Chapter 9
Synergizing Aerospace Efficiency:
Blockchain and AI Integration for Enhanced Security in Flight Data Management

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ABSTRACT

Blockchain and artificial intelligence are two emerging technologies with a wide range of industrial uses. Artificial intelligence (AI) has the capacity to learn on its own, which makes it useful for automating some industrial tasks. However, blockchain offers decentralized system features to guarantee auditability, security, and transparency of transactions. The aerospace engineering field can benefit from the integration of blockchain technology and artificial intelligence (AI) to improve productivity, security, and transparency across the board. The area of flight data monitoring is also addressed, with a focus on how blockchain protects vital flight data and AI algorithms examine large datasets to improve flying performance, route optimization, and fuel economy. This chapter further investigates the possibilities of using AI algorithms in conjunction with decentralized air traffic management systems made possible by blockchain technology, which can dynamically adjust to changing circumstances in real time to minimize delays and congestion.

1. INTRODUCTION

Aerospace engineering, a specialized discipline, is concerned with designing and developing aircraft and systems for commercial and military applications. The demands for unparalleled efficiency and precision in aerospace operations necessitate the deployment of cutting-edge technologies. Despite significant technological advances, an ongoing requirement for enhanced security and reliability persists to ensure operational efficiency and safety in this sector .

Flight data management involves the collection, storage, and analysis of crucial information related to aircraft operations. Ensuring the security and integrity of this data is paramount for the safety of passengers and the overall efficiency of the aviation industry. This section explores how the integration of innovative technologies like Blockchain and AI is transforming security measures in flight data management (Dan et al., 2020). The aerospace industry stands at the forefront of technological innovation, continually pushing the boundaries of efficiency and safety. As aviation systems become increasingly interconnected and data-centric, the need for robust security measures in flight data management has never been more critical (Huynh-The et al., 2023). This chapter explores the transformative synergy of Blockchain and Artificial Intelligence (AI) in elevating security standards within flight data management, ushering in a new era of efficiency, transparency, and resilience and discusses the challenges.

A. Challenges in Flight Data Security

The aviation industry faces numerous challenges in securing flight data:

Cyber Threats: The increasing connectivity of aircraft systems exposes them to potential cyber threats.

Data Tampering: Unauthorized access and tampering of flight data can compromise the accuracy of records.

Real-time Threat Detection: Identifying and responding to security threats in real-time is a complex task.

B. The Role of Blockchain in Flight Data Security

Blockchain technology provides a decentralized and immutable ledger, addressing several security concerns:

Tamper-Proof Records: Blockchain's immutability ensures that once data is recorded, it cannot be altered, providing a secure and transparent historical record of flight data.

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