Applied Human Factors and Ergonomics (AHFE2025), Vol. 199, 2025, 1105–1115
https://doi.org/10.54941/ahfe1006923

Toward AI-Ready Graduates: Connecting Educational Innovation to Aviation Workforce Needs

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ABSTRACT

Artificial intelligence (AI) and smart technologies are rapidly transforming the landscape of aviation/aerospace technical education, raising critical questions about how academic programs can better prepare the workforce to meet evolving industry demands. This paper features insights from an initial, high-level investigation to better understand AI-related competencies in specialized aviation and aerospace fields. Initial observations indicate evolving and discipline-specific needs, particularly the applied skills identified as essential in aviation safety, cybersecurity, aeronautical sciences, and uncrewed and autonomous systems operations. In aviation safety, AI is increasingly used for predictive analytics, large-scale qualitative data processing, and data fusion to improve risk analysis. Integrating AI into safety-critical systems also introduces new challenges, including the need for updated certification processes, clearer understanding of AI limitations and failure modes, and the impact on traditional system safety practices. In the cybersecurity domain, ongoing work explores the use of AI and machine learning to detect anomalies and potential cyber events across vast datasets, including those generated from aircraft logs and manufacturing systems. Aeronautical sciences offer opportunities for AI to enhance operational decision-making, flight deck support, and maintenance forecasting through advanced data capture and analysis. In uncrewed and autonomous systems, AI technologies, including machine learning and agentic systems, improve human-system interoperability and enable increasingly autonomous capabilities. Across all areas, the study underscores the human factors challenge of AI interpretability, ensuring that AI-driven insights are transparent, explainable, and actionable, especially within safety-critical contexts. This research contributes a foundation for future curriculum development, aligning technical skill-building with operational realities and helping translate emerging technologies into effective, practice-ready educational experiences that meet both student and industry needs.

Keywords: Artificial intelligence (AI), Aviation/ aerospace technical education, Aeronautical science, Aviation safety, Cybersecurity, and uncrewed and autonomous systems

INTRODUCTION

As artificial intelligence (AI), machine learning (ML), and smart technologies transform aviation and aerospace, they underscore a pressing urgency for updated approaches to technical education. While traditional instruction provides foundational knowledge, the rapid expansion of AI underscores a need for revised educational strategies to develop workforce AI-fluency, applied skills, and practical experience (Barari & Barari, 2025; Kabashkin, Misnevs, & Zergina, 2023; Ohio State University, 2025; Terwilliger & Faraca, 2025a). The demand for advanced education is especially pronounced in safety-critical fields, where technical knowledge and operational competence are essential; a point accentuated by federal initiatives focused on AI assurance and certification (Federal Aviation Administration [FAA], 2024; U.S. Department of Transportation [DOT], 2024); agency strategies linking workforce development to mission success (National Aeronautics and Space Administration [NASA], 2025); and industry reports highlighting upskilling for safe adoption of AI in aerospace and defense (Aerospace Industry Association [AIA] & Accenture, 2025; Axios, 2024). For online programs, this creates a pressing challenge: how to deliver hands-on, experiential AI education in a distributed environment, while ensuring that graduates can seamlessly transition into professional roles (Terwilliger & Faraca, 2025a). Connecting classroom learning with real world expectations is essential to ensure graduates are ready to support latest technologies, maintain competitiveness, and uphold safety and reliability (Kabashkin et al., 2023; Ramoso & Ortega-Dela Cruz, 2025).

Along with growing educational demands, government and industry stakeholders have invested heavily in accelerating AI integration. Federal agencies (e.g., U.S. DOT [2024], Department of Defense [DoD; 2034], Department of the Interior [DOI; 2025], and NSF [2023]), as well as private aerospace and aviation organizations (AIA & Accenture, 2025; Axios, 2024; Boeing, 2025) are actively examining and investing in research, infrastructure, and workforce development. These efforts reflect recognition that workforce readiness is a national priority tied to innovation, economic competitiveness, and system safety (U.S. DoD, 2024; The White House, 2025). Recent reports highlight enthusiasm, as well as hesitancy surrounding AI: aviation professionals remain cautious about trust, privacy, and skill erosion (European Union Safety Agency [EASA], 2025); organizations face leadership gaps and immature deployment strategies despite employee readiness (Bughin, Chui, & Manyika, 2025); and consumers broadly adopt AI, but default to general tools unless specialized systems provide clear, trustworthy advantages (Ventures, 2025). Together, these insights underscore the need for education that builds technical fluency while preparing graduates to address adoption barriers, organizational dynamics, and the ethical demands of safety-critical domains, ensuring that as AI technologies expand, the workforce remains capable and adaptive without compromising safety or capability (AIA & Accenture, 2025; Bughin et al., 2025; EASA, 2025; FAA, 2024; Ventures, 2025).

