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IMPLEMENTATION OF ARTIFICIAL INTELLIGENCE-BASED CCTV SYSTEMS TO ENHANCE SECURITY AND ENSURE RAPID RESPONSE AT AIRPORTS MANAGING OVER ONE MILLION PASSENGERS PER YEAR

(Presented by Indonesia)

EXECUTIVE SUMMARY

One of the remarkable solutions to heighten security monitoring over time is by implementing AI-driven CCTV cameras with automated detection and real-time analysis that diminishes risks for any incidents and facilitates agents or authorities to act faster. For instance, AI-powered CCTV cameras have the ability to read and classify objects, determining whether they are humans, vehicles, or even unattended items that could be suspicious. The AI system can detect things like abnormal behaviour of a person, suspicious movement of objects, someone located in an area where they are not supposed to be, or other weird activities which should alert security reasonably. Cameras can track people or objects automatically if they are suspicious and focus in real-time zoom lens control view. Cameras can also detect wildlife on the airside as well as Foreign Object Debris (FOD) or obstacles on the runway or taxiway. When the system is based on AI CCTV, security personnel will get instant notifications from their control room and be alert to potential threats or emergencies. Integration with other systems (alarms, access control, etc.) constitutes a keystone in the whole security system. Other unique functionalities include individual face recognition, crowd analysis, and people counting for better security management within the area.

<i>Strategic Goals:</i>	This working paper relates to Strategic Goal <i>Every Flight is Safe and Secure</i>
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<i>Financial implications:</i>	None
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<i>References:</i>	Annex 17 – <i>Aviation Security</i>
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1. INTRODUCTION

1.1 Airport Aviation Security breaches carry manifest risks for passengers, staff, and infrastructure. Unauthorized entry into a restricted area may also pose risks, such as sabotage, theft, or attacks on aircraft and airport infrastructure. Any breach is a threat to the integrity of operations at an airport and can result in extensive shutdowns, delays, and anxiety for passengers and personnel alike.

1.2 Apart from security breaches, this could allow for the illegal trafficking of banned/hazardous goods, as well as weaponry over that screening point at an airport, raising the chances of doing criminal activities like terrorism or organized crime. These incidences result in often many deaths and devastating financial expenses, undermining a great deal of people's trust in air travel and the airline sector as well.

1.3 To secure airports against such hazards, it requires an advanced level of security norms, which includes recent surveillance technologies like AI-enabled CCTV cameras included with access controls and, importantly, the surplus of skilled workforce. Ensuring the safety and security of all stakeholders involved in civil aviation, rapid detection and response to intrusion attempts are paramount for any airport environment and to prevent escalation.

1.4 CCTV systems powered by Artificial Intelligence (AI) are an immense step up from regular security cameras, bringing above and beyond benefits of automated tracking. AI-driven algorithms in these cameras can automatically detect and classify objects (people, vehicles, unattended objects), reducing the requirement of human bodies to monitor them 24/7. Real-time analysis allows the system to also alert security personnel if someone inside the building is acting suspiciously or presenting a potential threat, which in turn increases situational awareness.

1.5 The biggest benefit of AI-driven CCTV is that it can identify anomalous behaviour in the case of abnormal movements, unauthorized presence in zones, or else patterns which could indicate security-related concerns. These intelligent cameras can dynamically follow movement, continuously adjusting focus and zoom to ensure best-practice monitoring of people or items under observation. These proactive surveillance capabilities enable faster emergency response times and serve as a deterrent to incidents that might otherwise go out of hand.

1.6 Additionally, AI-enabled CCTV systems can work in tandem with other security infrastructure such as alarms, access control, and incident management platforms to build a complete security framework. Facial recognition, crowd density analysis, and foreign object detection in operational areas assure improved safety as well as spruce up the operational efficiency for cinema owners. While there are challenges in implementation, mostly to do with ensuring enough technological infrastructure and trained personnel, it is difficult to argue against the advantages that AI CCTV brings to the table in terms of bolstering security efficiency and response times for organizations looking for modern-day surveillance remedies.

