

Commercial Pilots

AI augmenting flight management, optimizing operations, and enhancing safety in the cockpit.

EXPOSURE	WINDOW	ADOPTION TODAY	READING
30 Moderate exposure	5–15 yrs until change lands	Medium	Augmented more than re- placed. Exposure is the share of today's work AI can plausibly take on within the window.

§ 01WHAT IS HAPPENING

What is happening to commercial pilots

Impact

AI systems are automating routine flight tasks, optimizing flight paths, predicting potential conflicts, and enhancing situational awareness. This shifts pilots' focus to strategic decision-making, anomaly detection, human-AI collaboration, and managing unforeseen, complex events, emphasizing critical human judgment.

Risk

Significant augmentation; focus on oversight, complex decision-making, and human-AI teaming.

The Commercial Pilot role will be profoundly augmented by AI. AI will handle many routine flight phases, data processing, and initial decision-making. Pilots will need to become experts in overseeing AI systems, critically evaluating AI outputs, managing unforeseen events, and making critical decisions in high-stakes scenarios where human judgment, adaptability, and ethical considerations are paramount. The role will increasingly involve seamless human-AI collaboration.

Sector readiness

Cautious & Highly Regulated Integration

The aviation industry is highly regulated and safety-critical, leading to a cautious but progressive integration of AI into cockpit systems and air traffic management. Investments are being made in advanced avionics and decision support systems leveraging AI for efficiency, capacity, and safety, with rigorous testing and certification processes governing adoption.

§ 02 POSITION

Where you stand

- i The Commercial Pilot role is at an inflection point, with AI profoundly augmenting the traditional methods of managing aircraft and air traffic.
- ii AI will automate routine flight management, optimize operations, and amplify safety, freeing pilots for more complex decision-making, human-AI collaboration, and managing unforeseen events.
- iii Mastering AI tools, adapting to advanced human-machine interfaces, and maintaining strong cognitive skills and human judgment will be crucial for navigating the evolving airspace and ensuring the highest levels of safety.

§ 03 ACTIONS

15 POINTS

What this means for you

Concrete changes to how the work gets done, in the order you are likely to meet them.

- 01 **AI-Assisted Navigation & Flight Path Optimization.** Commercial Pilots are increasingly leveraging AI systems to optimize flight paths in real-time, considering dynamic factors such as weather, air traffic, and fuel efficiency. This allows for more precise and economical flight management, shifting focus from manual trajectory calculations to strategic oversight.
- 02 **Enhanced Situational Awareness & Anomaly Detection.** AI systems are fusing vast amounts of data from diverse sources – radar, weather, aircraft systems, and air traffic control – to provide Commercial Pilots with a highly synthesized, predictive overview of the operational environment. This enhances real-time decision-making and allows for proactive anticipation of complex scenarios.
- 03 **AI for Predictive Systems Monitoring.** Commercial Pilots will utilize AI systems that continuously monitor aircraft health, engine performance, and component wear. AI predicts potential failures before they occur, providing early warnings and allowing for proactive maintenance, thereby enhancing flight safety and operational reliability.
- 04 **Automated Flight Control & Autonomy.** While human pilots remain in command, AI is significantly enhancing autopilot capabilities, particularly for routine flight phases like cruise. Commercial Pilots are overseeing these advanced autonomous flight modes, intervening for complex maneuvers, emergencies, or when human judgment is indispensable.
- 05 **Intelligent Decision Support in Complex Scenarios.** AI tools are providing Commercial Pilots with real-time recommendations and analyses during complex situations, such as unexpected weather, system malfunctions, or air traffic congestion. This augments human cognitive processing, offering multiple data-backed options for optimal resolution.