Despite investment and growing use, substantial challenges, risks, and barriers remain. AI models often lack interpretability and transparency, complicating certification and raising questions about accountability (EASA, 2025; Luettig, Akhiat, & Daw, 2024; NASA, 2025; U.S. DOT, 2024). Regulation and policy frameworks have not yet matured to match the pace of technological change, leaving gaps that affect integration into critical aviation systems (AIA & Accenture, 2025; Bughin et al., 2025; FAA, 2024; Luettig et al., 2024; NASA, 2025; Terwilliger & Faraca, 2025a; U.S. DOT, 2024). Domain-specific requirements also vary widely, creating a fragmented landscape of skills and competencies (AIA & Accenture, 2025; FAA, 2024; Kabashkin et al., 2023; NSF, 2023; Menloe Ventures, 2025). Across aviation, the integration of AI is introducing added complexity, requiring professionals to master new technical tools while also adapting through educational strategies that address institutional hesitancy, evolving policies, and the challenges of human–AI teaming in safety critical environments (AIA & Accenture, 2025; EASA, 2025; FAA, 2025; Kabashkin, 2023; Kirwan, 2025).

DOMAIN-SPECIFIC INSIGHTS

The rapid integration of AI, ML, and emerging technologies is transforming aviation and aerospace, introducing powerful capabilities while raising challenges for safety, interpretability, and workforce readiness. From human–AI teaming in aeronautics, to predictive analytics in safety, anomaly detection in cybersecurity, and autonomy in uncrewed systems, applications bridge critical domains. These shifts also underscore the need for curricula that keeps pace with technological advances and prepares graduates with the competencies needed for a resilient, future-ready workforce.

Aeronautical Science/Aeronautics

Commercial aviation maintenance currently shows a need to quickly integrate more uses of AI into the current maintenance workforce that has a deficient Aviation Maintenance Technician (AMT) shortage forecasted over the next 20 years. With such a personnel crisis facing industry in maintenance, opportunities for AI that are currently successful need to be quickly expanded to provide the AMT with a more efficient and safer working environment. These current AI aviation maintenance technologies that are having a big impact in the aviation maintenance arena include: diagnostics for engine health, predictive maintenance, automated visual inspections, coordination of work management through gate-time prediction and collection of data to use in algorithms to predict and make better management decisions. Currently 25% of commercial flights in the U.S. experience delays caused by insufficient maintenance personnel and maintenance problems (Lu, 2024). 62% of AMTs have 25–35% more tasks in 2025 from 2014. Meanwhile most of the U.S. airlines are using mandatory overtime to compensate for the extra AMT work. 40–50% of maintenance related incidents and accidents are related to the procedure and fatigue is now contributing to 20–30% of maintenance incidents (Miller, 2023).

Leveraging current AI driven maintenance technology, airlines can optimize the current shortages in the workforce by using the right resources to decrease unscheduled maintenance, grounded planes and flight delays while greatly increasing proactive maintenance to prevent hazards. Predictive maintenance driven by AI allows maintenance teams real time performance data that foster proactive strategies to improve fleet management for better revenue. Computer automated visual inspections to engines, wings and airframes supported by AI driven algorithms can analyze images and video to identify or predict defects. Rolls Royce utilizes advanced AI maintenance technology to monitor engines that increase engine performance and reliability while decreasing engine down time (Lu, 2024). AI helps maintenance management make better decisions through the use of databases and algorithms for planning resources such as where and when AMTs should work with more accurate gate times. Meanwhile AI systems in maintenance provide accurate data, prediction algorithms and detailed information for decisions that work around the clock. Current top uses of AI diagnostics in commercial aviation maintenance are engine health (82%) and fault prediction (67%), (Jordan, 2024). A key part of the increased use of AI commercial maintenance is that the Electronic Maintenance Logbooks are implemented in 65% of the airlines globally (IATA, 2024).

