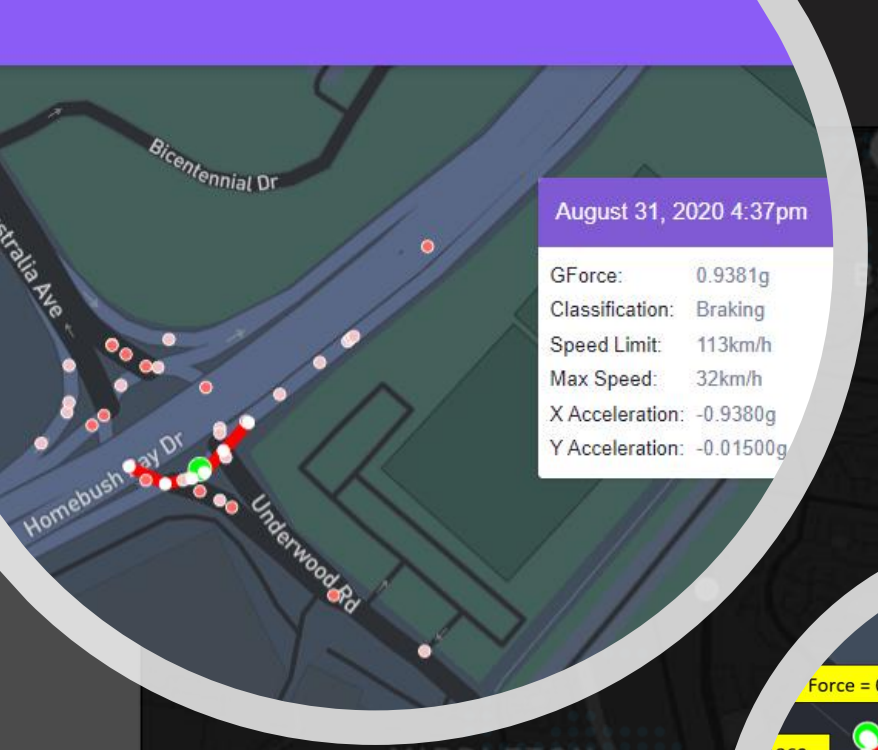
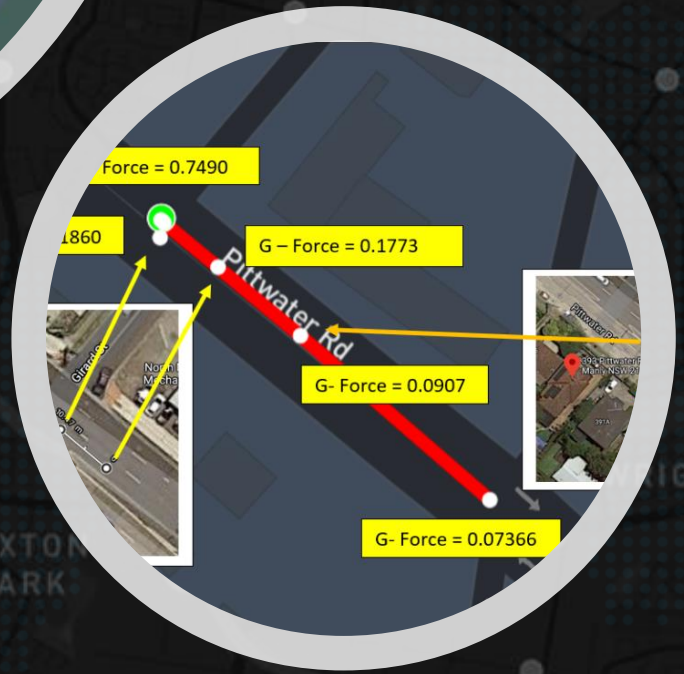
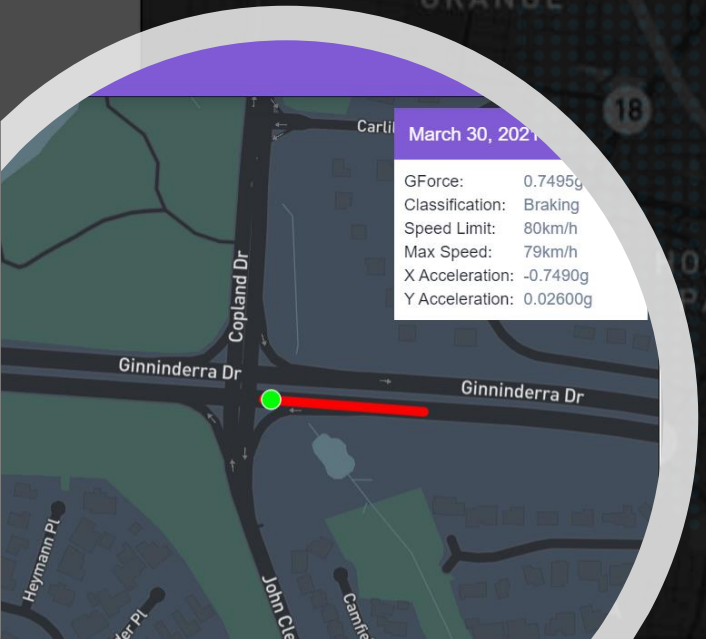
What does Safepoint show ?