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- 06 **Voice Recognition & Natural Language Processing (NLP) for Cockpit Systems.** AI is improving human-machine interfaces in the cockpit through advanced voice recognition and NLP. Pilots can issue verbal commands and receive clear, concise information, reducing manual input errors and allowing for more focus on external conditions.
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- 07 **AI-Driven Fuel Efficiency Optimization.** Commercial Pilots are benefiting from AI systems that analyze a multitude of factors (aircraft weight, wind patterns, air traffic, altitude) to recommend optimal flight profiles that minimize fuel consumption. This contributes to significant operational cost savings and environmental benefits.
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- 08 **Augmented Reality (AR) in the Cockpit.** AR systems, often AI-powered, are superimposing critical flight data, terrain information, or navigational cues onto the pilot's view. This enhances spatial awareness and provides intuitive visual guidance, particularly in challenging visibility conditions.
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- 09 **Cybersecurity Awareness for Avionics.** As aircraft systems become more interconnected and AI-enabled, Commercial Pilots will need increased awareness of cybersecurity threats to avionics. Understanding protocols and identifying suspicious system behavior will be crucial for maintaining flight integrity.
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- 10 **AI for Emergency Response & Recovery Guidance.** AI systems are being developed to rapidly analyze in-flight emergencies (e.g., engine failure, cabin depressurization) and suggest optimal response procedures, checklists, or nearest suitable diversion airports. Pilots will evaluate these AI-generated recommendations under extreme pressure.
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- 11 **Human-AI Teaming & Trust Management.** A core aspect of the future role for Commercial Pilots is managing the dynamic between human judgment and AI capabilities. This involves understanding AI's limitations, fostering appropriate trust, and knowing when to intervene or defer to AI for optimal operational outcomes.
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- 12 **Continuous Learning & AI Literacy.** The rapid evolution of AI in aviation necessitates that Commercial Pilots continuously update their knowledge of new AI-powered avionics, flight management systems, and decision support tools. Proactive digital literacy and a commitment to lifelong learning are essential.
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- 13 **AI-Powered Training & Simulation.** Commercial Pilots will train extensively in AI-powered flight simulators that create highly realistic and dynamic scenarios. These simulations allow for practice in managing complex emergencies, interacting with AI-augmented systems, and adapting to new operational procedures in a risk-free environment.
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- 14 **Data Analysis for Post-Flight Optimization.** AI tools are analyzing vast amounts of post-flight data (flight recorder data, pilot inputs, system performance) to identify areas for operational improvement, training needs, or procedural refinement. Pilots will contribute to and utilize these analyses for continuous enhancement of safety and efficiency.
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- 15 **Global Harmonization of AI in ATC/Avionics.** Commercial Pilots will operate within an increasingly harmonized global aviation system that incorporates AI-driven air traffic management and avionics. This requires understanding and adapting to new international standards and interoperability requirements for AI systems.
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What is pushing this change

- 01

Increasing Air Traffic Volume. The global volume of flights continues to increase, putting pressure on existing ATC and aircraft operational limits.
- 02

Demand for Higher Airspace Capacity & Efficiency. Airlines and regulators seek to move more aircraft safely and efficiently through limited airspace, driving AI adoption.
- 03

Need for Enhanced Safety & Reduced Human Error. AI can help identify potential human errors, predict incidents, and reduce workload, leading to fewer safety-critical events.
- 04

Advancements in AI/ML (Predictive Analytics, Reinforcement Learning). New AI techniques enable more sophisticated flight optimization, autonomous control, and data interpretation.
- 05

Development of Next-Gen Avionics & ATM Systems. Major initiatives are underway globally to modernize aircraft systems and air traffic control, with AI at their core.
- 06

Pressure for Fuel Efficiency & Environmental Impact Reduction. AI-optimized flight paths and traffic flow can significantly reduce fuel consumption and CO2 emissions.
- 07

Growth of Autonomous Aerial Vehicles (UAS, eVTOL). The proliferation of drones, eVTOLs, and future autonomous cargo/passenger aircraft necessitates new AI-driven cockpit and ATM paradigms.
- 08

Complexity of Modern Aircraft Systems. Modern aircraft contain millions of lines of code and complex interconnected systems, requiring AI for monitoring and optimization.
- 09

Global Competition in Aviation Technology. Nations and aerospace companies are investing heavily in AI to gain a technological edge in aviation capabilities.
- 10

Pilot Workforce Shortages (AI as augmentation). AI augmentation is seen as a way to increase the capacity and efficiency of existing pilot workforces.

