

Institute of Agricultural Machinery

National Agriculture and Food Research Organization



Research projects and the role of IAM

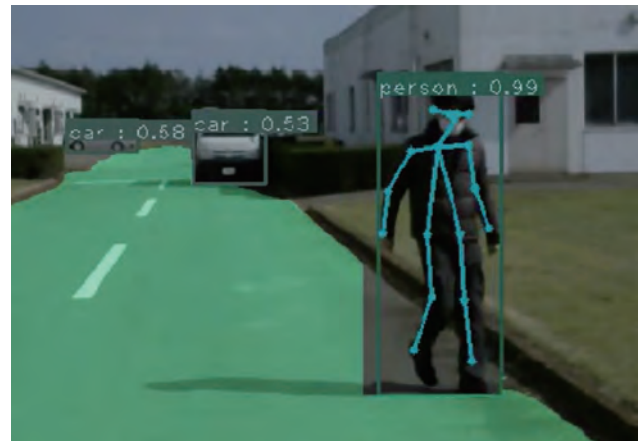
Establishment of highly efficient and safe smart agriculture, and promotion of international standardization

The Institute of Agricultural Machinery (IAM) promotes the development of intelligent agricultural machinery, international standardization, and the realization of unmanned agriculture by utilizing small electric robots. We work towards establishing a farm safety system to achieve “zero farm accidents” by integrating humans and AI.

IAM collaborates with the NARO’s farm work technology field along with related fields such as cultivation technology, pest control, and cultivar development. Particularly, we promote collaborative research with the Research Center for Agricultural Robotics (RCAR) and the Research Center for Agricultural Information Technology (RCAIT) for smart agricultural machinery development. Furthermore, we actively collaborate with agriculture and industry sectors to co-develop a system for fast-tracking research findings into real-world applications.



Puddling by robot tractors



Recognition of various environments (road, human, obstacles) of the robot vehicle by AI

IAM contributes to the future of sustainable agriculture with dramatically improved productivity, significantly reduced labor demands, minimized environmental impact, and enhanced safety for both workers and machinery by conducting integrated R&D and safety inspections of smart agricultural machinery.



