

## **Hitachi Hokudai Lab & Hokkaido University**

### **Programming Contest 2022 “Future autonomous distributed city development”**

**Accelerating research and development of spatio-temporal optimization technology to ensure sustainability of rural communities by opening problematization of real problems**

Hitachi Ltd. and Hitachi Hokudai lab. which was established on the Hokkaido University campus will hold a marathon-type programming contest “Hitachi Hokudai lab. & Hokkaido University Contest 2022” collaborated with Hitachi Ltd. and Hokkaido University.

Hitachi Hokkaido Lab. and Hokkaido University are collaborating to solve social issues in Hokkaido, such as depopulation, declining birthrates, and aging populations, and to promote joint research that will lead to the creation of local communities. As the number of farm households declines due to the depopulation and aging, domestic food self-sufficiency is on a downward trend. In order to ensure a stable food supply without relying on imports from overseas, the challenge is to improve the efficiency of farming and create an environment that facilitates entry into farming. It is expected to improve agricultural efficiency through the introduction of smart agricultural machinery using robot technology and ICT to solve this issue, however, the high introduction costs are a concern. Therefore, it will be important in the future to promote services that minimize initial investment as much as possible and maximize equipment utilization by leasing or sharing farm machinery.

Hitachi Hokkaido Lab. and Hokkaido University are developing an agricultural asset sharing platform to help decarbonize and improve productivity in the agricultural sector by sharing agricultural assets such as electricity and farm machinery to ensure sustainability in rural communities (Fig. 1). We have been developing local promotion for local consumption, and self-supporting regional energy systems based on small-scale, self-supporting nanogrids that utilize renewable energy as the basic unit. The multi-sector community simulator aims to estimate specific investment development effects by simulating the entire community that encompasses this system. The evaluation of the feasibility of an efficient agricultural asset sharing platform, which is the subject of this contest, is an important positioning for the realization of Hitachi Hokudai Lab’s vision of a symbiotic community through a virtuous cycle of health, industry, and energy.

In addition to problem-solving techniques, it will be important to identify the problems that need to be solved from the sense of issues noticed in the community and to share the issues in order to solve increasingly complex social issues. Hitachi Hokudai Lab. and Hokkaido University have been holding an annual marathon-type contest since 2017, in which local problems (real problems) to be solved are formulated using mathematical modeling, and a marathon contest is held every year by open problem solving, including clear evaluation criteria and the fun of coming up with algorithms. By dealing with real problems rather than simple benchmarks, people around the world can share the social issues that we want to solve and empathize with the value of services we want to provide, and through this contest, highly efficient algorithms that lead to practical applications are being proposed.

In this year's contest, a total of two questions (A and B) will be given in the following schedule for optimization problems (space-time optimization problems) involving many complex factors such as working hours, travel of farm machinery, and timing of work, under the theme of work planning efficiency for farm machinery sharing, etc.

■ Sponsorship: Center for Explanatory Research, Hitachi, Ltd., Hitachi Hokudai Lab., Hokkaido University

■ Cooperation: Kansai University

■ Date: December 23, 2022 ~ January 22, 2023 (Problem A, B)

The winners of the contest will be awarded prize money (Problem A: 100,000 yen, Problem B: 300,000 yen), and the top-scoring contestants will also receive prize money and special gifts.

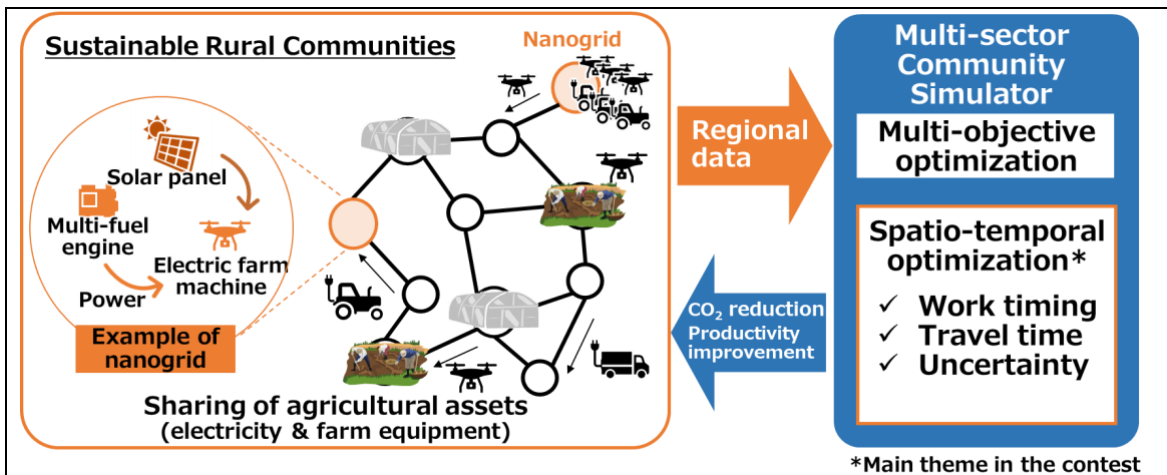
The awards ceremony will be held during the lunch seminar session of the "85<sup>th</sup> National Convention of the Information Processing Society of Japan". Awards will be given to the top-scoring contestants in each problem, and the lectures by the winners and other events are planned to commemorate the event.

■ Date and Time: March 3, 2023 (Fri) 11:40 ~ 12:30

■ Site: The University of Electro-Communications and Online (Hybrid)

Anyone is eligible to participate in this contest, regardless of affiliation, age, or residential area. Please access from the following site.

<https://atcoder.jp/contests/hokudai-hitachi2022>



**Fig. 1 Agricultural asset-sharing platform**

\* Marathon-type programming contest: programming contests that are held over multiple days (solution code submission period). This contest will be held for one month.

Related News Releases:

- Development of a regional stand-alone energy system enabling local production and consumption to both low-carbon local industry and strengthen disaster prevention functions

Hitachi opens stand-alone nanogrid demonstration site in partnership with the Iwamizawa City, Hokkaido to start proof-of-concept testing in cooperation with local companies and farmers December 9, 2021

[https://www.hitachi.com/rd/news/topics/2021/2112\\_ses.html](https://www.hitachi.com/rd/news/topics/2021/2112_ses.html)

- Toward Sustainable Agriculture in Iwamizawa City: Growing Expectations for Hitachi's Stand-alone Nanogrid Mar. 30, 2022

<https://social-innovation.hitachi/en/article/nanogrid/>

Contact person:

Tamiki Komatsuzaki

Molecule & Life Nonlinear Sciences Laboratory

Research Center of Mathematics for Social Creativity

Research Institute for Electronic Science (RIES)

Professor

011-706-9434

tamiki@es.hokudai.ac.jp