Impact by sector

The headline figure is an average. Where you work changes the picture.

Airline Pilots (Long-Haul)	AI for optimizing long-duration cruise phases, fuel efficiency, and predicting adverse weather. Focus on flight management and strategic planning.
Airline Pilots (Short-Haul/Regional)	AI for optimizing approach/departure procedures, managing high-density traffic, and dynamic rerouting. Focus on rapid decision-making in congested airspace.

Cargo Pilots	AI for optimizing cargo loading, route efficiency for weight, and predicting maintenance needs for fleet reliability. Focus on logistics and operational efficiency.
Test Pilots	AI for analyzing vast flight test data, simulating unknown scenarios, and assisting in rapid test iteration. Human judgment for safety of flight is critical.
Military Pilots	AI for mission planning, threat detection, autonomous flight control, and real-time combat decision support. Human command authority and tactical judgment remain paramount.

Skills to build

The skills that keep the human part of this work valuable as the routine part is automated.

- 01 **Situational Awareness & Spatial Reasoning.** Ability to maintain a clear mental picture of airspace, aircraft systems, and operational environment, and to visualize future states.
- 02 **Critical Decision-Making Under Pressure.** Making rapid, accurate, and safe decisions in high-stakes, time-critical situations, often with partial information.
- 03 **Human-AI Teaming & Trust Management.** Working seamlessly with AI systems, understanding their capabilities and limitations, fostering appropriate trust, and effectively delegating tasks while maintaining oversight.
- 04 **Communication & Leadership.** Delivering precise, unambiguous, and timely instructions to crew, passengers, and air traffic control, and leading the flight deck effectively.
- 05 **Problem-Solving Complex System Failures.** Diagnosing complex aircraft malfunctions, identifying root causes, and implementing effective solutions, often with AI system support.
- 06 **AI Tool Proficiency & Data Interpretation.** Ability to effectively use AI-powered avionics, flight management systems, and decision support tools, and to interpret AI-generated insights.
- 07 **Regulatory & Safety Compliance Expertise.** Deep knowledge of aviation regulations (e.g., FAA, EASA), safety procedures, and the certification processes for new aircraft technologies.
- 08 **Adaptability & Continuous Learning.** Willingness to learn new AI-powered systems and adapt to evolving flight procedures and technologies in a dynamic operational environment.

Tools in use

KINDS OF TOOL WORTH KNOWING

- 01

AI-Enhanced Flight Management Systems (FMS). Integrated avionics systems that leverage AI for optimizing flight paths, fuel consumption, and managing complex flight plans.
- 02

AI-Powered Weather & Turbulence Prediction Systems. Systems that use AI/ML to analyze vast meteorological data for highly accurate, localized, and real-time predictions of weather events and turbulence.
- 03

Predictive Maintenance Avionics (PHM). Aircraft systems that analyze sensor data from engines, airframes, and components to predict failures, optimizing maintenance schedules and enhancing safety.
- 04

AI for Cockpit Decision Support. AI applications integrated into cockpit displays that provide pilots with real-time recommendations, anomaly detection, and scenario analysis for complex situations.
- 05

AI-Assisted Autonomous Flight Control Systems. Advanced autopilot systems that use AI for more sophisticated and adaptive flight control, particularly in non-normal or highly optimized flight phases.
- 06

AI for Voice Recognition & Natural Language Understanding. AI software integrated into cockpit communications systems to accurately transcribe pilot-ATC exchanges and interpret voice commands.

NAMED TOOLS ALREADY IN USE

- Honeywell IntuVue RDR-7000 (Weather Radar)**

VISIT

An AI-powered weather radar that provides pilots with predictive and precise insights into hazardous weather phenomena, enhancing situational awareness.
- GE Aviation (Digital Solutions, Predix)**

VISIT

A major aviation systems provider with digital solutions that leverage AI for predictive maintenance, operational efficiency, and flight data analytics.
- Safran (Engine PHM, various AI solutions)**

VISIT

A key aerospace supplier focusing on AI for engine health monitoring (PHM), predictive maintenance, and optimizing operational performance for aircraft components.
- Airbus (Skywise platform) / Boeing (AnalytX)**

VISIT

Major aircraft manufacturers' data platforms that leverage AI to analyze vast flight data for operational optimization, maintenance insights, and airline efficiency.
- Garmin (Autoland - for general aviation, but concept extends)**

VISIT

An advanced autonomous flight system (currently for general aviation) that can land the aircraft in an emergency without pilot intervention, showcasing AI's potential in critical situations.