- Harsh braking
- Vehicle conflicts
- Near Misses
- Severe acceleration and deceleration
- Incident clusters
- Crashes
- Vehicle trajectory
- Violent lateral movements
- Potential Hazard locations
- Infrastructure deficiencies

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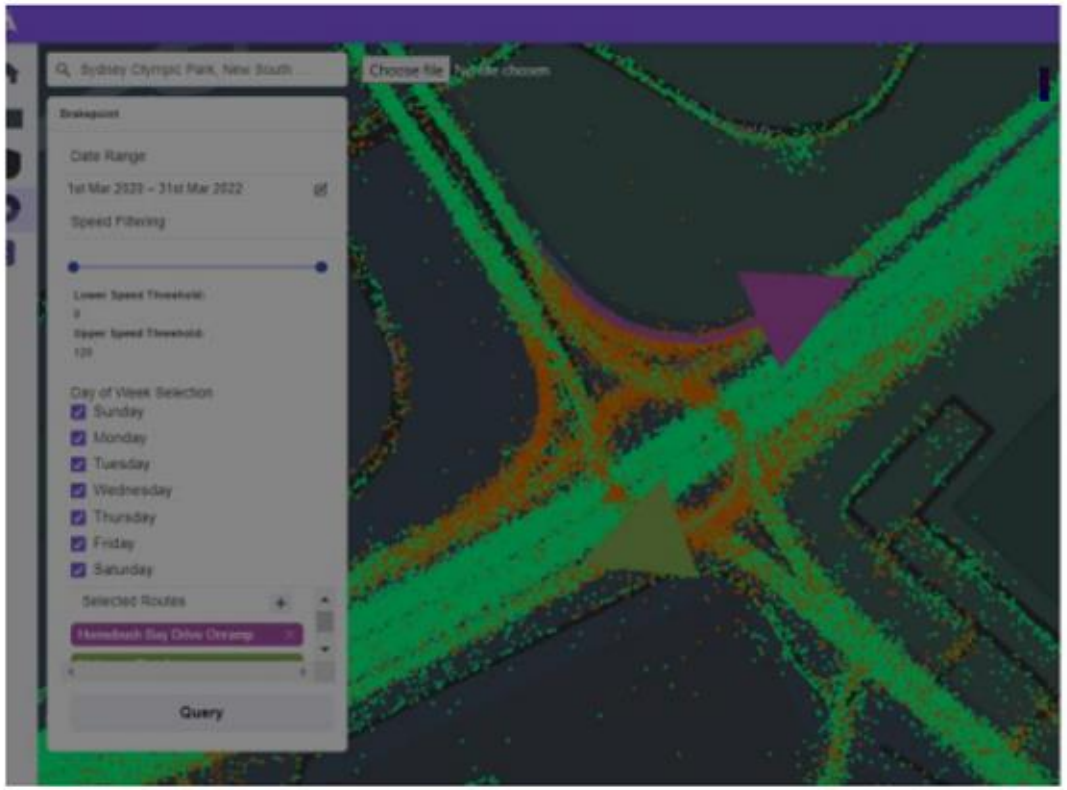
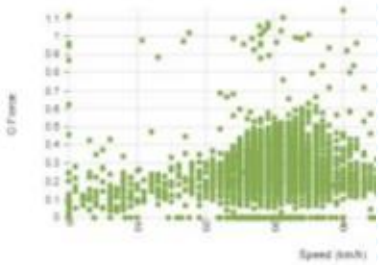
Brakepoint