With so much emphasis on AI in aviation maintenance, it is critical that AMTs and maintenance managers trust and understand the AI they are using while working with the AI to make better decisions. Therefore, AMTs and their managers need to be oriented to know how to work with AI in their basic AMT education. Academic aviation maintenance programs also need to do the same. However basic AI education and the current ongoing evolution of AI in commercial aviation also strongly call for a much more immediate partnership with the industry on how to use these AI tools from an aviation education perspective in the classroom. What the industry is currently using is very real and working while what is currently used in the classroom is simply discussion of how it is being used. This gap between current AI maintenance practices and the aviation maintenance education classroom is big and can only be filled with stronger partnerships with industry. This will also mean overcoming boundaries of what is company proprietary AI technology and practices while still partnering with future maintainers currently being trained in the classroom.

While commercial aviation maintenance has immediate solutions to many of its current personnel shortage problems through AI, the efficacy of AI use on the flight deck for commercial pilots is one of proceeding with extreme caution. Commercial pilots have become much safer pilots over the last 50 years by utilizing simple forms of AI on the flight deck like Ground Proximity Warning Systems (GPWS)/Terrain Awareness Warnings Systems (TAWS) and Traffic Alert and Collision Avoidance System (TCAS). With the entire US Air Traffic Control system now digitalized through ADS-B satellite technology, and ADS-B (In) data information available on most commercial pilot Electronic Flight Bags (EFBs) relative to terrain, other aircraft and weather, the next logical step in integrating AI into the flight deck would be in the form of an AI driven pilot decision making tool. This AI pilot decision making tool would work with the pilots like an extra crew member organizing and analyzing vast amounts of data digitally streaming on the flight deck and then team with the pilots to increase situational awareness and make better aeronautical decisions. The airline pilots' unions will have to render collective support to this, but current digital system trends favor this new edition of a more advanced form of AI decision making teammate for aeronautical decision making on the flight deck.

The implementation of such a system would call for changes in basic flight training by integrating such a system at the lowest training level. Training with such a tool would be imperative in basic flight training on upwards to Type aircraft training for Commercial pilot ratings. It would also require an additional element to be added to the current CRM/TEM model by integrating the new AI teammate into the CRM/TEM model. Meanwhile the CRM/TEM yearly training would also have to be amended to welcome the edition of the new AI teammate into the training system with the endorsement of the FAA. From an aviation educational standpoint this would call for more AI related team decision making usage in aviation undergraduate and graduate programs.

Aviation Safety

Improved data analysis is the most obvious opportunity for leveraging AI in aviation safety. However, AI-enabled automation and autonomous systems will also create opportunities and challenges in certification of safety-critical systems and in system safety processes. Students need to be prepared to exploit the advantages of AI in data analysis, and to accommodate the requirements of AI-enabled systems in certification and system safety.

AI enables large-scale qualitative analysis, predictive risk assessment, and rapid feedback of safety data to enterprises. Large language models (LLM)s can process narrative incident reports and extract actionable insights at a scale beyond human analysts (Barshi et al., 2023). ML supports proactive, real-time risk prediction (Odisho, 2020; Puranik et al., 2020), while AI-enabled pattern recognition and data fusion accelerates the conversion of hazard information into mitigations (Ellis et al., 2022). To fully realize the benefit of these tools, students must develop skills in extracting insights from large data sets, applying visualization for decision-making, and fusing diverse data streams into a full risk picture. Curricula should emphasize concepts and workflows over specific software training. Students must also understand AI's implications for aircraft certification. Traditional certification assumes deterministic, traceable systems, but AI, like humans, is non-deterministic, responding based on training data. Even with controlled offline training, certification must address verification and validation of datasets (FAA, 2024; Lanzi et al., 2024). Online training raises further challenges, as inputs cannot be fully controlled. Just as aviation has studied human factors to mitigate risks from human operators, students must now examine "machine factors," how AI systems sense, process, and decide, to predict and reduce hazards introduced by AI.

