

Application Of Quantum Technologies In Air Traffic Management

Jerzy Manerowski^a, Mariusz Zieja^a, Paweł Gołda^b,
Justyna Tomaszewska^b, Tadeusz Zaworski^a

^a*Polish Air Force University, Dęblin, Poland*

^b*Air Force Institute of Technology, Warsaw, Poland*

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The aim of the project is to investigate the extent to which enhancements to existing Air Traffic Management (ATM) systems using quantum algorithms could enable the development of variant-optimal plans/schedules in real-time in response to dynamic changes in the airspace, considering all preset parameters, constraints and potentially multiple solution evaluation criteria.

The primary objective of the project was to develop methods for air traffic management using quantum approaches. This article focuses on the specific task of identifying the weaknesses of classical methods. By honing in on these shortcomings, the aim was to pinpoint areas where quantum methods could bring improvements. Additionally, the project involved the formulation of test scenarios to assess and validate the effectiveness of these quantum-based enhancements. The overarching goal was to leverage quantum methodologies to address the challenges associated with air traffic management, ultimately paving the way for more efficient and advanced solutions in this critical domain.

As part of the study, a detailed analysis of classical algorithms was conducted, focusing on identifying their weaknesses. The objective of this approach was to understand the limitations of existing optimization methods applied in air traffic management. Concurrently, an in-depth analysis of current quantum solutions was carried out, aiming to refine existing methods by harnessing the potential of quantum computers. This stage of research allowed the identification of areas where modern quantum technologies could significantly enhance the effectiveness of optimization in air traffic management. Consequently, a test scenario was developed to enable the testing of the developed methods in a realistic environment. This scenario represents a crucial step in assessing the practical effectiveness and utility of the new approaches, shedding light on potential benefits and challenges associated with implementing novel optimization technologies in the field of air traffic management.

This exploration of Quantum Technologies in Air Traffic Management focuses on optimizing classical algorithms' weaknesses. Quantum solutions exhibit potential for enhanced efficiency, yet current computing limitations are acknowledged. The project aims to evaluate the comparative effectiveness of classical and quantum methods, identifying areas for successful quantum applications in air traffic management. Test scenarios are developed to assess the feasibility and benefits of integrating quantum technologies into the existing system.

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