

Groovenauts and Shimizu Corporation: Moving Mountains with Quantum Computing

CASE STORY

Every new construction project begins with an excavation. But without effective management of the fleet of dump trucks responsible for clearing earth and rocks away from the dig site, those early stages can get bogged down in delays.

In early 2020, Shimizu Corporation teamed up with Japanese quantum computing pioneer Groovenauts to explore how their technology could optimize this transportation process. Groovenauts offers a cloud-based platform known as MAGELLAN BLOCKS, using D-Wave's quantum computing systems, for the optimization of complex logistical problems. Shimizu's dump truck management challenge—which entails planning the fastest and most efficient movement of its fleet of vehicles along 17 million possible routes—was a perfect testing ground for this platform.

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— Masakazu Yanagawa, Shimizu Corporation

Based on the results of their work, the companies are currently running field tests with the actual vehicles used in the projects.

Adopting the routing strategy identified by Groovenauts could save Shimizu considerable time and money for future construction projects. This is not only important for the company's bottom line, but also for meeting the ambitious goals set by Japan's Ministry of Land, Infrastructure, Transport and Tourism, which aims to improve the productivity at construction sites by 20% by the year 2025. As an added benefit, the increased efficiency should also improve local traffic conditions in the area surrounding a construction site and reduce overall carbon emissions.

This is not the only opportunity for collaboration between the two companies. In a recent interview with Groovenauts, Masakazu Yanagawa, leader of the Advanced Technology Group at Shimizu's Civil Engineering Division noted that “There are still many areas that require real-time simulation at construction sites.” For example, he foresees the potential to extend Groovenauts' technology to other tough problems such as cost management and maximizing safety at construction sites.



10% INCREASE IN THE
AMOUNT OF DIRT MOVED

Every dump truck in a construction project has multiple opportunities to get bogged down by traffic or road conditions during the loading and unloading process. In order to get a handle on these factors, Groovenauts used GPS to track the behavior of active Shimizu vehicles, including their speed, idling time, and the volume of dirt transported while on a particular route. The MAGELLAN BLOCKS system then applied the data to an optimization framework known as an 'Ising model' on a D-Wave quantum computer. This analysis allowed Shimizu to identify a series of routes for a fleet of 40 active dump trucks that would ultimately increase the amount of dirt moved by roughly 10%.



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MAGELLAN BLOCKS can readily be adapted to such problems—the platform was designed to automatically generate optimized models based on whatever parameters and constraints the operator supplies, whether those pertain to equipment management, human resources, or other process-specific data.

And as the Japanese government continues to push for the implementation of novel digital tools as part of its ongoing ‘i-Construction’ initiative, Shimizu has the chance to lead by example in putting this cutting-edge technology to practical use. “We look forward to the utilization and widespread use of quantum computers, and we will provide more industry and field knowledge and data than ever before,” said Yanagawa, Shimizu Corporation.

D-Wave Launch: The on-board to quantum computing program

If you are ready to get started but not sure how, the D-Wave Launch program has been designed to help enterprises at every step of their quantum journey, from problem discovery through production implementation.



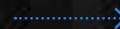
Identify the problem best suited to quantum



Get your team trained and start the development process



Move your application into test and ready for production



Get your application up and running to deliver benefit to your business



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