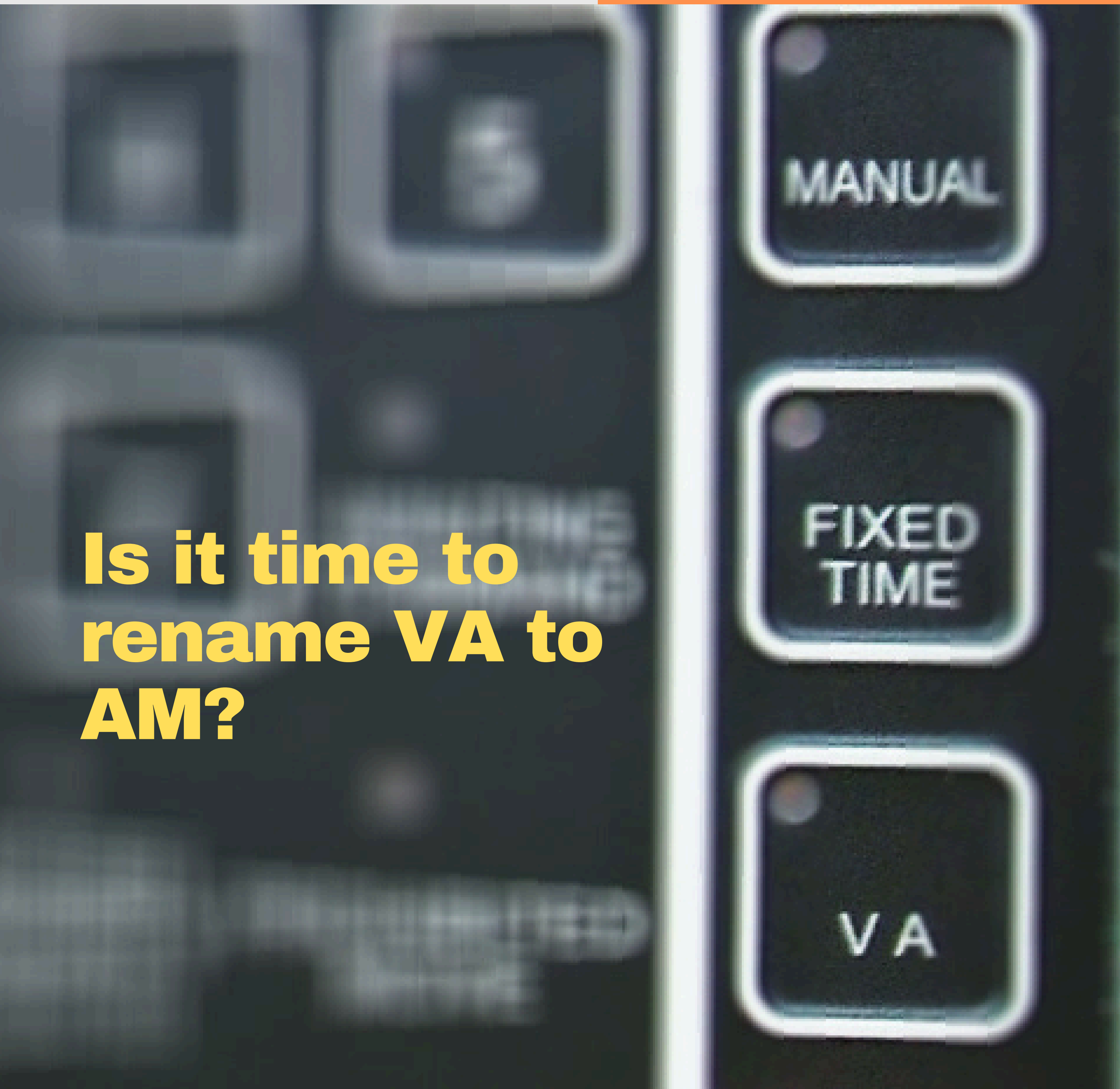
ITS EDGE

Intelligent Transport Systems

No. 1 - SPRING 2025



Is it time to rename VA to AM?

Intelligent Transport Systems - Explained

Technologies to operate and manage transport infrastructure

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https://ITSNow.org

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ITS Edge is published by ITS Now, which exists to promote best practice and professional development within the Intelligent Transport Systems (ITS) sector, in the UK and internationally.

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In this edition:

Intelligent ANPR technology for Smart solutions

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The new MAV AiQ customisable ANPR camera has been designed to meet the most stringent traffic system requirements. Offering AI enhanced performance, GhostPlate™ technology, plate tracking, global plate recognition and vehicle classification amongst its many features, system developers and users can expand their objectives and look beyond standard expectations.

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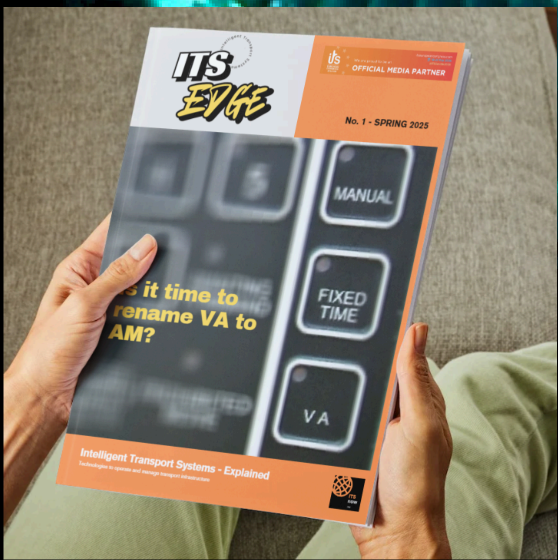

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Hey everyone!

We are delighted to welcome you to the eagerly anticipated first edition of **ITS Edge**, brought to you by **ITS Now**. This builds on our YouTube and social media channels to provide an update on what we have been up to. Please feel free to use the links we've included throughout the articles to see the related videos and posts.