Indicate speed and g-forces throughout the whole network

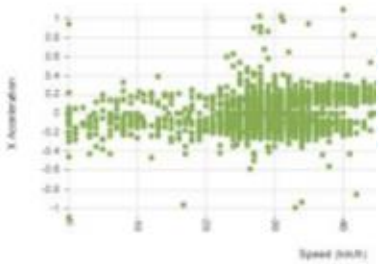
BRAKEPOINT

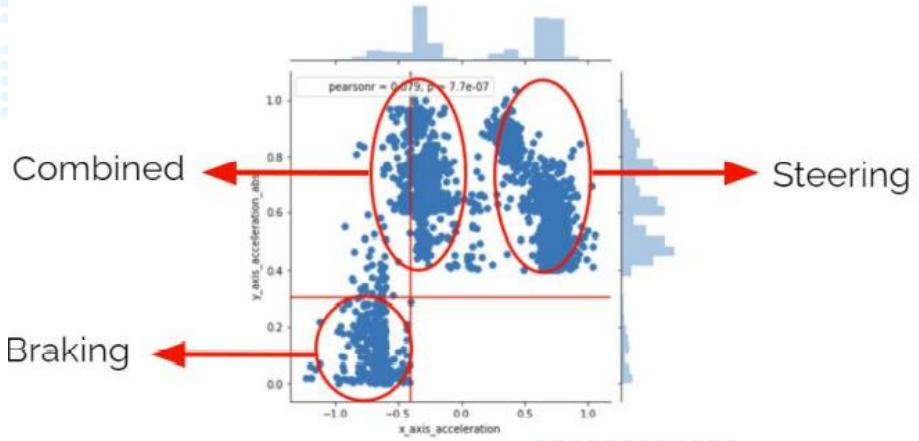


Relational Gforce



Relational Xacc





Survey

Provides deep insights for volume, speed and travel times

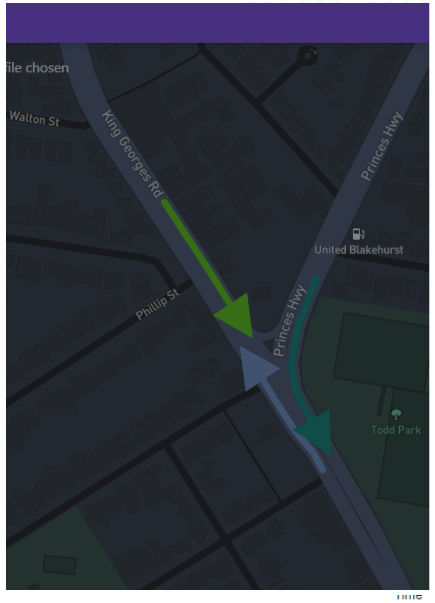
Traffic Volumes

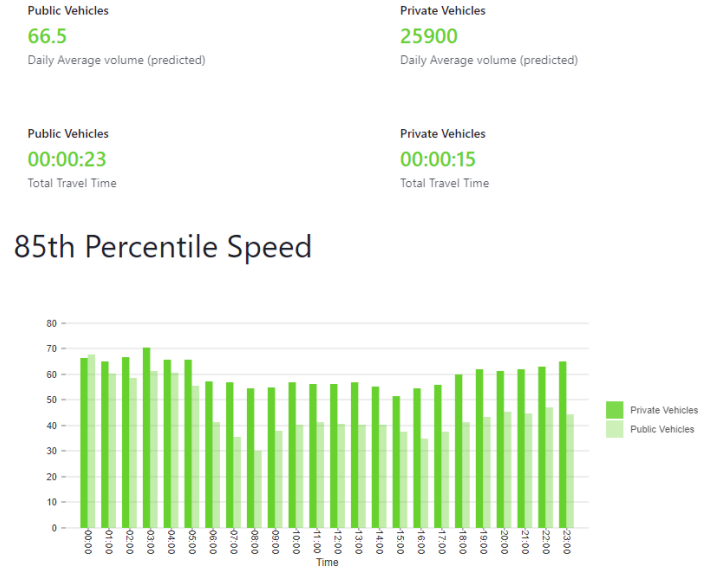
Daily Traffic Flows:

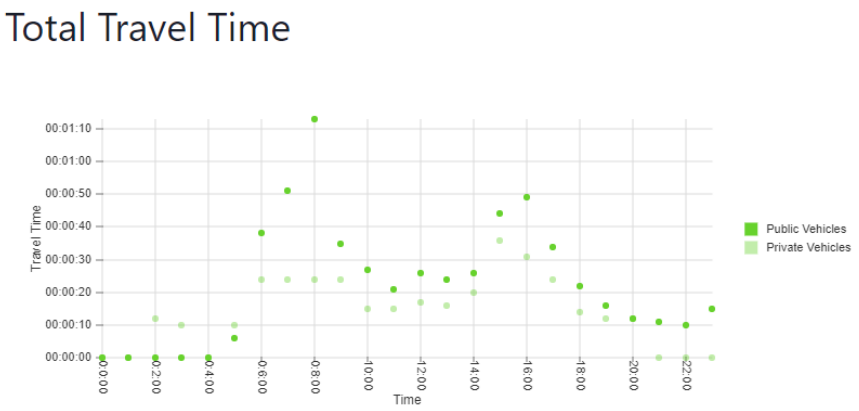
- Section of road
- Journey
- Turning movements

