



Next Generation Agriculture Partnership Through automated vegetable harvesting robots And RaaS modeling.

inaho Inc.

Changing the future of agriculture through technology



Management issues and labor shortages affecting Japan's agriculture

Agriculture in Japan is projected to decrease by half in the next 15 years due to the aging population. There is already a labor shortage preventing expansion of cultivated land, and many farmers do not expect to improve their yields.

Agriculture is considered to be hard labor with few breaks, but in fact when it comes to production of certain vegetables, some require daily harvesting for over half of the year. inaho has been working to develop technology such as AI (artificial intelligence) to provide robots that can act in place of people to harvest crops and make more time for farmers.

Crops that can be harvested by the inaho robot

inaho divides crops into two categories. Harvesting of produce that is ready for harvest all at once and can be harvested together is called "batch harvesting" and harvesting of produce that grows at different rates and must be harvested as it ripens is called "selective harvesting." Crops such as rice and potatoes are harvested using batch harvesting. A harvester is used to collect it all at once, and the work is not strenuous. However, crops that

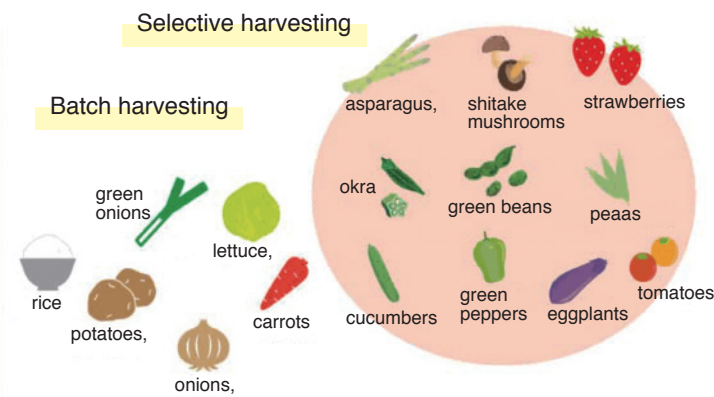
require selective harvesting such as asparagus, tomatoes, eggplants, cucumbers, and so on are difficult for machines to determine whether a specimen is ready to harvest, so until now automatic harvesting had not made much progress in this field. At inaho, a robot has been developed that uses AI to determine whether to harvest or not, which has made it possible to automate the harvest. An automatic harvesting robot that collects asparagus was implemented, and it has been providing its services in Saga prefecture since September 2019.

Outline of robot structure and automatic harvesting service

The robot has an electrically-powered cart, a camera and sensor to determine what to harvest, and an arm to do the harvesting. It works via these three steps of moving, exploring, and harvesting. It is equipped with a light so it can work at night. With asparagus, it matches the harvesting standards with the shipping standards and can be set in one-centimeter increments. The harvest speed is 12 seconds per stick, and it is powered by a battery that can be recharged on a household outlet.

Rather than selling the robots, inaho provides them as a service using the Raas (Robot as a Service) model. Consumers can choose to pay a fixed rate or pay a flexible rate based on harvest volume. Compared to the traditional business custom of purchasing agricultural machines, there is low setup and maintenance cost, and the period of use is flexible.

The company is considering doing consulting with consumers to provide advice on the best field environment for harvesting using data gathered while working, in order to use the robots more effectively. The types of harvesting will be expanded to include tomatoes, cucumbers, strawberries, eggplants, green peppers, and more, while also working to lighten the load of other farming operations such as pest control, leaf raking, and transportation. As a service provider working together with producers, the company hopes to change the future of agriculture with the power of technology to improve productivity.



Batch harvesting and Selective harvesting

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