In practice

Ways people in this role are already using AI, and what they get from it.

Optimize Flight Paths for Fuel Efficiency EXAMPLE 1	HOW	Pilots will receive real-time recommendations from an AI-powered Flight Management System (FMS) suggesting dynamic adjustments to their flight path and altitude to minimize fuel consumption based on current winds, air traffic, and turbulence.
	GAIN	Significantly reduces airline operating costs, lowers carbon emissions, and improves flight efficiency.
Enhance Situational Awareness with AI Fusion EXAMPLE 2	HOW	Pilots will view an AI-enhanced cockpit display that synthesizes data from multiple radar, weather, and aircraft sensor feeds, presenting a unified, predictive view of the airspace, identifying potential conflicts or severe weather cells before they become immediate threats.
	GAIN	Enhances pilot's understanding of complex airspace, reduces cognitive load, and enables more proactive and safer decision-making.
Receive AI-Driven Decision Support EXAMPLE 3	HOW	During an unexpected in-flight system malfunction (e.g., partial hydraulics failure), an AI assistant will rapidly analyze the aircraft's state and available resources, providing the pilot with a prioritized list of optimal response procedures, checklists, and potential diversion airports.
	GAIN	Provides critical, data-backed guidance in high-stress situations, improving safety outcomes and reducing pilot workload during emergencies.
Automate Routine Autopilot Functions EXAMPLE 4	HOW	Pilots will engage an AI-powered autopilot that handles not just basic altitude/heading hold, but also complex tasks like automated takeoffs, landings, and continuous optimization of climb/descent profiles, allowing the pilot to monitor and intervene if necessary.
	GAIN	Reduces pilot workload during routine flight phases, increases precision in maneuvers, and frees cognitive resources for higher-level monitoring and strategic tasks.
Predict Potential System Malfunctions EXAMPLE 5	HOW	Pilots will receive alerts from an AI-powered Prognostics and Health Management (PHM) system indicating a high probability of a specific engine component failure (e.g., a specific bearing) within the next 50 flight hours, enabling proactive maintenance scheduling.
	GAIN	Prevents costly unscheduled maintenance, minimizes flight disruptions due to breakdowns, and significantly enhances the overall safety and reliability of the aircraft.

§ 09 CONTEXT

How this role compares

Three neighbouring roles chosen to show the direction of travel.

Flight Dispatchers (Routine flight plan filing) MORE EXPOSED	AI IMPACT High (AI can automate flight plan creation, weather analysis, and basic routing suggestions, reducing manual effort.) WORK MOVES TO Role may contract or shift to overseeing AI systems, handling complex flight plan exceptions, or specializing in real-time operational adjustments.
Aviation AI Engineers / AI Safety & Certification Specialists DIFFERENT SKILLS, GROWING	AI IMPACT Foundational (They design, build, and deploy the AI algorithms and systems that Commercial Pilots will utilize.) WORK MOVES TO Deep expertise in AI/ML algorithms, data science, software engineering, and specific aviation safety/certification domain knowledge.
Aircraft Maintenance Technicians (Hands-on repair) COMPLEMENTARY, LESS EXPOSED	AI IMPACT Low-Moderate Augmentation (AI assists in diagnostics, predictive maintenance), but core manual dexterity, troubleshooting, and complex repair tasks remain paramount. WORK MOVES TO Hands-on mechanical and avionics repair, complex troubleshooting, and ensuring physical integrity of aircraft systems.

§ 10 VERDICT

Closing judgement

For Commercial Pilots, AI is not a threat to their expertise but a powerful augmentation that will redefine their critical role. It automates the routine and amplifies their ability to manage complex, high-stakes situations. The future pilot will be a master of human-AI teaming, blending their invaluable judgment, critical thinking, and adaptability with AI's analytical power to ensure the safest and most efficient skies.

