ARTIFICIAL INTELLIGENCE (AI) FOR INTELLIGENT TRANSPORTATION SYSTEMS (ITS) PROGRAM

Photo Source: U.S. DOT

Potential Application of AI in Transportation

AI is revolutionizing every walk of life, allowing machines to learn from experience, adapt, and perform tasks that have historically required human cognition. The ITS Joint Program Office (JPO) established research in AI as a priority area to accelerate adoption of AI by state and local agencies for addressing transportation problems.

The *Identifying Real-World Transportation Applications Using Artificial Intelligence (AI): Summary of Potential Application of AI in Transportation* report (July 2020, **FHWA-JPO-20-787**) identified broad categories of AI-enabled applications that can be applied to address specific transportation problems and needs and summarized existing and potential applications enabled by AI under each category based on a literature review.

To view the report, please visit: https://rosap.ntl.bts.gov/view/dot/50651

Key Findings

The report identified 60 AI-enabled applications in ITS across 11 categories. The research team assessed each application's maturity, based on a review of publicly available information, and classified them as "Concept," "Research and Development (R&D)," "Prototype," or "Production" phases. More than half of the AI-enabled applications identified fell in the "Prototype" or "Production" phases, with 21 and 13 applications, respectively.

AI for ITS Category	Total Apps	Concept Phase Apps	R&D Phase Apps	Prototype Phase Apps	Production Phase Apps
Advanced Driver Assistance Systems and Automated Driving Systems	9	0	7	2	0
Cybersecurity	2	0	2	0	0
Accessible Transportation	7	0	2	5	0
Traveler Decision Support Tools	3	0	0	1	2
Transportation Systems Management and Operations	9	0	1	3	5
Commercial Vehicle and Freight Operations	7	1	0	2	4
Transit Operations and Management	7	0	1	5	1
Emergency Management	3	0	1	1	1
Air Traffic Management	4	0	4	0	0
Remote Sensing	6	1	4	1	0
Asset Management and Roadway Construction and Maintenance	3	0	2	1	0
Total	**60**	**2**	**24**	**21**	**13**

ITS JPO HIGH-PRIORITY RESEARCH AREAS

▸ Automation
▸ Data Access and Exchanges
▸ Emerging and Enabling Technologies
▸ Cybersecurity for ITS
▸ Complete Trip – ITS4US
▸ Accelerating ITS Deployment

VISION Advance next-generation transportation systems and services by leveraging trustworthy, ethical AI (including machine learning) for safer, more efficient, and accessible movement of people and goods.

MISSION Identify, develop, implement, evaluate, and coordinate technology and policy research to advance the contextualization and integration of AI (including machine learning) into all aspects of the transportation system.

Intelligent Transportation Systems Joint Program Office

U.S. Department of Transportation

AI FOR ITS PROGRAM

Research Methodology

The report documented 11 categories of AI-enabled ITS applications that can be broadly mapped to the Architecture Reference for Cooperative and Intelligent Transportation (ARC-IT) version 8.3[1]. The report organized each of the 60 AI-enabled applications identified in the literature review into these categories.

[1] https://www.standards.its.dot.gov/News/ARC_IT_8_3

CATEGORY
Advanced Driver Assistance Systems (ADAS) and Automated Driving Systems (ADS) Includes applications that use AI to enable vehicle automation, including ADAS and ADS
Cybersecurity Includes applications that use AI to provide the security of cyber technologies used in transportation for communications and control; positioning, tracking, and navigation; and operations and management
Transportation Systems Management and Operations (TSMO) Includes applications that use AI to optimize the performance of a multimodal infrastructure through implementation of real-time and dynamic systems, services, and management strategies to preserve capacity; advance efficiency and productivity; and improve the security, safety, and reliability of our transportation system
Emergency Management Includes applications that use AI to address the management by public safety agencies of emergencies or incidents in the transportation network including those relating to HAZMAT materials that are transported through the transportation network
Commercial Vehicle and Freight Operations Includes applications that use AI to address the management of the efficiency, safety, and operation of commercial vehicle fleets and the movement of freight
Transit Operations and Management Includes applications that use AI to address the management, operations, maintenance, and security of public transportation and mobility services to enable them to provide services that meet the demands of users and operate an efficient and integrated mobility system
Accessible Transportation Includes applications that use AI specifically for accessible transportation supporting independent travel for all travelers including people with disabilities and older adults
Asset Management and Roadway Construction and Maintenance Includes applications that use AI to address the strategic and systematic process of operating, maintaining, and improving physical assets at minimum feasible cost
Traveler Decision Support Tools Includes applications that use AI for the provision of static, dynamic, and other information about the transportation network, such as route and mode travel times, transit status, mobility services, flight arrivals, weather conditions, pricing information, and incentive-based data
Remote Sensing Includes applications that use AI to provide intelligent remote sensing such as use of drones and unmanned aerial vehicles for traffic monitoring, pavement monitoring, bridge inspections, and aerial mapping to support transportation planning, management and operations, incident management, and transportation infrastructure maintenance and construction
Air Traffic Management Includes applications that use AI for safe and efficient air traffic management and operations that can be adapted for use in ITS

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