In this edition, we have been collaborating with organisations such as ERTICO, from across the ITS sector, to bring you a range of articles. We start by looking at how the language we use in traffic engineering might influence the solutions we engineer and how this might work to the detriment of progressing how we think about the active transport agenda.

As this is our first edition, we have included an explanatory article about what ITS is. We also have four articles from our series written in the UAE and Oman, about issues that face successful ITS deployments.

We finish this edition with our Technology Insight item for the first episode of Season 4 of the @ITSNow YouTube Channel. In this, we have worked with the Japanese firm NEC to look at their developments for Distributed Fibre Optic Sensing (DFOS), make sure to watch the full video online too!

See you next time,

Alistair

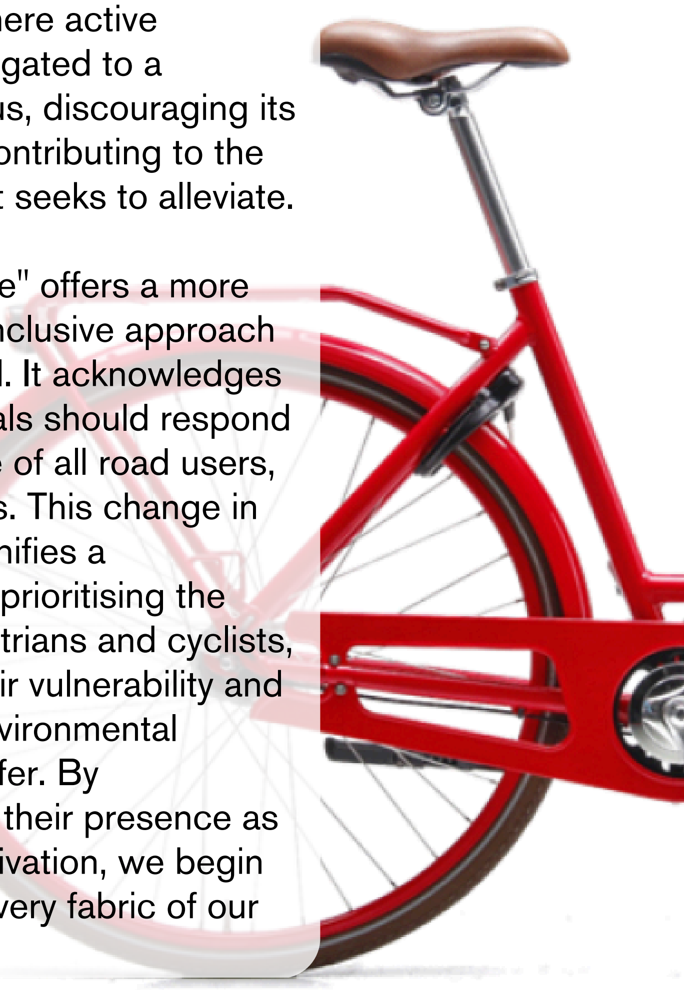
Is it time to rename VA to AM?

The language we use shapes our perception of the world. In the realm of urban transportation, the phrase "Vehicle Activated" within traffic signal control systems reflects a historical bias that prioritises the movement of cars over the needs of pedestrians and cyclists. As cities grapple with the challenges of congestion, pollution and inequity, a fundamental shift in perspective is imperative. This shift demands a move away from the car-centric paradigm and towards a more inclusive, sustainable approach that embraces active transport.

The simple, yet profound, act of renaming "Vehicle Activated" to "Activated Mode" is not merely a semantic adjustment; it represents a crucial step towards realising this transformative vision and reflects the changes to the priority of users which now prioritises active transport users' above vehicular traffic.

The current terminology perpetuates the notion that roads are primarily designed for vehicular traffic. This assumption is deeply problematic, particularly in densely populated urban environments where pedestrian and cyclist safety and accessibility are paramount. "Vehicle Activated" signals often impose unnecessary delays on those traveling on foot or by bicycle. These individuals are frequently forced to wait for gaps in vehicular traffic or press a button, even when no vehicles are present. This creates an environment where active transport is relegated to a secondary status, discouraging its adoption and contributing to the very problems it seeks to alleviate.

"Activated Mode" offers a more equitable and inclusive approach to traffic control. It acknowledges that traffic signals should respond to the presence of all road users, not just vehicles. This change in terminology signifies a commitment to prioritising the needs of pedestrians and cyclists, recognising their vulnerability and the manifold environmental benefits they offer. By acknowledging their presence as a trigger for activation, we begin to reshape the very fabric of our urban spaces.



Pedestrian and cyclist detection systems:
Utilising a combination of cameras, radar and infrared sensors to accurately detect the presence and movement of non-vehicular road users. These systems must be sophisticated enough to differentiate between various types of active transport and to account for varying speeds and movement patterns.

Smart signal algorithms: Developing algorithms that prioritise pedestrian and cyclist crossings based on real-time data. These algorithms must be capable of dynamically adjusting signal timings to minimise delays and enhance safety, while also considering the overall flow of traffic.

Adaptive signal control:
Implementing systems that dynamically adjust signal timings based on the overall flow of traffic, giving priority to active transport modes during peak pedestrian and cyclist hours. This requires a holistic understanding of traffic patterns and the ability to anticipate and respond to changing conditions.

By adopting "Activated Mode," cities can send a powerful message that active transport is valued and prioritised. This symbolic gesture can translate into tangible benefits, including:

- Increased safety: Reducing conflicts between vehicles and vulnerable road users, thereby minimising the risk of accidents and injuries.
- Improved accessibility: Making it easier for people of all ages and abilities to walk and cycle, thereby creating more inclusive and equitable urban environments.
- Reduced congestion: Encouraging a shift away from private vehicle use, thereby mitigating traffic congestion and improving overall traffic flow.
- Enhanced environmental sustainability: Promoting cleaner and healthier transportation options, thereby reducing air pollution and greenhouse gas emissions.

