



\Orchestrating a brighter world

The background features a complex, abstract graphic. It includes a large, glowing green wireframe sphere in the upper half, with a blue semi-transparent rectangle overlaid on it. Below the sphere, there are several curved, glowing lines in green and magenta that sweep across the lower half of the image. The entire scene is set against a dark background with a blue gradient on the right side.

Transforming Road Inspection Efficiency in Australia & New Zealand

through AI-driven automation.

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Introduction

Australia and New Zealand's extensive road networks form the backbone of national productivity and community mobility. Maintaining these assets is a critical responsibility, particularly in regional and remote areas where infrastructure degradation often goes undetected for long periods.

Traditionally, road condition assessments have relied on manual inspections by field personnel—a method that is time-consuming, costly, and often reactive. NEC's AI-powered road condition monitoring platform, Kurumie introduces a new model: automated, AI-powered inspections integrated with routine vehicle movements, allowing agencies to move toward proactive, data-driven road asset management.

Kurumie is an AI-powered road inspection system that uses dash-mounted cameras on existing vehicle fleets to automatically detect road defects such as potholes, cracks, faded line markings, and damaged signage. The data is processed in the cloud, delivering near real-time insights that support timely, informed maintenance decisions.

Kurumie can transform road asset management across Australia and New Zealand (ANZ); by shifting from infrequent, manual inspections to frequent, automated monitoring, transport agencies and local councils can address maintenance needs proactively, reduce operational costs, and improve safety.

The system has been successfully implemented in Japan, notably in Toyota City, a municipality managing over 2,500 kilometres of road across a population of approximately 410,000 people. Toyota City deployed Kurumie on road patrol vehicles, using AI to detect urgent potholes that were not previously identified through visual inspections. The ability to monitor road conditions continuously reduces the workload of staff and enables preventive action in hazardous spots.



The Limitations of Manual Inspection

Manual road inspections have long been the standard approach for assessing road conditions and infrastructure health. However, this method presents significant operational, safety, and strategic challenges that hinder effective road asset management—especially across vast and diverse networks like those in Australia and New Zealand.

Safety Risks to Field Staff – Inspectors frequently work in high-risk environments, including roadside locations with live traffic, inclement weather, or poor visibility. These conditions expose workers to unnecessary danger and liability, particularly for remote or nighttime inspections.

Infrequency and Delays – Due to limited resources and staff availability, inspections are often conducted infrequently—sometimes only once every few months or even years, particularly in rural and regional areas. This results in delayed identification of hazards, which can escalate into costly repairs or safety incidents.

Labour-Intensive and Costly – Manual inspections require trained personnel to travel to, assess, and document road conditions in person. This is resource-heavy, particularly when inspections span thousands of kilometres of road, which can be the reality in regional ANZ. Travel, labour, and administrative costs quickly add up, consuming budget that could otherwise go toward maintenance and repair.

Subjectivity and Inconsistency – Manual visual assessments often rely on inspector judgment, which can vary based on experience, fatigue, or environmental conditions. This subjectivity can result in inconsistent reporting and missed issues—especially subtle early-stage defects that worsen over time.

Reactive, Not Proactive – Because inspections occur so infrequently, they tend to focus on visible damage or defects that have already developed—leading to a reactive maintenance model. This often results in higher repair costs, reduced road lifespan, and limited ability to plan or prioritise works strategically.

Limited Coverage in Remote Areas – Rural and remote roads—common across Australia and New Zealand—are often left out of regular inspection cycles due to distance, accessibility, or funding. This creates a risk of undetected degradation in areas that may already suffer from limited infrastructure investment.



Challenges Unique to AUS and NZ



While many road asset management challenges are global, Australia and New Zealand face a unique combination of geographic, environmental, and operational factors that amplify the limitations of traditional inspection methods and demand innovative solutions.

Vast and Dispersed Road Networks – Australia and New Zealand have extensive road networks that span remote outback highways, rural shire roads, mountainous regions, and dense urban corridors. Covering this scale of infrastructure with limited inspection teams poses a significant logistical challenge, especially for regional and rural councils with limited staff.