Traditional system safety practices based on reliability engineering do not effectively identify all the risks associated with complex non-deterministic systems (Johnson, 2018). Students need to be conversant with traditional hazard identification tools but should also understand their limitations when applied to AI-enabled systems. Finally, while students must be able to use AI tools and understand AI limitations, they must also be aware of the rapidly changing landscape in regulations, standards, and certification processes that pertain to the use of AI in safety-critical systems.

Aviation/Aerospace Cybersecurity

Anomaly detection is becoming a growing opportunity to use AI/ML to enhance cybersecurity in the aviation/aerospace ecosystem. This ecosystem has complex, highly interconnected networks of merged information technology (IT) and operation technology (OT) that span across diverse domains such as avionics, air navigation service providers, airports, maintenance/repair operations, and supply chains. The volume of data generated by sensors and systems logs requires the use of automated tools to aid human analysts to detect anomalies that may signify a cyber event. AI/ML tools, in conjunction with Data Science to narrow the scope of the data analyzed, present the opportunity to human analysts to detect if a cyber attack is occurring and determine if a cyber event is the result of an attack (Center for Aerospace Resilient Systems, 2025). Manufacturing operations and aircraft logs are specific areas where AI/ML shows strong potential. These technologies can detect patterns and anomalies in sensor data that may be imperceptible to human monitoring. By analyzing data across multiple sensors, AI/ML can reveal previously undetected correlations and issues that might otherwise remain hidden (Sukdeo & Mothiall, 2023).

Despite these advantages, the adoption of AI/ML in aviation cybersecurity faces significant hurdles. A primary concern is that AI/ML systems are not deterministic; meaning identical inputs may not always produce identical outputs. The models operate as opaque systems, with node weights that shift as additional training data is introduced. This creates a certification challenge. In aviation, any airborne software must be assessed for potential safety consequences of errors (Radio Technical Commission for Aeronautics, 2011). Certification agencies are reluctant to approve AI/ML systems in safety-critical contexts because their results cannot always be replicated with certainty (AIA, 2025). Another challenge involves the amount of data required to train effective models. In manufacturing, low production volumes may not provide sufficient data to teach an AI/ML model to reliably detect anomalies. Similar issues exist in airline operations, where separate models may be necessary for each make, model, and version of an aircraft. This requirement adds complexity and further underscores the difficulty of deploying AI/ML at scale (European Union Aviation Safety Agency, 2023). These technical considerations highlight a workforce challenge. The acquisition, collection, and analysis of data through AI/ML requires integration across multiple systems, and employees at every stage must understand their role in ensuring that the models receive accurate and appropriate data (Yadav et al., 2025). Building a workforce equipped with both cybersecurity and AI/ML expertise is therefore essential.

AI/ML models must be retrained whenever significant system changes occur, such as replacing a line-replaceable unit (LRU) or applying a software update. Workers need the skills to determine when an existing model is no longer valid and to create new models with sufficient volumes of both normal and anomalous data (Yadav et al., 2025). This ensures that anomaly detection remains effective in the new operational environment.

Uncrewed and Autonomous Systems

AI, ML, and related emerging technologies are leading to new opportunities for strengthening uncrewed and autonomous systems education in online and distributed environments. In operations and integration, these tools allow students to engage with advanced autonomy concepts, such as beyond visual line of sight (BVLOS), advanced air mobility (AAM) integration, sensor fusion, adaptive navigation, swarming, and computer vision, all through simulation and scenario-based learning (FAA, 2024; EASA, 2023; NASA, 2025). Human–system interoperability and natural language command and control (C2) interfaces further prepare learners for oversight and teaming, reflecting human factors challenges identified in human–AI teaming research (Kirwan, 2025) and the trust and explainability issues emphasized in EASA's ethics survey (2025). Such uses enable students to explore the technical and operational dimensions of autonomy, while building awareness of regulatory and safety considerations that shape workforce practice (Luettig et al., 2024).