Ultimately, renaming "Vehicle Activated" to "Activated Mode" is about creating a more humane and sustainable urban environment. It's about recognising that roads are shared spaces and that all road users deserve to be treated with respect and consideration. This simple change in terminology can be a catalyst for a broader transformation in how we design and manage our transportation systems. It can pave the way for cities that are safer, healthier and more liveable for everyone. It is a step toward creating cities where people are prioritised over vehicles. It is a step towards a more sustainable and equitable future.

So, what is ITS?

An introduction to Intelligent Transport Systems

The modern world is defined by its interconnectedness and nowhere is this more evident than in the complex web of transport networks that facilitate our daily lives. While the term "Intelligent Transport Systems" (ITS) might conjure images of futuristic, self-driving pods zipping around our cities, the reality is far more grounded, yet equally transformative. ITS represents a sophisticated suite of technologies and systems designed to optimise the management, operation and utilisation of our diverse transportation infrastructure. It's the invisible hand guiding the flow of traffic, enhancing safety and informing our journeys, often without us even realising it.

At its core, ITS is about leveraging data and technology to improve the efficiency and safety of transportation. This encompasses a broad spectrum of applications, ranging from simple, stand-alone devices to intricate, interconnected systems.

These systems address a multitude of critical challenges, broadly categorised as:

- Improving Safety: Reducing accidents and mitigating their impact through real-time monitoring and intervention.
- Increasing Capacity: Optimising traffic flow to alleviate congestion and maximise the utilisation of existing infrastructure.
- Informing Users: Providing timely and accurate information to travellers, enabling informed decision-making.
- Managing Assets: Ensuring the efficient maintenance and operation of transportation infrastructure.

In a Highways context, the implementation of ITS solutions varies depending on the specific context, generally falling into two primary categories: **Urban** and **Inter-Urban**.

Urban ITS: Navigating the Cityscape

Urban environments, characterised by dense populations and complex traffic patterns, demand specialised ITS solutions. These implementations focus on optimising traffic flow within towns and cities, addressing challenges such as congestion, pedestrian safety and public transport efficiency. A quintessential example is the ubiquitous traffic signal. While seemingly simple, modern traffic signals are often integrated into sophisticated Urban Traffic Control (UTC) systems. These systems utilise real-time data from a network of sensors to dynamically adjust signal timings, minimising delays and improving overall traffic flow.

Beyond traffic signals, urban ITS encompasses a wide array of applications, including:

- Real-time parking information systems: Guiding drivers to available parking spaces, reducing search times and congestion.
- Variable message signs: Providing dynamic information about traffic conditions, road closures and alternative routes.
- Public transport information systems: Offering real-time updates on bus and train schedules, enabling efficient journey planning.
- Pedestrian detection systems: Enhancing safety at intersections by detecting pedestrians and adjusting signal timings accordingly.
- Environmental monitoring systems: Tracking air quality and noise levels, contributing to sustainable urban development.

Inter-Urban ITS: Mastering the Highways

Inter-urban environments, primarily motorways and trunk roads, present a different set of challenges. These high-speed corridors require ITS solutions that prioritise safety, efficiency and journey time reliability. One of the most prominent applications is the use of variable speed limits. By dynamically adjusting speed limits based on real-time traffic conditions, these systems help to smooth traffic flow and prevent congestion.

Key features of inter-urban ITS include:

- Ramp metering: Regulating the flow of traffic entering motorways to prevent congestion and maintain smooth traffic flow.
- Automatic incident detection systems: Utilising sensors and CCTV cameras to rapidly identify accidents and other disruptions, enabling swift response.
- Electronic toll collection: Streamlining toll payment, reducing delays and improving traffic flow.
- CCTV surveillance: Providing network operators with a comprehensive view of traffic conditions, enabling proactive management and incident response.
- Vehicle detection systems: Gathering data on traffic volume, speed and occupancy, providing the foundation for real-time traffic management.

The Future of ITS: Connected and Automated Vehicles (CAVs)

The advent of Connected and Automated Vehicles (CAVs) is poised to revolutionise the landscape of ITS. These vehicles, equipped with advanced sensors and communication technologies, have the potential to significantly enhance safety, efficiency and sustainability.

In the interim, we are witnessing the increasing sophistication of Advanced Driver Assistance Systems (ADAS), such as active cruise control and lane departure warning. These systems provide drivers with real-time information and assistance, enhancing safety and comfort. Furthermore, the growth of online information systems that supply drivers with real time traffic data and road condition information will continue to become more refined.

The integration of CAVs into the existing transportation infrastructure will require significant advancements in ITS. This includes the development of robust communication networks, sophisticated data processing capabilities and intelligent control systems. The future of ITS lies in the seamless integration of these technologies, creating a truly intelligent and responsive transportation ecosystem.

In conclusion, ITS is not a futuristic fantasy, but a present-day reality that is transforming our transportation networks. From the humble traffic signal to the sophisticated systems that manage our motorways, ITS is working behind the scenes to enhance safety, improve efficiency and inform our journeys. As technology continues to evolve, ITS will play an increasingly vital role in shaping the future of transportation, creating a safer, more efficient and sustainable world.

To see the accompanying video, scan the QR code or go to:
https://www.youtube.com/watch?v=y2R28el03eI

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"The 16th ITS European Congress in Seville, marks a crucial juncture for all stakeholders to convene and explore future solutions focusing on clean, resilient and smart mobility. Aligned with European initiatives such as the Green Deal and the Sustainable and Smart Mobility Strategy, Seville exemplifies how our host cities' lead the transformation of smarter, cleaner and more sustainable future.

With its commitment to cleaner transportation, Seville embodies the spirit of innovation that our Congress seeks to promote. On behalf of ERTICO as organiser, and together with the host City of Seville, in sync with ITS Spain and the entire host committee, I have the great pleasure of inviting all of you to continue fostering enriching dialogues and unique network opportunities that propel Europe towards a more sustainable future.

I am very much looking forward to greeting you all in Seville."

