Artificial Intelligence in Transportation

Objectives

- Map the current and potential applications of AI in asset management, transportation safety, traffic operations, digital twin, autonomous vehicles and generative AI
- Understand the perceptions, expectations and concerns about AI from diverse stakeholder groups including state agencies and academic/industry experts

Benefits

- Inform the strategic planning and implementation roadmap for WisDOT and other agencies through evidence-based insights into user perceptions, benefit-risk tradeoffs and key areas for investment

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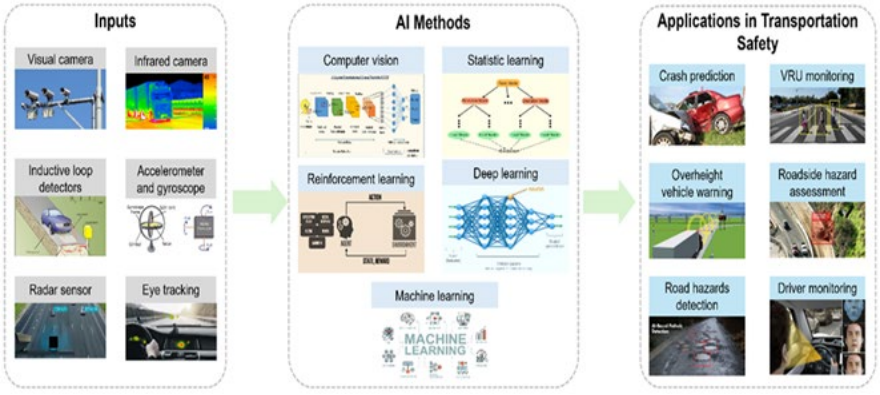
Background

Artificial Intelligence (AI) has emerged as a transformative force in transportation, enabling smarter, safer, and more efficient systems. Key areas where AI has demonstrated significant potential include transportation asset management, transportation safety, transportation operations, digital twins, autonomous vehicles, and generative AI. The U.S. Department of Transportation (USDOT), in collaboration with the Federal Highway Administration (FHWA), Federal Railroad Administration (FRA), and Federal Aviation Administration (FAA), has started exploring AI's potential within the transportation ecosystem.

However, integrating AI into transportation agency operations requires a strategic understanding of current capabilities, stakeholder perceptions, data readiness, and implementation risks. This study aims to address these gaps by providing a comprehensive, stakeholder-informed roadmap for advancing AI deployment across WisDOT operations.

Methodology

To achieve this, researchers conducted a targeted literature review categorized by the key areas listed above. Researchers also collected perception data through a structured survey and follow-up interviews and performed a cross-sectional analysis of professional attitudes toward AI deployment. Key dimensions of analysis included data quality and availability, perceived benefit-risk balance, application maturity, time investment expectations, and organizational perspectives.



AI-driven methods and applications for enhancing transportation safety

Results

The results highlight areas of alignment and divergence among transportation professionals and reveal how experience, institutional affiliation, and domain maturity shape attitudes toward AI. The results

"As AI is increasingly in the news, it's important to understand its benefits without getting lost in the hype. This research will help WisDOT take advantage of this technology to improve our transportation system in ways that are strategic, human-centered, and most importantly, safe." – **Johanna Schmidt, WisDOT**

show state agencies prioritize trustworthiness and practical implementation, while academic stakeholders focus more on innovation and technical readiness.

The research reveals that while AI is advancing rapidly in the broader transportation sector, its adoption by public agencies remains in relatively early stages. Significant opportunities for these agencies lie in asset management, safety, and traffic operations, which offer the best near-term benefits. Key challenges include data quality and management, alongside notable skills gaps in the workforce.

Recommendations for Implementation

Researchers proposed several recommendations for both short-, medium- and long-term implementation including these highest priority steps:

- Establish comprehensive data governance frameworks that standardize collection, storage and quality control protocols across the organization. This foundation is essential as data quality consistently emerges as a prerequisite for successful AI implementation
- Prioritize asset management, safety and operations applications for initial AI deployments. These areas offer the clearest near-term opportunities for demonstrating AI benefits while building organizational capabilities
- Implement AI training programs that develop differentiated skills for employees at different career stages and with varying AI exposure. This approach could address the workforce gaps identified in the survey and maximize the value of diverse perspectives and experiences
- Establish AI Center of Excellence to create a dedicated team of AI experts who can provide internal consulting, training, and project support across the organization. The Center would serve as the operational backbone of AI efforts across the agency and act as a key coordination node, interfacing with both the AI Ethics Committee and the Transportation AI Research Consortium to align implementation with ethical standards and research insights
- Develop robust AI governance policies that address data privacy, and model documentation, testing standards and human oversight mechanisms. Clear governance frameworks provide guidelines for development teams while ensuring responsible innovation
- Pursue a diversified partnership strategy that leverages vendor relationships for proven solutions, academic collaborations for research and peer agency exchanges for knowledge. This balanced approach accelerates capability development while managing resource constraints

Interested in finding out more?
Final report is available at:
WisDOT Research website

This brief summarizes Project 0092-24-14
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