Diverse and Harsh Climate Conditions – From New Zealand's alpine environments and heavy rainfall to Australia's extreme heat, dust, and flooding, the region's climate accelerates wear and tear on road surfaces. These conditions also complicate inspection scheduling and can degrade roads faster than current maintenance cycles can respond.

The Case for Change

Benefits of Frequent Inspection and Early Intervention

Our road networks are critical to the movement of people, goods, and services. Yet the ways these networks are inspected and maintained remains largely reactive – driven by limited inspections, public complaints, and emergency repairs often related to weather events. As infrastructure ages, traffic volumes grow, and climate impacts evolve, the limitations of this approach become more pronounced.

Financial – With frequent, AI-enabled inspections the “fix it when it breaks” approach is a thing of the past. Early detection, allowing councils and agencies to intervene before minor issues become major liabilities, reduced lifecycle costs and frees up resources for strategic investment.

Safety and Reputation – Delayed road repairs can pose serious safety risks – for cyclists and pedestrians as well as vehicles. They can also affect the public perception of the government or agency's responsiveness and competence. Proactive inspection and maintenance at a standardised degree, demonstrates accountability and can strengthen community trust.

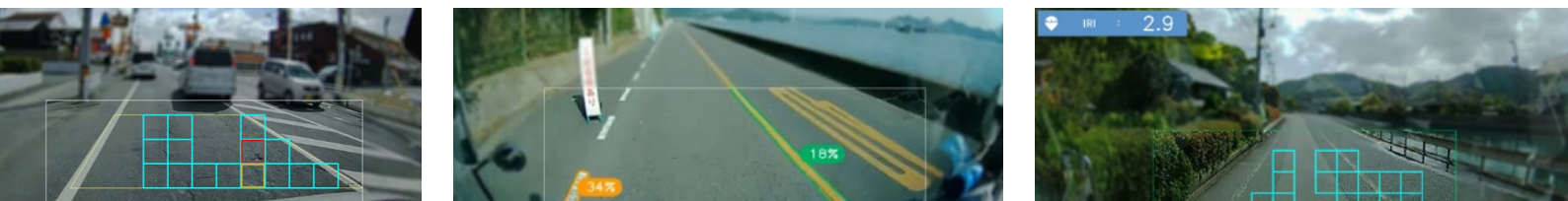
Opportunities for Strategic Planning – AI-powered systems like NEC’s Kuramie provide continuous, objective data streams that feed directly into asset management systems. This enables smarter, data-informed planning that aligns with long-term infrastructure goals.

Climate Resilience and Future-Proofing Infrastructure – Many local roads were not designed to endure today’s traffic volumes or climatic extremes. As climate-related events—like heatwaves, heavy rainfall, and flooding—increase in severity and frequency, proactive asset monitoring becomes essential to maintain resilience and prevent infrastructure failure.

AI-supported inspections offer a scalable way to monitor these changes and adjust maintenance strategies accordingly.

Digital Transformation Momentum – Across ANZ, transport and government agencies are undergoing a digital transformation—driven by smart cities, data-driven governance, and citizen expectations for improved services. Automated road inspection aligns perfectly with these objectives, offering a tangible and practical way to digitise an essential function.

In short, the case for change is clear. Maintaining the status quo is costly, risky, and unsustainable. AI-powered road inspection systems like Kuramie offer a practical path toward safer, smarter, and more strategic infrastructure management across Australia and New Zealand.



Current Landscape

Technology for Road Asset Management

Several technologies are used to monitor road conditions, each with varying applicability:

Technology	Strengths	Limitations
LiDAR / Survey Vehicles	High precision	Costly and infrequent
AI & Vision-Based Systems	Cost-effective, frequent	Emerging in ANZ
Remote Sensing / Satellite	Wide coverage	Low resolution for fine defects
IoT Sensors	Real-time monitoring	Not suited for visual defects

NEC’s Kurumie system offers a powerful balance between coverage, accuracy, and affordability—particularly for agencies looking to scale up their asset monitoring programs.