Joost Vantomme
CEO, ERTICO – ITS Europe

Registrations are open for the 16th ITS European Congress, Europe's premier smart mobility and digital transport event, being held in the vibrant city of Seville, 19-21 May 2025. Organised by ERTICO – ITS Europe, it expects 3,500+ attendees, including professionals, policymakers, researchers and innovators. The released Technical Programme features three Plenary Sessions, 105+ Specialist Sessions and 30+ Paper Sessions, covering key industry trends and innovations. The congress offers an interactive exhibition with 100+ exhibitors, live demonstrations and networking events, including the ITS Dinner. Technical visits showcase Seville's smart mobility initiatives. ERTICO CEO Joost Vantomme highlights it as a crucial event for anyone involved in shaping the future of transport.

Navigating the Labyrinth: Competing Standards and User-Centricity in ITS

> “A critical shift in perspective is necessary, one that emphasises the "outcome" and the "goal" of a project...”

The burgeoning field of Intelligent Transportation Systems (ITS) presents a unique set of challenges and opportunities. While the promise of enhanced efficiency, safety and accessibility is undeniable, the path to realising this potential is fraught with complexities, particularly concerning the delicate balance between adherence to established standards and the paramount importance of user-centric design. A critical examination of these competing forces reveals a landscape where technical compliance must be tempered with a deep understanding of human needs and contextual realities.

One of the most significant hurdles lies in the stark disparity between regions with mature, well-defined standards and those where such frameworks are either nascent, inconsistent or altogether absent. This dichotomy often results in a chaotic adoption of a "mishmash" of international standards, a patchwork that, while potentially adhering to technical specifications, can drastically fall short of fulfilling the practical needs of the end-users. This phenomenon underscores the inherent danger of prioritising compliance over tangible outcomes, a tendency that can lead to designs that are technically sound but functionally inadequate.

The core issue stems from an over-reliance on prescribed standards, a tendency to view them as ends in themselves rather than as tools to achieve a specific goal. A critical shift in perspective is necessary, one that emphasises the "outcome" and the "goal" of a project rather than blindly adhering to specifications. This does not imply a disregard for standards; rather, it necessitates a recognition that they are frameworks, guidelines that should be interpreted and applied with a discerning eye and a focus on the user experience. Even in regions with established standards, a critical evaluation of their relevance and applicability is essential to ensure the development of high-quality, user-friendly infrastructure.

In regions with less stringent or absent standards, this user-centric approach becomes even more critical. Here, the potential for misalignment between technical specifications and user needs is amplified. The absence of a clear regulatory framework necessitates proactive engagement with clients, fostering a collaborative environment where user-friendly solutions can be co-created. This collaborative approach is especially vital in international contexts, where local needs and cultural considerations can diverge significantly. ITS professionals must be adept at navigating these cultural nuances, ensuring that their designs are not only technically sound but also culturally sensitive and contextually appropriate.

The essence of effective ITS design lies in producing context-aware solutions. While standards and specifications provide a valuable foundation, they must be interpreted and applied with a deep understanding of the specific context in which they are deployed. This requires a move beyond mere technical compliance and a commitment to understanding the unique needs and preferences of the communities being served. ITS professionals must be adept at conducting thorough user research, engaging in participatory design processes and incorporating feedback from diverse stakeholders.

Prioritising user experience is not merely a matter of convenience; it is a fundamental principle of ethical design. It is about creating systems that are accessible, intuitive and responsive to the needs of all users, regardless of their background, abilities or cultural context. By engaging in proactive collaboration with clients, ITS professionals can ensure that their designs are not only technically sound but also truly beneficial to the communities they serve. This approach fosters a more inclusive and effective transportation infrastructure, ultimately enhancing the quality of life for all users.

The goal is to create systems that seamlessly integrate into the daily lives of individuals, improving safety, efficiency and accessibility. This requires a holistic understanding of the transportation ecosystem, encompassing not only technological aspects but also social, economic and environmental considerations. ITS professionals must be adept at considering the broader impacts of their designs, ensuring that they contribute to sustainable and equitable development.

Ultimately, the success of ITS design is measured not by its technical complexity, but by its ability to improve the lives of the people it serves. This requires a shift from a technology-centric to a human-centric approach, one that prioritises user needs, contextual awareness and ethical considerations.

By navigating the labyrinth of competing standards with a focus on user-centricity, ITS professionals can create transformative solutions that enhance the quality of life for all. The path forward requires constant communication, adaptability and the willingness to learn from the users that are being served. This will result in a more efficient, safe and accessible transportation environment for all.

To see the accompanying video, scan the QR code or go to:
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LESSONS LEARNT

Implementing Intelligent Transport Systems (ITS) projects in less developed countries provides an illuminating lens through which to examine the fundamentals of successful technological deployment.

These environments, often characterised by resource constraints and unique socio-cultural landscapes, expose the inherent vulnerabilities and critical dependencies that can undermine even the most well-intentioned projects. The lessons gleaned from these challenges are not confined to the developing world, they provide an invaluable guide for any ITS scheme regardless of its location or scale.

One of the most prominent issues highlighted is the absolute necessity of robust infrastructure. In regions where underpinning infrastructure may be lacking, the deployment of advanced ITS solutions faces significant hurdles. Limited or unreliable power supplies, inadequate communication networks and poorly maintained road systems can all impede the effectiveness of even the most sophisticated systems. This underscores the need for a holistic approach to ITS planning, one that considers the appropriateness of proposed solutions as a fundamental prerequisite for success.

One area which is often overlooked is the importance of achievable maintenance regimes which becomes strikingly apparent in resource or skills constrained environments. Without adequate funding and trained personnel, even the most innovative ITS solutions can quickly fall into disrepair or fail to achieve optimal levels of operational efficiency. This highlights the need for a long-term perspective, one that prioritises ongoing maintenance and support over short-term gains. Developing local capacity for maintenance and repair is crucial, ensuring that projects remain sustainable and beneficial to the communities they serve. This teaches us that implementing a system is only half the battle, maintaining it is equally, if not more, important.