Evidence and revisions

What the exposure figure rests on, what changed when it was last revised, and the published work cited for this role.

SCORE

30 (held)

WINDOW

5-15 years (unchanged)

The 4 October 2026 review held the score.

Microsoft's AI applicability score for the matching occupation is 0.16, in the upper half of 785 US occupations; Anthropic's observed-exposure data records almost no Claude usage on this occupation's tasks; the US Bureau of Labor Statistics places it in the 'moderate' AI-exposure tier; BLS projects employment to grow 5.2% over 2025–35. Taken together this is consistent with our previous figure of 30, which we have held.

MEASURES BEHIND THE SCORE

US Bureau of Labor Statistics · *Employment Projections 2025–35 and AI Exposure Categories* (27 August 2026)

AI-exposure tier: Moderate. Projected employment change 2025–35: +5.2%. Matched to Commercial pilots.

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Microsoft Research · *Working with AI: Measuring the Applicability of Generative AI to Occupations* (10 July 2025)

AI applicability score 0.16 (percentile 55 of 785 occupations) for SOC 53-2012.

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Anthropic · *Anthropic Economic Index report: Cadences* (26 June 2026)

Observed exposure 0.00 for SOC 53-2012 (no meaningful Claude usage recorded on these tasks).

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UK Department for Science, Innovation and Technology · *Assessment of AI capabilities and the impact on the UK labour market* (28 January 2026)

UK context: around 70% of UK workers are in occupations with tasks AI could perform or enhance, above the US average; a one-standard-deviation rise in exposure was associated with a 3.9% fall in UK job postings.

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ALSO CITED FOR THIS ROLE

McKinsey Global Institute · *Agents, robots, and us: Skill partnerships in the age of AI* (25 November 2025)

Hands-on trades sit in the robot share of technical potential (~13% of US hours), which depends on hardware costs and is expected to move far more slowly than desk work.

PUBLISHER

Archived copies are served only where the licence permits; otherwise the link goes to the publisher. Full research library:
<https://www.careerguard.ai/sources>

Method and sources

Each report was written from a large body of published research and then, in October 2026, re-scored against occupation-level evidence: the US Bureau of Labor Statistics AI-exposure classification and 2025–35 projections, Microsoft Research's AI applicability scores and Anthropic's observed-exposure data, cross-checked against the reports listed in the Evidence section above. The organisations and publications below are the standing literature behind the narrative sections. Every source, with dates, licences and archived copies where we are permitted to hold them, is catalogued in the research library.

Scores are revised by blending the previous editorial figure (60%) with a composite of the three occupation-level measures (40%), capped at fifteen points per revision and rounded to the nearest five. The window shifts one notch when a score moves ten points or more. Hand adjustments are recorded with their reason in the revision log.

I GLOBAL AND MACROECONOMIC IMPACT OF AI ON WORK

World Economic Forum

The Future of Jobs Report series — Employer survey of expected job growth and decline, skill shifts and technology adoption (2020, 2023 and 2025 editions); Artificial Intelligence and the Future of Entry-Level Work (2026).

AI governance and transformation reports — Frameworks on ethical AI, talent strategy and industry transformation.

McKinsey Global Institute

AI, Automation and the Future of Work series — Research quantifying automation potential by task, sector and demographic, from "Jobs Lost, Jobs Gained" to "Agents, robots, and us" (2025).

Industry-specific reports — Financial services, healthcare, manufacturing and others.

PwC

Global AI Jobs Barometer — Annual analysis of job postings and productivity by AI exposure (2024–2026 editions).

Upskilling Hopes and Fears survey — Employee perceptions and readiness.

Microsoft Research and Anthropic

Working with AI (2025); Anthropic Economic Index (2025–2026) — Occupation-level usage data from Copilot and Claude conversations, the two observed-usage measures behind the 2026 revision.

Stanford Digital Economy Lab and Stanford HAI

Canaries in the Coal Mine? (2025–2026); AI Index Report (annual) — Payroll evidence on early-career employment in exposed occupations; annual measurement of AI capability, investment and adoption.

