# Risk control

## The Rise of Artificial Intelligence

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# The Rise of Artificial Intelligence

## Introduction

It seems that only recently there has been a rapid rise and greater awareness that Artificial Intelligence (or AI) could assist us in many aspects of our lives. Yet AI has been around for a while quietly working away with many of us not realising to what extent. In the driving space AI plays a crucial role in assisting road safety by leveraging advanced technologies to enhance various aspects of driving, traffic and driver management, and collision prevention. AI in transport and road safety involves the integration of data sources and technologies, and so this article will consider the impact of AI and the advantages and disadvantages of such technology in these areas.

## Current Use

AI is already widely used in road safety, and contributes in a number of ways by aiming to eliminate human error. Familiar enhancements include Advanced Driver Assistance systems (ADAS); collision avoidance; emergency response by automatically notifying authorities in the event of a crash; driver monitoring to detect signs of fatigue, distraction or impairment; road infrastructure monitoring to detect hazards such as debris and potholes allowing faster maintenance; predictive vehicle maintenance using algorithms to monitor vehicle sensors and on-board diagnostics; vulnerable road user safety to detect pedestrians or cyclists in close proximity, triggering automatic braking if needed; and self-driving cars which rely on AI to navigate and interact with their environment making real time decisions in complex traffic situations.

## AI in Logistics

AI in logistics is revolutionising the way goods are transported and managed. Routes can be optimised, with the most appropriate vehicle allocation and real time traffic data which in turn reduces travel time and lowers operational costs. Demand can be better predicted by looking at market trends preferred delivery times or slots, locations, and historical sales data to forecast future demand, and therefore better stock control. AI provides better risk management to avoid potential disruption to the supply chain allowing contingency plans to be in place in good time. A more familiar sight on the UK streets is last mile delivery pods, within urban areas to deliver shopping and parcels[1]. These vehicles, such as drones and robots are autonomous and can deliver quickly and efficiently. This removes a potential job but aids in addressing the driver shortage the transport sector is still facing.

## Enforcement

Known as smart policing, AI can be used to identify driving offences. The most obvious are speed cameras which monitor a vehicle's velocity between two points such as average speed cameras. Identified infringements lead to speeding tickets being issued to drivers. Cameras located at traffic lights, bus and cycle lanes, pedestrianised areas, and box junctions are a familiar sight on UK roads. These camera's use algorithms to detect vehicles that cross, or enter an area, even if prohibited.

Automatic Number Plate Recognition (ANPR) used by the Police can incorporate AI and identify vehicles that may be used in criminal activities. Recent trials have seen roadside enforcement cameras being able to identify drivers who were not wearing seat belts or using their mobile phone when driving. Initial detection found, in the first couple of weeks of use within Devon and Cornwall, almost six hundred people not wearing seatbelts[2]. AI can also be found in cameras, which identify illegal parking and lead to parking fines being issued.

## Advantages of AI

The exploitation of AI in logistics is gaining significant traction, as it can deliver notable advantages to organisations in terms of improved effectiveness, management capabilities, and efficiency savings. AI provides Transport Managers with data-driven insights and analytics, enabling them to make informed decisions about route planning, risk manage potential disruptions, better resource allocation, and operational improvements.

## Efficiencies

With the correct software, AI can optimise delivery routes by analysing real time traffic data, road and weather conditions, and even historical traffic patterns to find the most efficient route. This will have the benefit of reducing travel time and fuel consumption, minimising vehicle wear and tear, freeing up Transport Managers to focus on more strategic and value-added activities, whilst ensuring drivers stay on schedule.

To achieve this, AI helps Transport Managers allocate the most appropriate vehicles, drivers, and resources more efficiently by considering factors like delivery locations, package sizes, and even client urgency. AI analyses historical delivery data and market trends to accurately forecast demand, which enables Transport Managers to plan resources and adjust capacity according to fluctuating demand.

[1] https://www.starship.xyz/

[2] https://www.fleetnews.co.uk/news/car-industry-news/2023/08/17/ai-cameras-that-can-spot-mobile-phone-use-prove-successful-in-trials

Once drivers are operating their vehicles there is real time visibility into the location and status of vehicles, enabling Transport Managers to track deliveries, identify potential issues, and take proactive measures to ensure on-time deliveries. This will then lead to more accurate and reliable estimated delivery times to customers and enhance customer satisfaction and transparency.