Travel Speeds

- Average Speed
- Hourly Distribution
- Travel Times





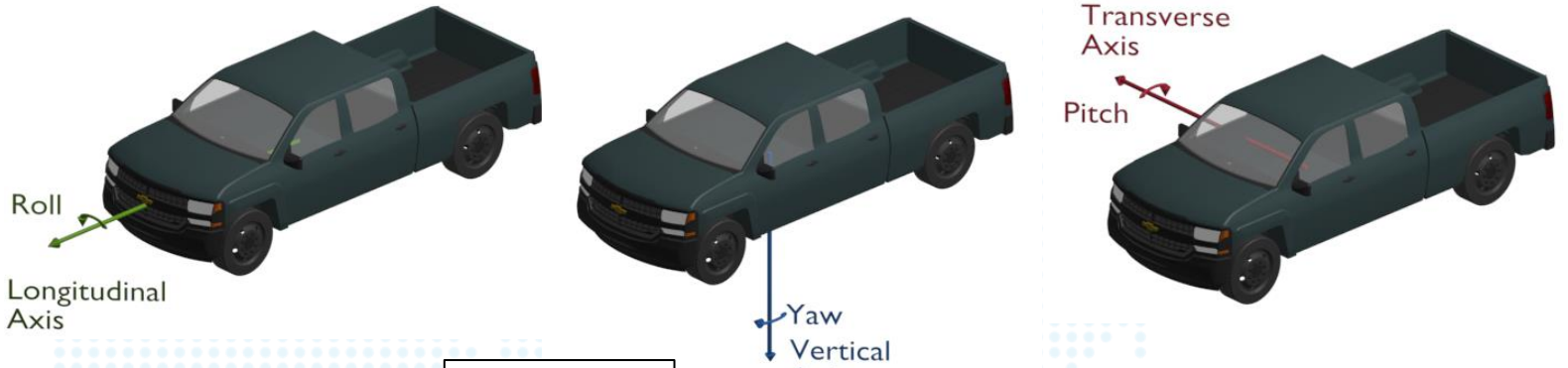


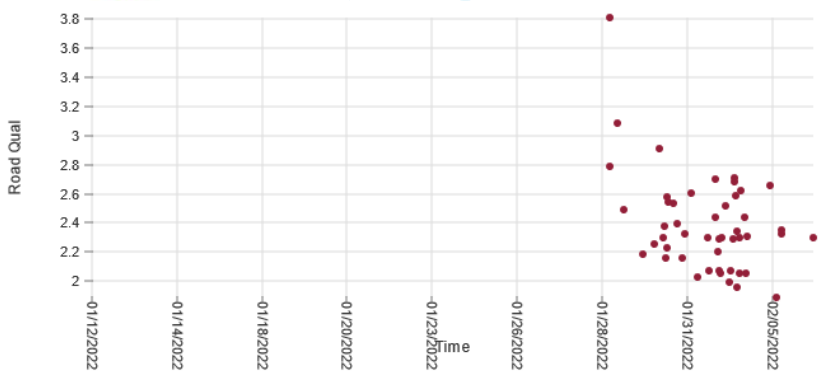
Pavepoint

Artificial Intelligence – driven road roughness profiling tool and vehicle riding quality application

Pavement Condition

- Gyroscopes data:
  - Roll (longitudinal axis)
  - Pitch (vertical axis)
  - Yaw (transverse axis)
- Pavepoint provides equivalent IRI indicators (International Roughness Index in mm/m)
- Pavepoint machine learning model is based on IRI profilometer reading matching with vehicle learning readings