Culturally sensitive approaches are also paramount, where cultural norms and social structures may differ significantly, it is essential to tailor ITS solutions to the specific needs and contexts of the local population. This may involve adapting user interfaces to local languages, providing training programs that are culturally appropriate and ensuring that projects are designed to address the specific challenges faced by the communities they serve. These cultural differences are also present in developed countries and must be considered when attempting to implement new systems.

The challenges of limited access to technology and varying levels of digital literacy are also brought into sharp focus. In regions where internet access is limited or digital literacy is low, it is essential to develop solutions that are user-friendly and accessible to all. This may involve simplifying interfaces, providing offline access to data and offering training programs that are tailored to the needs of different user groups. This lesson applies to all projects, ensuring that no one is left behind due to a lack of access or understanding.

Finally, resource constraints force a focus on pragmatic, scalable solutions. In environments where budgets are tight, it is essential to prioritise projects that offer the greatest return on investment. This may involve focusing on low-cost, high-impact solutions, such as traffic signal optimisation or public transportation improvements. This need for pragmatic solutions is relevant in all environments, especially those where budgets are limited.

By understanding these potential pitfalls, we can proactively address similar concerns in any ITS project, ensuring greater efficiency, inclusivity and long-term success. The lessons learned from the challenges faced in less developed countries serve as a powerful reminder that successful ITS implementation requires not only technological expertise but also a deep understanding of the social, cultural and infrastructural contexts in which projects are deployed.

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Details and Consistency in ITS Projects

Achieving successful Intelligent Transportation Systems (ITS) projects is a delicate balancing act, a constant negotiation between grand vision and granular execution.

The devil lies in the details and the achievement of consistency. It's a truth often overlooked in the rush to implement cutting-edge technologies and address pressing transportation challenges.

The allure of innovative ITS solutions, promising smoother traffic flows, reduced congestion and enhanced safety, can easily overshadow the meticulous groundwork required for their effective deployment. We often find ourselves captivated by the overarching vision, the broad strokes of a future where traffic systems intelligently anticipate congestion. Yet, without a corresponding focus on the minutiae, this vision can quickly unravel.

Incorporating details isn't merely about ticking boxes on a checklist. It's about understanding the intricate interplay of various components within the ITS ecosystem. It's about scrutinising sensor placement to ensure accurate data capture, meticulously calibrating algorithms to optimise traffic signal timings and rigorously testing communication protocols to guarantee seamless data exchange. It's about recognising that a seemingly insignificant discrepancy in data or a minor flaw in system integration can have cascading effects, undermining the project's overall effectiveness.

Moreover, maintaining consistency throughout the project lifecycle is paramount. From the initial planning stages to the final implementation and ongoing maintenance, a consistent approach is essential to ensure that the project stays on track and delivers the desired outcomes. This consistency extends beyond technical specifications to encompass communication, documentation and stakeholder engagement.

The challenge, as we've observed, is that the grand vision can easily become diluted or lost amidst the complexities of project execution. The initial excitement and enthusiasm can fade as teams grapple with technical hurdles, budgetary constraints and evolving stakeholder requirements. This is where the importance of a clear, well-defined project scope and a robust change management process becomes evident.

We must remain vigilant in ensuring that the project's objectives are consistently communicated and reinforced throughout the team. Regular reviews, progress meetings and open communication channels are essential to keep everyone aligned and focused on the desired outcome. Furthermore, detailed documentation of design decisions, implementation procedures and testing results is crucial for maintaining consistency and facilitating future maintenance and upgrades.

The "correct outcome" is not a static target. It evolves as we gather data, analyse performance and adapt to changing conditions. Therefore, a flexible and iterative approach is essential. We must continuously monitor the system's performance, identify areas for improvement and make necessary adjustments to ensure that the project continues to deliver the intended benefits.

In essence, successful ITS projects demand a holistic approach that balances the pursuit of innovation with a steadfast commitment to detail and consistency. By paying close attention to the minutiae, maintaining clear communication and remaining adaptable, we can ensure that our visions translate into tangible improvements in transportation efficiency, safety and sustainability. We must remember that the success of any ITS scheme lies not just in its technological prowess, but in its ability to consistently deliver on its promises, ensuring that the initial vision is realised and the correct outcome is achieved.

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Project Management
My role is to identify and then deliver the 'vision' for a project, often in the face of adversity, whilst maintaining a strong team culture (irrespective of organisation and geographic spread) by using my collegiate management style.

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I have an extensive specialist knowledge of traffic systems which is used to devise and deliver practical and economic solutions with innovative designs to improve capability, safety and efficiency.

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- Equipment specification

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As a freelance consultant, I can undertake independent design audits for clients or as an extra resource for consultancies undertaking design work.

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- Specification checks
- Report checks