Case Study: NEC Kurumie in Japan

NEC's Kurumie system has been successfully deployed across over 50 Japanese municipalities. The system:

- Uses dash-mounted cameras on municipal vehicles
- Applies AI in the cloud to automatically detect potholes, cracks, lane marking wear, and signage damage
- Transmits only relevant footage (e.g., potential defects) to reduce data load and privacy concerns
- Can be enhanced with SAR (Synthetic Aperture Radar) satellite data to deliver broad, high-level monitoring

Notable deployment

The system has been successfully implemented in Japan, notably in Toyota City, a municipality managing over 2,500 kilometres of road across a population of approximately 410,000 people. Toyota City deployed Kurumie on road patrol vehicles, using AI to detect urgent potholes that were not previously identified through visual inspections. The ability to monitor road conditions continuously reduces the workload of staff and enables preventive action in hazardous spots.

Potential for Kurumie in ANZ

Australia and New Zealand's vast and diverse road networks present a clear opportunity for smarter, more efficient approaches to asset management. NEC's Kurumie platform is ideally positioned to address the growing need for proactive, cost-effective road monitoring in both urban and regional settings.

Unlike traditional inspection methods or expensive survey vehicles, Kurumie is built to be low-touch, scalable, and practical for everyday council operations. It provides a viable path for councils and transport agencies to shift from reactive maintenance to proactive asset management—regardless of their size or budget.

Key Advantages



Leverages existing fleet vehicles

No need for dedicated inspection trips—cameras can be mounted on garbage trucks, buses, and council cars already operating on regular routes.



Cost-effective to deploy and scale

Minimal hardware requirements, cloud-based analytics, and flexible rollout options reduce upfront and ongoing costs.



High-frequency, objective inspections

Roads can be inspected as often as vehicles travel their routes, capturing accurate and consistent data far more frequently than manual methods.



Supports predictive maintenance

Frequent insights allow agencies to identify trends, schedule interventions earlier, and extend the lifespan of road assets.



Improves safety and operational efficiency

Reduces the need for roadside inspections, minimising risk to staff and allowing faster response to emerging issues.

Scalable and Flexible – The Kurumie platform can be implemented through staged pilots or full-scale deployments, depending on an agency's needs and readiness. Councils can start small—trialling the system on a few vehicles or in high-priority areas—before expanding to broader networks or additional asset classes.

- Easy to add more vehicles over time
- Compatible with regional and metropolitan environments
- Integration-ready with existing asset management systems

Aligned with Strategic Priorities – In addition to improving operational efficiency, Kurumie supports broader government goals:



Sustainability

Reduces emissions by removing the need for dedicated inspection trips



Climate Resilience

Enables better tracking of damage from extreme weather



Digital Transformation

Advances smart city and smart council initiatives



Public Accountability

Delivers faster, data-driven responses to community concerns

Recommendations and Next Steps

1. **Pilot Programs:** Launch trials in urban and regional councils to build local evidence
2. **Stakeholder Engagement:** Involve operational teams early to encourage adoption
3. **Capacity Building:** Train staff in using and interpreting the system outputs
4. **Systems Integration:** Link Kurumie data to existing asset management platforms
5. **Sustainable Resourcing:** Allocate funding and policy support for long-term adoption



Conclusion

NEC's Kurumie offers a transformative step forward in how road condition data is captured and used in Australia and New Zealand. Its flexibility, affordability, and technical capability make it an ideal solution for transport agencies and councils seeking to modernise road maintenance and deliver safer, more reliable infrastructure for their communities.

Kurumie represents a new era in road asset management—where inspections are frequent, accurate, and affordable. For transport agencies and councils in Australia and New Zealand, this technology offers the opportunity to improve road conditions, optimise spending, and enhance public safety.

By adopting this proactive and scalable solution, road managers can unlock a more sustainable, efficient, and trusted infrastructure future.

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