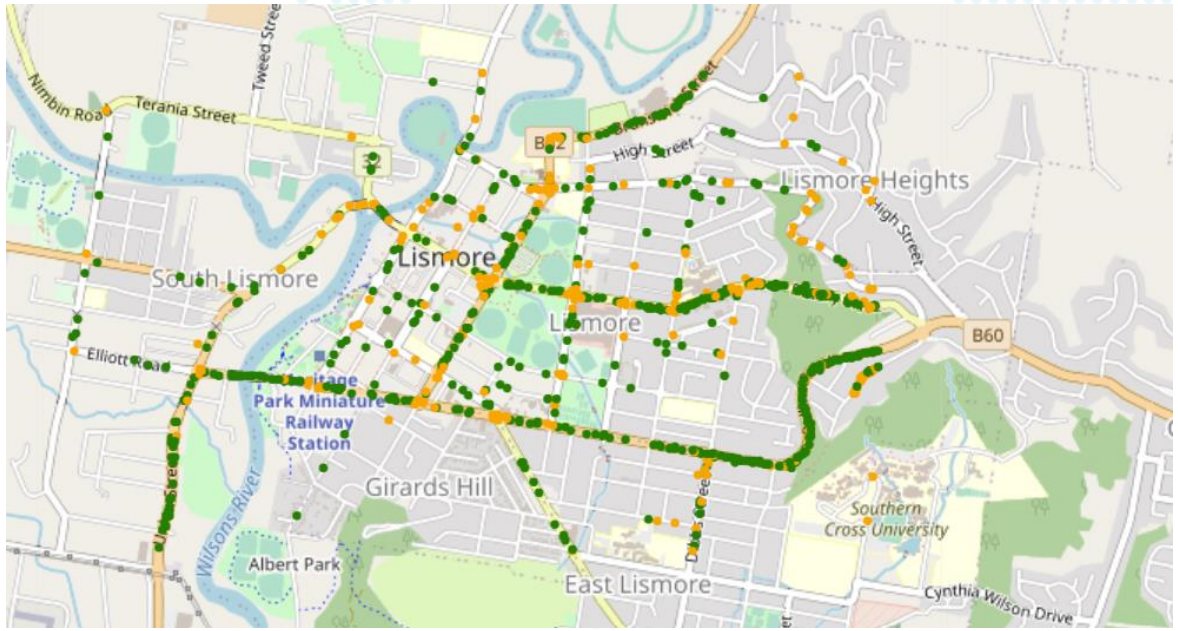
Pavepoint model

The Pavepoint model was built using profilometer data in conjunction with other data sets, such as sensor data from vehicle readings.

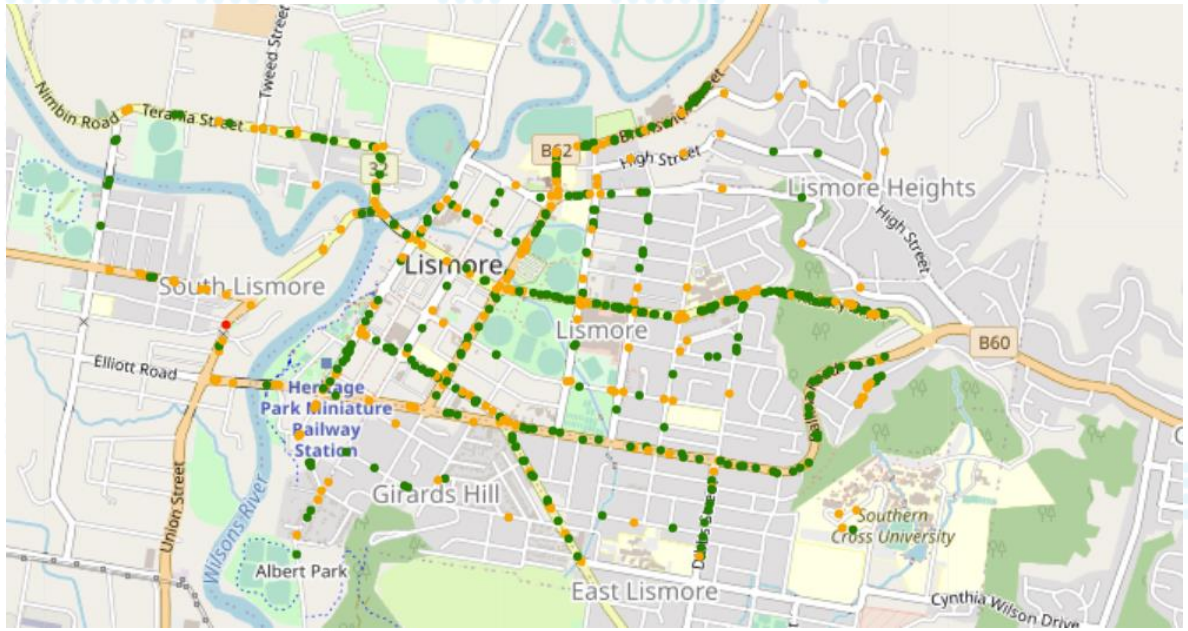
The Pavement platform predicts through machine learning the road surface conditions and the changes over time.

IPSWICH FLOODING – FEBRUARY 2022 (Comparing road quality before and after the severe flooding)

Pavepoint - before flooding



Pavepoint – after flooding (streets turning orange)



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Why the approach to road safety should change