Deloitte

Human Capital Trends series — Workforce, talent and HR technology trends.

Tech Trends series — Emerging technologies and their business implications.

Accenture

Technology Vision series — Forward-looking analysis of emerging technology, with emphasis on AI.

Fjord Trends — Design, innovation and human experience in a digital world.

Boston Consulting Group

AI/ML insights and industry solutions — "The AI Revolution in the Workplace" and related research.

EY

AI and workforce reports — Adoption, talent strategy and ethics.

IBM Institute for Business Value

AI and automation studies — Business models, workforce evolution and leadership.

OECD

AI Policy Observatory — International data and policy on AI, labour markets and skills.

Employment Outlook — Labour-market trends including technological impact (2023–2026 editions).

International Labour Organization

Generative AI and Jobs: A Refined Global Index of Occupational Exposure (2025) — Task-level exposure gradients for every ISCO occupation; successor to the 2023 global index.

International Monetary Fund

Staff Discussion Notes on AI and work (2024, 2026) — Complementarity framing: where AI augments and where it substitutes.

UK Department for Science, Innovation and Technology

Assessment of AI capabilities and the impact on the UK labour market (2026) — UK occupational exposure and job-posting evidence.

Brookings Institution

AI and automation research — Economic and social implications, displacement and skills.

Yale Budget Lab and Goldman Sachs Research

Tracking the Impact of AI on the Labor Market; AI and the US labour market (2026) — Aggregate labour-market monitoring; macro displacement estimates.

Oxford University (Oxford Martin School)

The Future of Employment — Frey & Osborne and subsequent research on susceptibility to automation.

MIT Technology Review

AI & Work — Reporting on AI research and its implications for industries and jobs.

Gartner

Hype Cycle for Artificial Intelligence — Maturity and adoption of AI technologies.

Future of Work reports — Workplace models and talent strategy.

U.S. Bureau of Labor Statistics

Employment Projections 2025–35; AI Exposure Categories; Occupational Outlook Handbook — Ten-year employment projections and, from the 2025 cycle, an AI-exposure tier for every detailed occupation.

Indeed Hiring Lab

AI at Work Report (2025) and posting-market updates — Skill-level transformation estimates and job-posting trends by occupation.

II CORE AI AND MACHINE-LEARNING RESEARCH

OpenAI

Research papers, blog and API documentation — Large language models, generative AI, safety and societal impact.

Google DeepMind

Research papers and blog — Reinforcement learning, AI for science, AGI and ethics.

Meta AI

Research papers and blog — Large language models, computer vision, AI for social good.

Hugging Face

Transformers library and model hub — Open-source state-of-the-art NLP models.

TensorFlow and PyTorch

Documentation and community forums — Core frameworks illustrating practical capability.

arXiv

cs.AI, cs.LG, cs.CV, cs.CL — Pre-print research.

NeurIPS and ICML

Conference proceedings — Top-tier academic research.

ACM and IEEE

Journals and proceedings — ACM Computing Surveys; IEEE Transactions on AI.

Kaggle

Datasets and competition solutions — Applied machine learning on real-world problems.

The Alan Turing Institute

Research and reports — Responsible and applied AI.

III ETHICAL AND RESPONSIBLE AI DEPLOYMENT

NIST

AI Risk Management Framework — Voluntary framework for managing AI risk.

European Commission

AI Act — Risk-tiered legal framework for AI.

Ethics Guidelines for Trustworthy AI — Principles for responsible development.

Partnership on AI

Research and best practice — Responsible AI development.

AI Now Institute

Annual reports — Social implications: power, inequality, rights.

ACM FAccT

Proceedings — Fairness, accountability and transparency.

Data & Society

Publications — Social implications of data-centric technology.

WIPO

Conversation on IP and AI — Intellectual-property implications of AI.

IEEE Global Initiative on Ethics of AI/IS

Ethically Aligned Design — Recommendations for ethical AI design.

Center for AI and Digital Policy

Policy briefs — Accountable AI policy.