Beyond operational skills, AI-driven applications support development, modeling, and workforce readiness. GenAI can streamline documentation and prototyping, while adaptive simulators and digital twins create realistic environments for fleet management, anomaly detection, predictive maintenance, and iterative design (Lu, 2024; Jordan, 2024; Boeing, 2025). Modeling tools further enable mission visualization, weather forecasting, safety management system (SMS) analysis, and traffic management exercises aligned with assurance frameworks (IATA, 2024; DOT, 2024; Center for Aerospace Resilient Systems, 2025). Coupled with attention to regulatory literacy, human factors, resilience, and cross-domain mission planning, these tools can prepare graduates with the competencies needed to enter a rapidly evolving workforce (NSF, 2023; Terwilliger & Faraca, 2025a, 2025b).

Embedding AI and emerging technologies into online education does present challenges. Simulation tools may lack the fidelity to replicate BVLOS, sensor fusion, or swarming, limiting authentic skill development, while the absence of live operations hampers trust, explainability, and oversight (RTCA, 2011; Luettig et al., 2024). Simplified natural language C2 systems risk overlooking safety and accountability, underscoring the need to balance simulation with applied practice (EASA, 2025). Over-reliance on GenAI may weaken technical writing, comprehension, and hands-on proficiency, while barriers such as cost, data security, and sustaining digital twins remain significant (Bughin et al., 2025). At the workforce level, regulatory uncertainty, difficulty replicating resilience and cross-domain operations, and broader issues of transparency, interoperability, and cybersecurity highlight the importance of deliberate instructional design to ensure graduates gain both technical exposure and sound judgment (Yadav et al., 2025; White House, 2025).

DISCUSSION

AI is becoming increasingly embedded in aviation, aerospace, and technical education, raising urgent questions about transparency, explainability, and regulatory readiness. AI models often lack interpretability, complicating certification and accountability processes (EASA, 2025; Luettig et al., 2024; NASA, 2025; U.S. DOT, 2024;). Explainable AI (XAI) practices, such as audit trails, model cards, and traceability mechanisms, are emerging as essential for aligning operations with established safety frameworks. At the same time, uneven regulatory maturity (Bughin et al., 2025; DoD, 2024; FAA, 2024) creates accountability gaps, while industry reports highlight the need for practice-ready graduates with skills in applied AI, ethics, and human–AI teaming (EASA, 2025).

EASA's (2025) survey underscores that trust, explainability, and fears of deskilling remain barriers to adoption, reinforcing the need for education to address ethical and human factors. An ongoing *Employer AI Use Survey* features initial observations ($n = 33$; Terwilliger & Faraca, 2025b) that align; respondents highlight risks from high-impact decisions without human oversight (75%), unverified outputs (65%), and misuse of public LLMs for proprietary work (60%), with data privacy (80%), IP leakage (75%), and misinformation (65%) as top concerns. Governance remains limited; only 25% report formal policies and 25% informal guidelines, while more than half are still planning or lack frameworks. Workforce readiness is a major gap, with 58% judging graduates inconsistent and 16% poorly prepared to use AI responsibly. Hiring priorities point to AI ethics and risk assessment (70%), system integration (70%), prompt engineering (60%), and decision support (50%), underscoring demand for technical and ethical fluency. Together, these insights suggest academic programs must move beyond teaching AI as a technical tool to embedding it as a framework for safety, compliance, and workforce resilience, integrating ethics, explainability, and regulatory literacy into curricula while providing experiential practice through labs, simulations, and digital twins to ensure graduates become competent, trusted contributors.

CONCLUSION

The integration of AI and related technologies across aviation and aerospace highlights opportunity and risk, underscoring urgent workforce needs in maintenance, flight operations, safety, cybersecurity, and uncrewed systems. Across these diverse domains, professionals must be prepared to navigate challenges of interpretability, regulatory uncertainty, human–AI teaming, and organizational adoption while using AI's capacity to enhance efficiency, predictive capability, and resilience. Addressing these needs requires targeted curriculum development in online and hybrid aviation/ aerospace education that embeds applied AI fluency, ethics, explainability, and regulatory literacy alongside with modeling and simulation, digital twins, and industry-linked experiential learning. Moving forward, research and collaboration among academia, industry, and government are essential to bridge current educational gaps, align with evolving policies, and co-develop scalable, trustworthy training tools. By prioritizing these efforts, higher education can deliver on the shared goal of producing AI-ready graduates equipped to sustain safety, innovation, and competitiveness in an increasingly AI-enabled aviation ecosystem.