2. AI-POWERED CCTV'S CONTRIBUTION TO ENHANCE SAFETY AND SECURITY IN CIVIL AVIATION

2.1 More to the point, an AI-based CCTV system supports fortifying the monitoring in airports and additional aviation facilities. By means of automatic detection, the cameras capture and maintain meticulous records and real-time analysis, which makes it easy to recognize trends in behaviour based on patterns or objects. This, in turn, results in enhanced safety and security measures as possible threats can be identified or dealt with before such situations are triggered.

2.2 Being able to monitor performance and automatically identify issues, an AI-powered CCTV solution helps improve the quality of services alongside strengthening security. The system is able to track passenger flow, detect any congestion in particular areas, and identify operational bottlenecks or disruptions. More than that, it also enables better utilization of human resources, allowing for more

harmonious passenger flow arrangements and thus contributing to a great user experience. Thus, this technology is serving as a security surveillance tool itself, but also as an aiding accessory to making the airport operations more efficient.

2.3 In terms of regulatory compliance, the utilization of AI-backed CCTV enables all stakeholders to comply with the best global aviation security standards outlined by ICAO, Annex 17, as well as in terms of national regulations. Such systems have the capability to store forensic-grade recordings, are held as verifiable evidence in investigations, and ensure all security procedures occur under established requirements. Once integrated, AI-powered CCTV is an important factor in establishing and maintaining a secure, proper, and compliant facility.

2.4 AI-based CCTV at Soekarno-Hatta Airport, Tangerang, Banten (source: <https://travel.detik.com/travel-news/d-7582457/blak-blakan-angkasa-pura-gunakan-ai-di-bandara-bandara-indonesia>) AI-based CCTV at Ahmad Yani Airport, Semarang, Jawa Tengah (source: <https://www.antaranews.com/berita/3995922/bandara-semarang-pasang-puluhan-kamera-di-sekitar-landasan-pacu>).

2.5 Regulations relating to the implementation of AI-based CCTV systems for aviation safety at airports handling more than 1 million passengers per year are expected in the near term to ensure reliable air transport service users with improved airport service and comfort.

3. MITIGATION MEASURES AND REQUIREMENTS FOR THE IMPLEMENTATION OF AI-POWERED CCTV IN AIRPORTS

3.1 Man

3.1.1 Training and certification of aviation security personnel in how AI is supposed to work (and how it creates new risk) in actual systems.

3.1.2 Promotion of personnel privacy protection consciousness and ethical AI use.

3.1.3 Ensure key decisions based on detections are always overseen by a human agent, thereby lessening error and bias.

3.1.4 Providing a dedicated organisation or special unit to operate the AI-based CCTV system at the airport.

3.2 Machine

3.2.1 Implement state of the art CCTV devices and AI systems to operate at the highest technical levels and conduct timely maintenance for best practices.

3.2.2 Secure the CCTV AI devices and their networks with robust cybersecurity mechanisms to avoid unauthorized access and data loss.

3.2.3 Maintain the accuracy, test, and calibrate AI algorithms periodically to adjust according to field conditions.

3.2.4 Follow communication with the Ministry of Transportation's Command Centre for monitoring.

3.3 Material

3.3.1 Securely store and manage recorded video data with encryption and access control.

3.3.2 Equip them with reliable and appropriate hardware to maintain AI CCTV operations non-stop under any condition of the airport.

3.3.3 Create full training tools and detailed fundamental documents to ensure usability and system manageability.

3.3.4 Provision of a separate room for surveillance role, thus adhering to the principle 'one aerodrome, one surveillance'.

3.4 Method

3.4.1 Define concise Standard Operating Procedures (SOPs) for running, maintaining, and acting on AI CCTV detections.

3.4.2 Privacy policy and data usage are tracked by AI systems, supporting One Data Indonesia and One Data Transportation.

3.4.3 Design auditing and periodic inspection methods to confirm that the rules of safety and ethics are being followed.

3.5 Money (Funding)

3.5.1 Spend adequately on acquiring robust AI CCTV technology and servicing, along with cybersecurity.

3.5.2 Invest in human resources training to ensure the effective operation of the system and supervision.

3.5.3 Fund external audits and system improvements to ensure reliability and public trust.

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