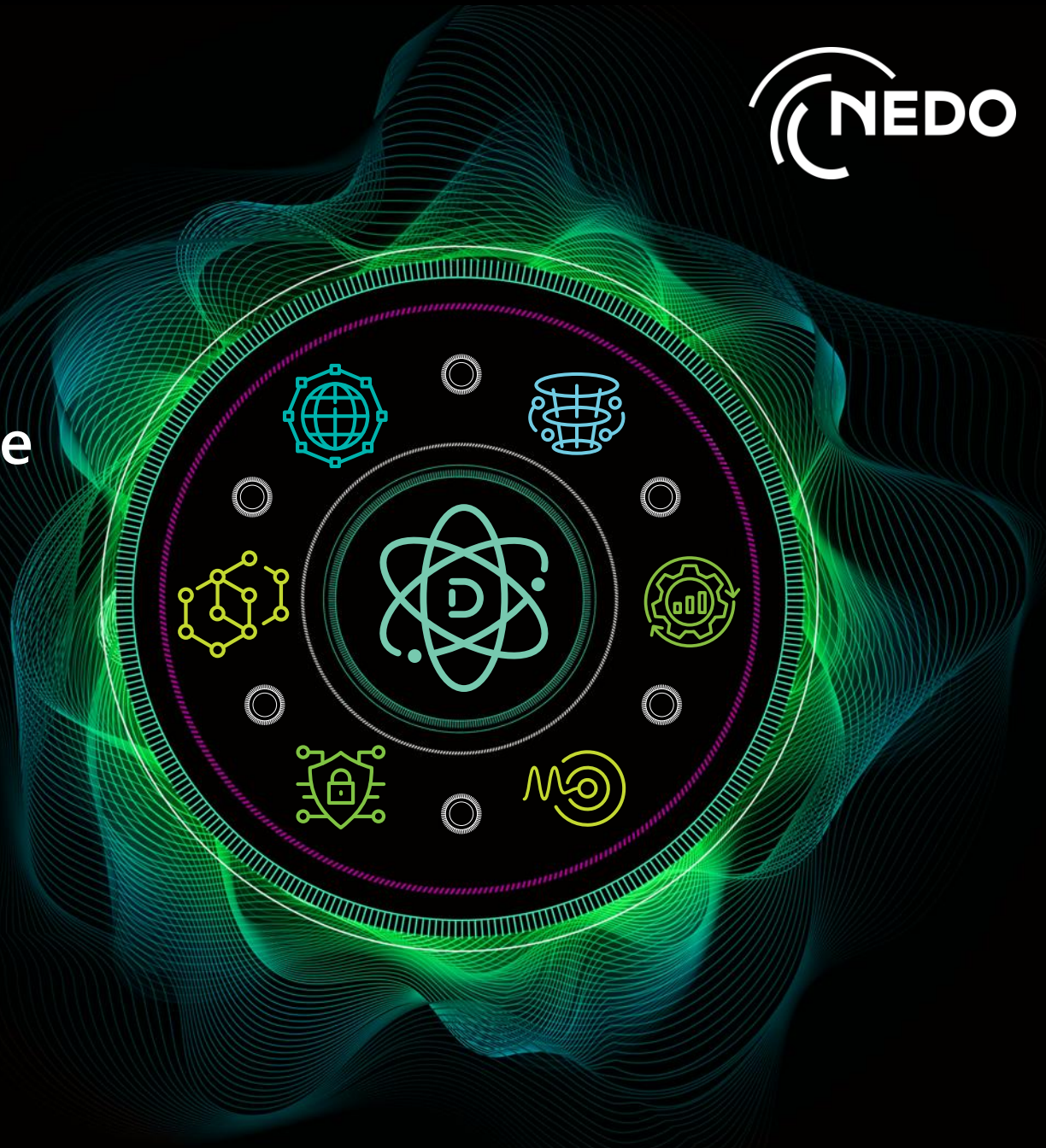
Quantum Computing Use Cases

Improving efficiency in automotive computer design

Fujitsu and TOYOTA SYSTEMS



New Energy and Industrial Technology Development Organization (NEDO)

Fujitsu and TOYOTA SYSTEMS: Improving efficiency in automotive computer design [2026/1]

Validation

Industry	Discrete Manufacturing
Process	process design
Method	combinatorial optimization
Category	Ising*

Background

- The mobility industry needs to address sustainable product development and increasingly complex software and hardware designs, but **there is a serious shortage of human resources to support them.**

Issues and motivation to be solved

- **The connector pin arrangement of the in-vehicle computer has a scale of 100 pins, and theoretically there are 9.3×10 to the power of 157 combinations. This is a problem that takes time to study and decision making is easy to become personal.**

Problem setting as a quantum computer

- The AI model learns information obtained by scoring the connector pin placement pattern and its evaluation, which had been determined based on the knowledge and know-how of skilled engineers, and converts the AI model into mathematical expression information.
- **Constructed a mechanism to automatically calculate the optimal placement of connector pins through high-speed calculation processing using quantum inspired optimization (Fujitsu Digital Annealer).**

Expected business benefits

- High-speed calculation by digital annealer achieves **20 times faster than conventional**
  - Costs are expected to be reduced by reducing design man-hours and suppressing redesign and troubleshooting.
- It is expected that skilled know-how, which has been a subject of personal development, will be transformed into formal knowledge, and that it will also address issues related to technology succession.



Image of efforts to improve design efficiency

Reference: Toyota Systems Incorporated and Fujitsu Limited: "Toyota and Fujitsu use quantum-inspired technology, AI to streamline automotive computer design for sustainable development" (https://global.fujitsu/ja-jp/pr/news/2026/01/14-01)
*Ising: A computing approach, mainly associated with quantum annealers and simulators specialized for the Ising model, in which a problem is first formulated as an Ising model and then solved computationally. It is particularly well suited to problems that involve finding the optimal combination from a vast number of possibilities.

More use cases are available on our website. We invite you to explore them.
https://www.quantum-computing-use-cases.nedo.go.jp/english/

More Use Cases

New Energy and Industrial Technology Development Organization (NEDO)
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This collection of use cases was obtained as a result of the work commissioned by the New Energy and Industrial Technology Development Organization (NEDO) "Cyber-Physical Development Business of Quantum/Classical Hybrid Technology/Study of Use Case of Quantum Technology" and the "Post-5G Information and Communications System Infrastructure Reinforcement R & D Project (Quantum Industrialization)/Comprehensive Study for Promoting the Industrialization of Quantum Computers".