REFERENCES

Aerospace Industries Association. (2025). AI flight plan: Best practices for AI governance in aerospace. https://www.aia- aerospace.org/publications/best-practices-for-ai-governance-in-aerospace/

Aerospace Industries Association, & Accenture. (2025, June 6). *Artificial intelligence in aerospace and defense*. https://www.aia-aerospace.org/wp-content/uploads/AIAAccenture-AI-in-AD-June-2025-FINAL.pdf

Axios. (2024, June 17). *The defense sector is getting a speed boost from AI, experts say.* https://www.axios.com/sponsored/the-defense-sector-is-getting-a-speed-boost-from-ai-experts-say

Barari, N. & Barari, G. (2025). Continual Learning Models in Aviation Systems. *Collegiate Aviation Review International, 43*(1), 132–148.

Barshi, I., Matthews, B., & Feldman, J. (2023). Extracting Lessons of Resilience Using Machine Mining of the ASRS Database. *22nd International Symposium on Aviation Psychology*, 21. https://corescholar.libraries.wright.edu/isap_2023/17

Boeing. (2025, June). *Commercial services market outlook 2025–2044*. https://www.boeing.com/content/dam/boeing/boeingdotcom/market/assets/downloads/2025-smo-download.pdf

Bughin, J., Chui, M., & Manyika, J. (2025). *Superagency in the workplace: Empowering people to unlock AI's full potential at work*. McKinsey & Company. https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/superagency-in-the-workplace-empowering-people-to-unlock-ais-full-potential-at-work

Center for Aerospace Resilient Systems. (2025, August). *Part 1: Cybersecurity Data Science (CSDS) Aviation Architecture Framework (AAF) – Overview & Value Proposition*. FAA NextGen Cybersecurity Data Science Project.

Ellis, K. K., Prinzel, L. J., Krois, P., Davies, M. D., Oza, N., Stephens, C., Mah, R., Infeld, S., & Koelling, J. H. (2022). A future In-time Aviation Safety Management System (IASMS) perspective for commercial air carriers. In *AIAA Aviation 2022 Forum* (p. 3220).

European Union Aviation Safety Agency. (2023, May). *Artificial intelligence roadmap 2.0: Human-centric approach to AI in aviation*. https://www.easa.europa.eu/en/domains/research-innovation/ai

Federal Aviation Administration. (2024, July). *Roadmap for artificial intelligence safety assurance: Version I*. U. S. Department of Transportation.

European Union Aviation Safety Agency. (2025). *Ethics for AI in aviation: Aviation professionals survey results*. https://www.easa.europa.eu/en/downloads/142404/en

International Air Transport Association. (2024). *Adopting Aircraft Electronic Records*. IATA. https://www.iata.org

Johnson, C. (2018) The increasing risks of risk assessment: On the rise of artificial intelligence and non-determinism in safety-critical systems, *26th Safety-Critical Systems Symposium. Safety-Critical Systems Club York, UK*.

Jordan O. (2024, November 22). *AI for Predictive Maintenance in Aviation: 7 Proven Strategies Transforming the Industry* [Blog post]. We Shield. https://weshield.us/ai-for-predictive-maintenance-in-aviation-7-proven-strategies-transforming-the-industry/

Lanzi, P., Spiller, E., Jameel, M., Christoffels, L., Gigante, G., Esposito, R., Contissa, G., Sanchi, M., Galli, F., Everdij, M., & Stroeve, S. (2024). Challenges and new Directions for the Certification of AI and Advanced Automation in Civil Aviation. *SESAR Innovation Days*. Rome, Italy.

Lu, J. (2024). *AI in Aviation Maintenance: How It's Changing the Industry*. QOCO Systems-News & Blog. https://www.qoco.aero

Luettig, B., Akhiat, Y., & Daw, Z. (2024). ML meets aerospace: Challenges of certifying airborne AI. *Frontiers in Aerospace Engineering, 3*, 1475139.