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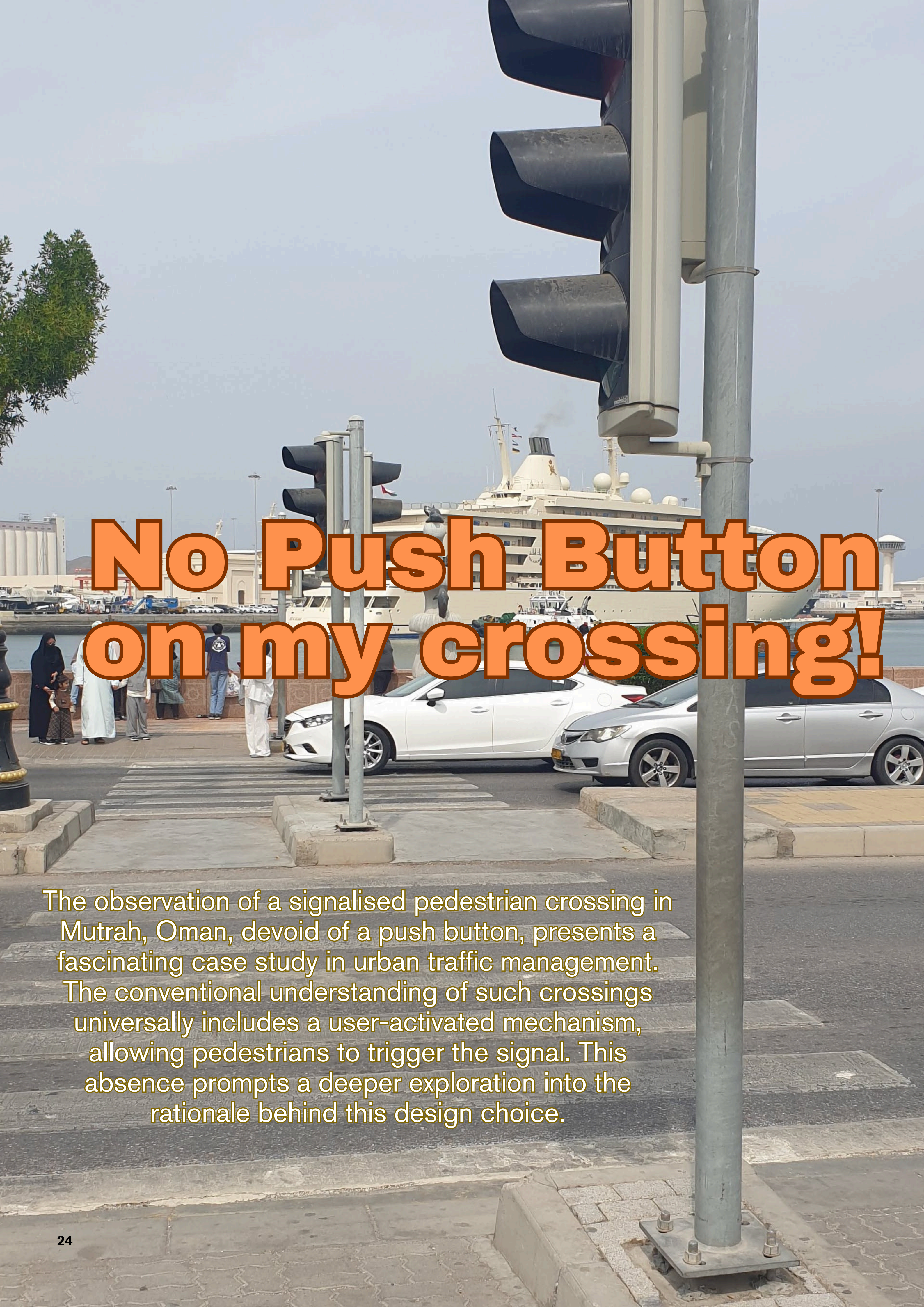


No Push Button on my crossing!

The observation of a signalised pedestrian crossing in Mutrah, Oman, devoid of a push button, presents a fascinating case study in urban traffic management. The conventional understanding of such crossings universally includes a user-activated mechanism, allowing pedestrians to trigger the signal. This absence prompts a deeper exploration into the rationale behind this design choice.

The crossing, situated at the entrance to the old souq, appears to operate on a fixed time sequence, alternating between vehicular and pedestrian traffic. While this approach might be effective during periods of high traffic volume, such as when cruise ships arrive, it proves inefficient during quieter times. Pedestrians are forced to wait unnecessarily and drivers are frequently halted when no one is crossing.

Several hypotheses arise to explain this unconventional design. One possibility is synchronisation with adjacent traffic signals. However, the absence of nearby signals rules this out. Another consideration is cost reduction, yet the presence of red-light enforcement and CCTV cameras suggests that cost was not a primary concern. The most plausible explanation is that the crossing was designed to address a specific, high-volume scenario, with insufficient consideration for what would happen the rest of the time.

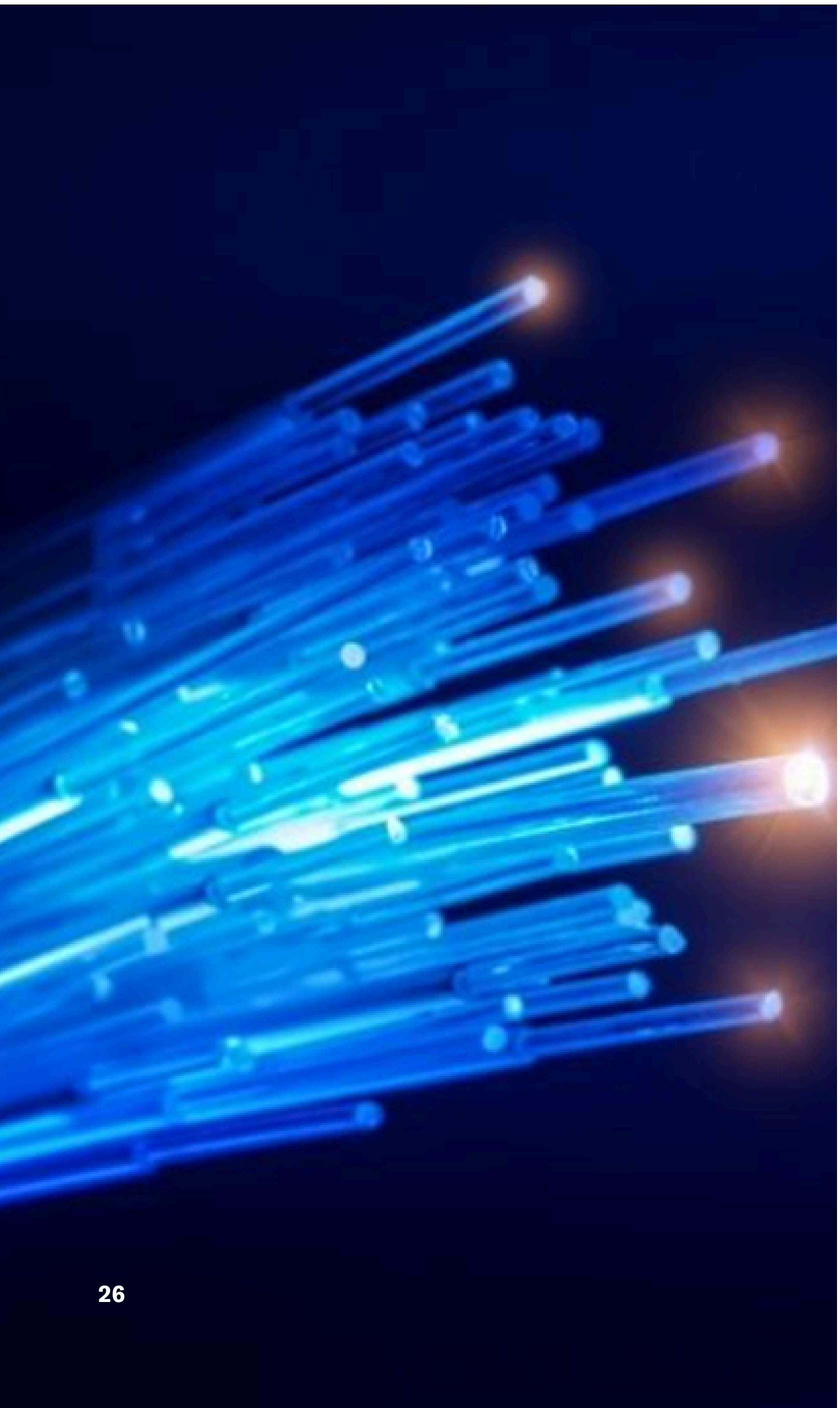
The implications of this fixed-time approach extend beyond mere inconvenience. Pedestrians, frustrated by unnecessary delays, are more likely to cross against the signal, putting themselves at risk. This highlights the importance of considering the "what ifs" during project planning. A solution designed for a specific problem may inadvertently create new issues.