## Fleet Maintenance

AI can predict maintenance needs by analysing vehicle sensor data, reducing unexpected breakdowns and costly repairs. This ensures that vehicles remain in optimal condition. It also improves fleet maintenance by leveraging data analysis, predictive analytics, and automation to enhance the efficiency, reliability, and cost-effectiveness of maintaining a fleet of vehicles.

*Predictive Maintenance*: AI analyses real-time data from vehicle sensors to predict when components are likely to fail or require maintenance. By identifying issues before they escalate, fleet managers can schedule proactive maintenance, reducing downtime and preventing costly breakdowns.

*Condition Monitoring*: Continuous monitoring of the condition of vehicles by analysing sensor data related to engine performance, tyre pressures, and fluid levels. Any changes from normal parameters trigger alerts, allowing fleet managers to address potential problems promptly.

*Reduced Downtime*: Predictive maintenance and condition monitoring help minimize unplanned downtime. AI ensures that maintenance activities are scheduled during optimal times, minimising disruptions to operations.

*Optimised Maintenance Scheduling*: AI considers factors like vehicle availability, maintenance history, and usage patterns to optimize maintenance scheduling. This ensures that maintenance tasks are performed when vehicles are not needed for deliveries, maximizing fleet utilisation.

*Parts Inventory Management*: AI analyses historical maintenance data and usage patterns to optimise the parts inventory. This prevents overstocking or shortages and ensures that the right parts are available when needed.

*Remote Diagnostics*: AI-enabled telematics systems can transmit real-time diagnostic data to fleet management software, allowing maintenance teams to diagnose and troubleshoot issues remotely. This provides integration with original equipment manufacturer (OEM) Systems to access vehicle-specific data and recommendations, enhancing accuracy in maintenance decisions. This can reduce the cost of maintenance by preventing unnecessary repairs, minimising emergency breakdowns, and extending the lifespan of components.

*Compliance Monitoring*: AI ensures that vehicles are compliant with maintenance and regulatory requirements, which can avoid penalties and legal issues related to neglected maintenance tasks.

## Disadvantages of AI

Clearly the advantages are widespread but that is not to say the systems do not have their limitations. The first is that the enforcement cameras could issue a false positive meaning drivers receive notice of intended prosecutions incorrectly, but equally a false negative whereby they should have received a penalty but are not correctly identified.

Organisations must ensure that they have robust data protection policies in place due to the gathering of data including video and images being captured. Failure to do so can lead to significant penalties by the Information Commissioner due to concerns around potential misuse.

AI systems may lack the nuanced decision-making and ethical judgment that human drivers possess. In complex situations that require ethical reasoning or creative problem-solving, AI systems might struggle to make the best decisions. When systems are built it is possible that they could hold inherent biases and that could lead to a discriminatory outcome where certain groups of drivers may be disproportionately targeted such as those who are of a particular age, race, or gender.

With the vast array of safety features found in vehicles it is possible that drivers will become overly reliant on AI-based driver assistance systems, if the technology will always prevent an incident occurring. This can lead to complacency and reduced attentiveness, which could be dangerous in situations where the technology fails or encounters unexpected scenarios.

AI by its nature is based on machine learning and could struggle to manage complex and rapidly changing traffic situations, adverse weather conditions, or unique road scenarios that deviate from their training data. Fortunately, weather restrictions are being overcome with all-weather imaging systems currently being rolled out[3].

Whilst AI has huge potential in all aspects of our lives there is no getting away from the fact it is expensive and requires significant infrastructure investments such as Smart Motorways. These can lead to frustrations and delays, causing anger amongst motorists.

[3] https://www.acusensus.com/solutions/harmony-2/

## Predictive Capabilities

AI can play a role in predicting the likelihood of a driver being involved in a crash by analysing various data points and patterns. However, it is important to note that predicting individual driver crashes with complete accuracy is extremely challenging due to the complex and dynamic nature of driving behaviour and external factors.