Menlo Ventures. (2025). *The state of consumer AI: 2025 report.* https://menlovc.com/perspective/2025-the-state-of-consumer-ai/

Miller, M. D., Mrusek, B., & Herbic, J. (2023) . Managing Fatigue in Aviation Maintenance while Promoting a Human Factors Safety Reporting System; A Strategic Approach to Aviation Safety [Conference paper]. In *Human Factors in Safety Management, Proceedings of the AHFE 2023 International Conference*.

National Aeronautics and Space Administration. (2025, April 8). *GSFC AI Strategy Final* [White paper]. NASA Goddard Space Flight Center. Available from NASA Technical Reports Server: NRTS Document No. 20250003431

National Science Foundation. (2023, December). *EducateAI (Dear Colleague Letter)*. https://www.nsf.gov/funding/opportunities/dcl-advancing-education-future-ai-workforce-educateai/nsf24-025

Kabashkin, I., Misnevs, B., & Zergina, O. (2023, October 25). Artificial intelligence in aviation: New professionals for the next technology. *Applied Sciences, 13*(21), 11660.

Kirwan, B. (2025). Human factors requirements for human–AI teaming in aviation. *Aerospace, 5*(2), 42.

Odisho II, E. V. (2020). *Predicting pilot misperception of runway excursion risk through machine learning algorithms of recorded flight data*. Embry-Riddle Aeronautical University.

Ohio State launches bold AI Fluency initiative to redefine learning and innovation. (2025, June 5). *Ohio State University College of Engineering News*. https://engineering.osu.edu/news/2025/06/ohio-state-launches-bold-ai-fluency-initiative-redefine-learning-and-innovation

Puranik, T. G., Rodriguez, N., & Mavris, D. N. (2020). Towards online prediction of safety-critical landing metrics in aviation using supervised machine learning. *Transportation Research Part C: Emerging Technologies*, *120*, 102819.

Radio Technical Commission for Aeronautics. (2011). *DO-178C Software Considerations in Airborne Systems and Equipment Certification*.

Ramoso, M. G. D., & Ortega-Dela Cruz, R. A. (2025). Contributing factors to Aircraft Maintenance Technology students' readiness for the aviation industry. *Collegiate Aviation Review International, 43*(1), 65–81.

Sukdeo, N. I., & Mothilall, D. (2023). The impact of artificial intelligence on the manufacturing sector: A systematic literature review of the printing and packaging industry. *2023 International Conference on Artificial Intelligence, Big Data, Computing and Data Communication Systems (icABCD)*, 1–5. https://doi.org/10.1109/ icABCD59051.2023.10220486

Terwilliger, B., & Faraca, J. (2025a). Leveraging Artificial Intelligence in Education to Drive Cross-Sector Innovation. In *Proceedings of the Association for Unmanned Vehicle Systems International XPonential 2025*. Arlington, VA: Association of Uncrewed Vehicle Systems International.

Terwilliger, B., & Faraca, J. (2025b). *Survey on AI Aviation/ Aerospace Education-Employer Perception* [Unpublished raw data]. Embry-Riddle Aeronautical University, Worldwide campus, Online.

The White House. (2025, July 23). *Winning the Race: America's AI Action Plan.* https://www.whitehouse.gov/articles/2025/07/white-house-unveils-americas-ai-action-plan/

U. S. Department of Defense. (2024, June). *Responsible Artificial Intelligence strategy and implementation pathway.* U. S. Department of Defense.

U. S. Department of the Interior. (2025, July 7). *Flash Report: Artificial Intelligence and Machine Learning Development and Operations in the U. S. Department of the Interior* (Report No. 2024-CTD-029). U. S. Office of Inspector General, Department of the Interior.

U. S. Department of Transportation, Highly Automated Systems Safety Center of Excellence. (2024, April). *An overview of AI assurance for transportation.* U. S. Department of Transportation.

Yadav I., Shekhawat, V., Gautam, K., Kumar Soni, G., & Yadav, R. (2025). Artificial intelligence for cybersecurity: Emerging techniques, challenges, and future trends. *2025 3rd International Conference on Sustainable Computing and Data Communication Systems (ICSCDS)*, 1176–1180.