The lesson learned from this experience is crucial for urban planners and traffic engineers, a holistic approach is essential when designing traffic management systems. It is vital to consider not only the immediate problem but also the potential consequences of the proposed solution. A flexible, responsive system that adapts to varying traffic conditions would be preferable to a rigid, fixed-time approach in this situation.

The Mutrah crossing serves as a reminder of the need for comprehensive analysis and foresight in urban planning. It underscores the importance of balancing efficiency and safety and the potential pitfalls of neglecting the long-term implications of design choices. A simple push button, seemingly a minor detail, can significantly impact the user experience and safety of a pedestrian crossing. It is essential therefore that designers consider projects in the whole, rather than only addressing specific issues.

To see the accompanying video, scan the QR code or go to:
https://www.youtube.com/shorts/AWOovldM9jU

THE EVOLUTION OF TRAFFIC MONITORING: FROM INDUCTIVE LOOPS TO DISTRIBUTED FIBRE-OPTIC SENSING (DFOS)



The efficient management of modern motorways and freeways is paramount for ensuring smooth traffic flow, enhancing safety and minimising congestion. Traditionally, incident and flow detection relied heavily on inductive loop detectors, embedded sensors that capture real-time traffic data like vehicle speed and headway.

This data, crucial for automated warning systems and speed limit adjustments, has served as the bedrock of traffic management for decades. However, the limitations of inductive loops have spurred the development of alternative technologies, culminating in the promising innovation of Distributed Fibre-Optic Sensing (DFOS).

Inductive loops, while considered the "gold standard" for their accuracy and reliability, suffer from inherent drawbacks. Their installation, requiring road surface disruption, poses significant logistical challenges, particularly during resurfacing projects. Moreover, their discrete placement, typically every 500 meters, limits their ability to provide continuous, comprehensive coverage of highway stretches. This constraint becomes particularly problematic in detecting incidents or stopped vehicles between sensor locations.

In response to these limitations, researchers and engineers explored alternative technologies, predominantly employing overhead or verge-mounted radar and optical detection systems. These systems offer high performance in replacing point-based inductive loop detectors, providing accurate data at specific locations. However, their accuracy diminishes with distance, limiting their effectiveness in applications like Stopped Vehicle Detection, which require comprehensive monitoring of highway sections. Furthermore, environmental factors such as heavy rain, snow or obscuration by large vehicles can significantly impair the performance of these systems, particularly at longer ranges.

To address these challenges, DFOS offers the capability of continuous linear detection. The technology leverages a fibre-optic cable, buried alongside the road, to sense vibrations caused by passing vehicles. Originally developed for security applications, such as pipeline and perimeter monitoring, DFOS utilises the principles of light backscattering to detect disturbances. By transmitting pulses of light through the fibre and analysing the reflected signals, subtle vibrations can be detected and interpreted. In highway applications, DFOS presents a paradigm shift in traffic monitoring. Its ability to provide continuous, linear data along the entire length of the fibre-optic cable enables comprehensive coverage of vast stretches of road. An optical integrator, connected to the fibre-optic cable, analyses the backscattered light using sophisticated algorithms, including artificial intelligence, to extract valuable traffic information. The vibrations generated by vehicle tyres are translated into data regarding vehicle speed, flow and density.

The Japanese company NEC has further advanced DFOS capabilities, enabling the detection of intricate vehicle behaviour, such as irregular lane changes. By analysing the centroid of individual vehicle vibrations, DFOS can pinpoint the location of lane changes, providing a more detailed understanding of traffic dynamics. This is achieved by observing the frequency of the vehicle vibration, which is higher for vehicles travelling on the lanes closest to the fibre-optic cable. This frequency difference allows the AI to determine lane changes. This ability to track individual vehicle movements and identify abnormal behaviour is crucial for detecting incidents and road defects.