AI can monitor a driver's actions, eye movements and facial expressions from driver facing cameras, alongside body posture to detect signs of fatigue, distraction, impairment, or drowsiness. Driver style can be analysed such as speed, lane changes, braking habits, and adherence to traffic rules. Sudden changes in behaviour through steering wheel, pedal data, telematics, or consistent risky actions all might be indicators of an increased crash risk. By also considering a driver's past driving behaviour and history of collisions or near-miss incidents, AI can identify patterns that might indicate a higher likelihood of future crashes through machine learning algorithms and predictive models.

Systems can provide real time feedback to drivers in the form of visual alerts, audible warnings, haptic feedback such as steering judders and seat vibrations to immediately draw the drivers attention to their actions. ADAS could activate the emergency braking when it detects an imminent collision due to tailgating or aggressive driving. Excessive head movements may indicate driver fatigue resulting in a warning being issued. Gamification, powered by AI through apps or e-learning platforms help to engage drivers through challenges, education, or competition to increase awareness of safe behaviours. The personalised feedback can provide suggestions for improvement through learning and coaching.

More advanced systems are being developed that encompass biometric sensors that can measure physiological signals like heart rate and skin conductance. These sensors can provide insights into the driver's stress levels and emotional state, which can influence driving behaviour. They are also able to measure driver speech and voice patterns to detect signs of fatigue, distraction, or impairment. Certain voice characteristics might indicate a driver's cognitive state.

Whilst AI can assist, driving behaviour can be unpredictable as humans are influenced by emotions, external events, and other factors that might not be captured effectively by AI systems. In summary, while AI can provide insights into crash risk based on various factors, predicting individual driver crashes with high accuracy remains a complex challenge due to the multifaceted and dynamic nature of driving behaviour and external influences.

## Trust in AI

To continue to use such systems we must be able to trust in it and a recognised concern is that of hacking and cybersecurity. AI systems rely on software and connectivity, making them potentially vulnerable. If malicious persons gain access to these systems, they could cause disruptions or even manipulate them for harmful purposes. In addition, drivers need assurances that their data is being used responsibly, ethically, legally, and kept securely.

Trust can be gained by systems that work well but can also be eroded by high profile failures such as crashes involving autonomous vehicles. Drivers can be encouraged to trust the systems more when they understand how the technology works and how decisions are made. This can in part be by developing human – machine collaboration where AI collaborates with human drivers rather than fully replacing them as drivers might feel more in control when they know they can intervene if necessary.

To mitigate these concerns, it is important to carefully design and regulate AI-based road safety systems, ensure transparency in how the technology works, address biases in algorithms, safeguard data privacy, and provide proper training for both drivers and law enforcement personnel on how to interact with these systems. Regulators, vehicle manufacturers, and technology companies must all play a combined role in shaping perception. Additionally, ongoing research and development are necessary to improve the accuracy, reliability, and fairness of AI technologies in road safety applications.

## Conclusion

By using AI to mechanise processes and evaluate data, organisations can streamline their operations, mitigate risk, and make informed decisions based on real-time data. AI can support organisations by identifying the most cost-efficient routes, reducing the time and resources necessary for planning and conduct. It can also help abate the issue of delays and interruptions, which can be costly. Additionally, AI transforms fleet maintenance by enabling proactive and data-driven approaches.

AI-powered systems can manage large volumes of data and complex optimisation tasks, making it easier for Transport Managers to manage larger fleets and more extensive delivery networks. Data sources include traffic cameras, GPS data, and even social media feeds to identify patterns and trends related to road safety. The systems can quickly adapt to changes in delivery patterns, unexpected disruptions, or new delivery locations, ensuring flexibility in the face of evolving circumstances.

Overall, AI empowers Transport Managers with tools and insights that streamline operations, enhance customer experiences, reduce costs, and contribute to more efficient and sustainable transport practices. The deployment of AI in logistics can offer substantial advantages and it is expected that the technology will continue to grow and improve.

## Further information

For access to further RMP Resources you may find helpful in reducing your organisation's cost of risk, please access the RMP Resources or RMP Articles pages on our website. To join the debate follow us on our LinkedIn page.

## Get in touch

For more information, please contact your broker, RMP risk control consultant or account director.

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