AIRBUS

BMW GROUP

The Golden App: Pushing the Boundaries of Quantum Tech for Mobility

Airbus - BMW Group
Quantum Computing Challenge 2024 | Reverse Track
version 1.0

1 In Search for the "Golden Apps"

Driven by a strongly growing and enthusiastic ecosystem, industrialization of quantum technology has achieved outstanding progress. Academia, start-ups, and industrial end-users have joint forces for future commercialization of quantum computing. Although the potential for quantum advantage for the simulation of quantum systems, cybersecurity and other "quantum-native" applications was theoretically proven, for the rest of the classically-known industrial challenges it is still unknown. It requires significant efforts to "nudge" quantum technology to non-quantum native systems, with no guarantee for success. Similarly, various hardware and software solutions exploiting quantum phenomena developed in academic research labs remain unseen by industry due to yet undiscovered matches with practical applications. So what if most of the key applications for quantum technologies still need to be identified? Are there hidden champions which will provide enormous benefits for industrial end-users in the future - the "golden apps"?

Airbus and BMW Group, global leaders in the aerospace and automotive sectors, embrace quantum technology as a part of their innovation strategies, bringing in their pioneering vision and setting up ambitious goals to prepare real-life quantum applications for future mobility. Driven by early technology

exploration and adoption, both companies encourage novel ideas to expand the boundaries of classical applications for mobility by exploiting the uniqueness of quantum phenomena.

This problem statement is an open call to all quantum providers to present their unique hardware and software solutions together with the ideas of quantum-native mobility-relevant applications not yet explored by industry players [1]. Airbus and BMW Group will assign in-house field experts to investigate the business and technology potential of proposed applications and the possibility of their integration into the value chain of both companies.

2 Submission Guidelines

The section outlines the guidelines for a successful submission to address the problem statement. We also emphasize following the general submission guidelines provided on the challenge website.

- Provide a concise summary of your background. Specify the context that led to the development of your specific hardware/software technology.
- Provide a clear explanation of your technology and the requirements for its function. Describe clearly which phenomenon or mathematical case it tackles and how it performs (including resource estimations, metrics).
- Propose an idea of the practical application of your technology and its potential relevance for the mobility sector, including the arguments justifying its novelty, scalability, advantage potential, as well as potential weaknesses and limitations.
- Optional: Propose an ideal workflow for your technology integration within the Airbus/BMW Group product development value chain and the preferred format of potential collaboration.

Airbus and BMW Group are excited to be part of this collaborative effort, contributing together with the global quantum community to the discovery of novel "golden apps" and their industrialization.

References

[1] Alexander M. Dalzell, Sam McArdle, Mario Berta, Przemyslaw Bienias, Chi-Fang Chen, András Gilyén, Connor T. Hann, Michael J. Kastoryano, Emil T. Khabiboulline, Aleksander Kubica, Grant Salton, Samson Wang, and Fernando G. S. L. Brandão. Quantum algorithms: A survey of applications and end-to-end complexities. *arXiv preprint arXiv:2310.03011*, 2023.