Traditionally, DFOS applications were limited to detecting linear traffic movements, enabling the identification of congestion points. However, the ability to track individual vehicle movements and identify lane changes represents a significant step forward, providing a more granular and comprehensive understanding of traffic flow. The inherent advantages of DFOS lie in its equipment topography. A single cabinet can monitor extensive stretches of highway, significantly reducing the need for roadside equipment. This translates into substantial cost savings in installation and maintenance, while also minimising the exposure of maintenance personnel to the hazards of roadside work. The minimal roadside footprint of DFOS, with only a fibre-optic cable running alongside the carriageway, enhances the aesthetics of the road infrastructure and reduces the environmental impact of monitoring systems.

The evolution from inductive loops to DFOS represents a significant advancement in traffic monitoring technology. While inductive loops have served as a reliable foundation, their limitations have spurred the development of more sophisticated and comprehensive solutions. Radar and optical systems offer improvements in specific applications, but their performance is constrained by distance and environmental factors. DFOS, with its continuous linear detection capabilities, overcomes many of these limitations, providing a more accurate and comprehensive understanding of traffic flow.

The ability to monitor vast stretches of highway with minimal roadside equipment, coupled with the detailed insights into vehicle behaviour provided by DFOS, offers significant benefits for traffic management. By enabling the early detection of incidents, the optimisation of traffic flow and the proactive identification of road defects, DFOS contributes to safer and more efficient transportation systems. As technology continues to advance, DFOS is poised to play an increasingly vital role in shaping the future of traffic management. The combination of AI and the distributed sensing that a fibre optic cable provides, allows for a comprehensive and cost-effective solution for modern highways.

We wish to thank NEC for their assistance in making this episode, to find out more please visit their website at: https://www.nec.com/en/global/solutions/ofs/

To see the accompanying feature video, scan the QR code or go to: https://youtu.be/0iouUgP61O4

Beyond the 85th Percentile!

In the realm of Intelligent Transportation Systems (ITS), a cornerstone of our analytical approach revolves around statistical measures of central tendency and distribution. We routinely employ the average, the median and percentile-based analyses to inform the design and implementation of our infrastructure. For instance, when configuring traffic management systems or designing roads, the 85th percentile of vehicle speeds serves as a critical parameter. This allows us to accommodate the vast majority of drivers, ensuring safety and efficiency for a significant portion of the user population.

However, a crucial aspect often overlooked is the consideration of outliers. Our focus, while essential, can inadvertently neglect the experiences of those who deviate from the typical user profile. This is particularly relevant when considering vulnerable road users, such as pedestrians with mobility impairments. Their needs and limitations often fall outside the statistical norm, requiring specialised accommodations that traditional analyses may not highlight.

Furthermore, the concept of outliers extends beyond addressing accessibility concerns. It also encompasses the exploration of the extreme ends of the spectrum, the "just sometimes" moments when we venture beyond the familiar. By examining these extreme cases, we gain valuable insights into the limitations and potential enhancements of our systems. For example, considering the behaviour of vehicles at exceptionally high speeds, far exceeding the 85th percentile, can reveal critical vulnerabilities in our infrastructure's design. Similarly, analysing the performance of our systems under extreme weather conditions or during rare traffic incidents can expose unforeseen weaknesses.

The exploration of these outliers is not merely an academic exercise; it has practical implications for the robustness and resilience of our ITS deployments. By understanding the behaviour of our systems under extreme conditions, we can develop more robust and adaptable solutions. This can lead to the design of infrastructure that is not only efficient for the majority but also safe and accessible for all users, including those with unique needs.

Moreover, by studying the extremes, we can uncover hidden patterns and correlations that might otherwise remain obscured. For example, analysing the impact of rare traffic incidents on network congestion can inform the development of more effective incident management strategies. Similarly, examining the behaviour of autonomous vehicles in extreme weather conditions can reveal limitations in their sensor capabilities and control algorithms.

Ultimately, the inclusion of outlier analysis in our ITS design process represents a shift towards a more comprehensive and inclusive approach. It acknowledges that the average user does not represent the entirety of the population and that the extreme cases can provide valuable insights into the strengths and weaknesses of our systems. By embracing this broader perspective, we can create transportation systems that are not only efficient and safe but also equitable and resilient. We must remember that the 85th percentile is useful, but it does not represent everyone and that sometimes the most important lessons are learned when looking at the edges, the extremes, the outliers.

To see the accompanying video, scan the QR code or go to:
https://www.youtube.com/shorts/_XOoYCKVz8g

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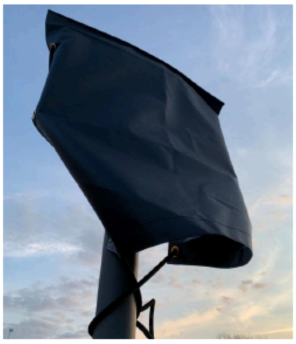


Temporary Highway Products

Applications: Traffic Signals, Level Crossing Signals, Raod Signs, Belisha Beacons, Push-Buttons, and Street Lights.

CoverMe bagging system makes the process and ease of bagging off signals, road signs, and Belisha beacons much SAFER by ELIMINATING the use of ladders. It allows operatives from the wider highways team to be used as there is NO ladder training required. This makes working in more confined locations EASIER where ladders would have required SLAG or where they would have impeded the footway. This helps REMOVE working at height accidents and meet ZERO working at height targets.

Advantages

- Eliminates the 'working at height' risk, removes the requirement for ladders on site
  Eliminates TM requirements – reduces disruption and cost.
- Fast and easy installation by a single operative.
- Secures and fastens to signal backboard.
- Overcomes working width restrictions.
- Fully adjustable pole.
- Poles are made from lightweight non-conductive GRP material.
- Easily transportable.
- Available with bespoke badging.
- Made with Recycleable material.

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ITS now .org

ITS Now exists to provide informative and educational resources about Intelligent Transport Systems (ITS), and should be of interest to technology practitioners in highways and mobility, along with people working in other engineering disciplines and for anyone who has an interest in transport generally.

Resources include our website - **ITSNow.org**, YouTube channel **@ITSNow** and **ITS Edge** magazine, along with our original books and articles on a broad range of related topics.

Intelligent Transport Systems - Explained

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