Measurement of static overturning angle of the tractor



Main building

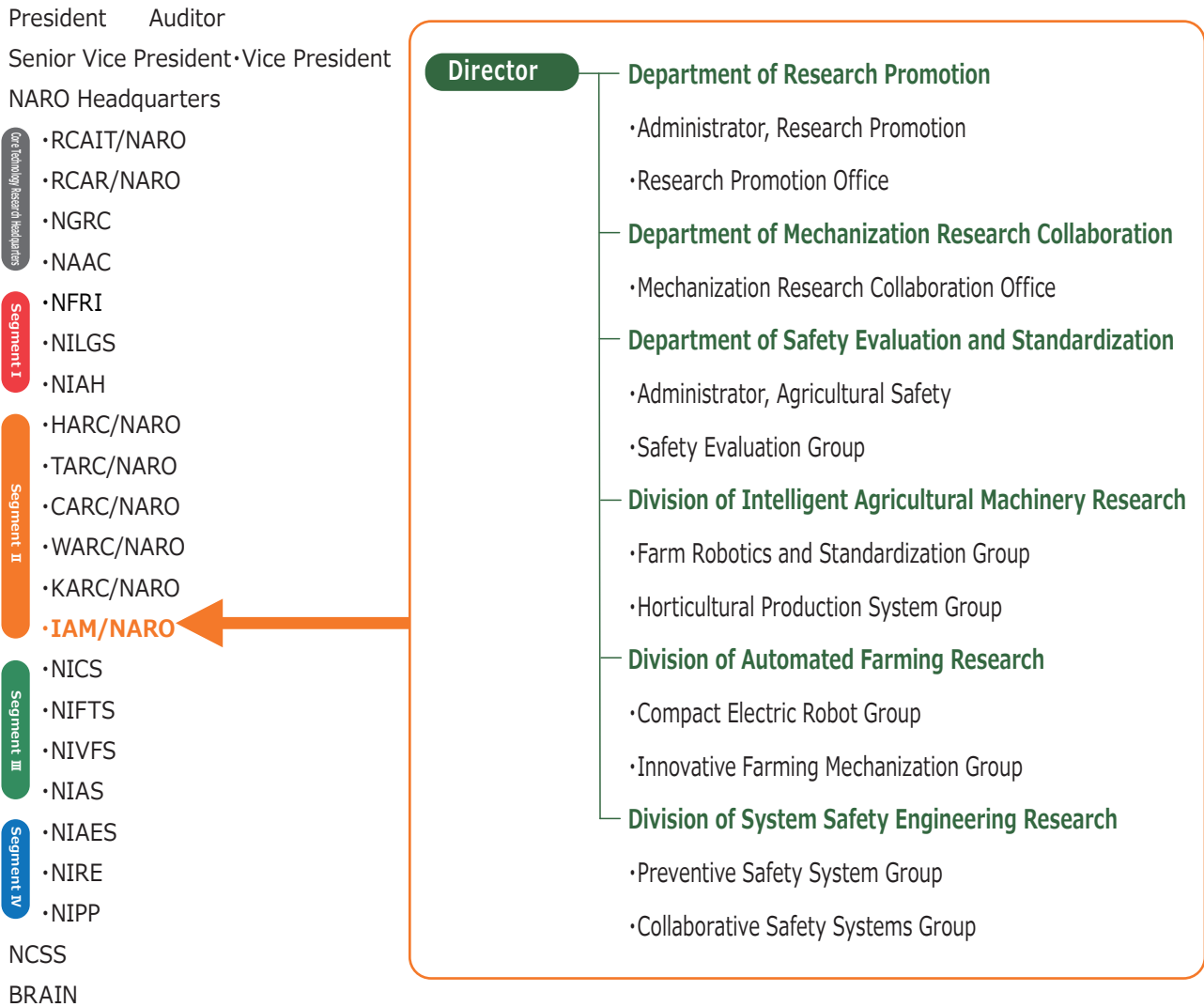


Prototype Factory

*Cover Photo: Autopilot Rice Transplanter in operation

Organization Chart

2021.4.1



History

- 1962 Established as “The Institute of Agricultural Machinery (IAM)”, a semi-governmental corporation
- 1986 Reorganized as “The Bio-oriented Technology Research Advancement Institution (BRAIN)”, a specially authorized corporation
- 2003 Integrated with “The National Agricultural Research Organization”, an independent administrative agency, and reorganized into “The Bio-oriented Technology Research Advancement Institution (BRAIN)”, an independent administrative agency
- 2006 Reorganized as “The National Agriculture and Food Research Organization (NARO), Bio-oriented Technology Research Advancement Institution (BRAIN)”, an independent administrative agency
- 2015 Reorganized as “The National Agriculture and Food Research Organization (NARO), Bio-oriented Technology Research Advancement Institution (BRAIN)”, a national research and development agency
- 2016 Reorganized as “The National Agriculture and Food Research Organization (NARO), the Institute of Agricultural Machinery (IAM)”, a national research and development agency
- 2021 Reorganized and changed its Japanese Name

Research division

Division of Intelligent Agricultural Machinery Research

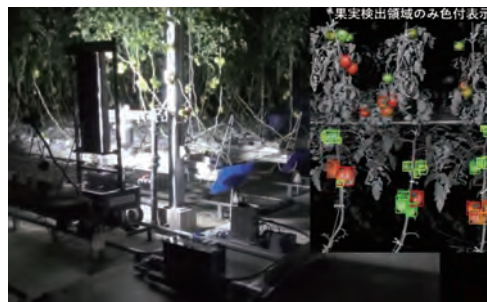
As land-based agriculture continues to grow in scale, it is becoming increasingly difficult to secure a hired workforce. There is an urgent need to dramatically reduce labor costs and improve productivity. Similarly, personnel expenses account for approximately 30% of production costs for protected horticulture that are growing more than one hectare in size, and management improvement is required by improving work efficiency.

To solve these issues, the Division of Intelligent Agricultural Machinery Research has been involved in developing sensing, data management, and autonomous technologies for smart agriculture. Sensing technology enables the acquisition of digital data, including the growth status, quality, and soil conditions of crops. These data are then stored in the farm management information system and analyzed to determine the optimal timing, duration, and methods for various farming operations. Agricultural robots, integrated with AI, are being intellectualized to perform a wide range of tasks requiring expert skills.

Through these innovative approaches, we aim to achieve the early realization of "Society 5.0" in the agricultural and food industry.



Automatically starts driving on farm roads after completing work in the field



Growth information diagnostic system for fruits and vegetables

Division of Automated Farming Research

The Division of Automated Farming Research engages in research and development with two main progs: i) developing and introducing small-sized electric agricultural robots to address the severe labor shortages for crop production sites like vegetables, where mechanization is not yet greatly progressed, ii) establishing highly efficient farm work systems that can work stably under diverse and varying conditions, such as weather, soil, and crop conditions, to reduce the loss of cropping opportunities and work delays caused by poor weather or other reasons.

Our division aims to improve the workload capacity per farmer by allowing small-sized electric robots to perform tasks autonomously or to cooperate with humans in managing, transporting, harvesting, and other tasks. We are committed to increasing the percentage of workable days by creating innovative solutions that overcome challenging weather and field conditions that have traditionally limited farm work. Furthermore, we are working in partnership with private companies, public experimental/research institutes, and producers for machinery development to promptly respond to production site needs.



Weeding robot (under development)



Cleaning robot for pigpen (under development)

Division of System Safety Engineering Research

Approximately 300 fatal accidents occur each year related to farm work. This number is over 10 times the average for all industries when converted to the working population. To promote agricultural production and for stabilizing farm management, it is important to promote initiatives aimed at eliminating farm accidents. To make this effort effective, producers, administrative agencies, agricultural cooperative organizations, private enterprises, and research institutions must work closely together to steadily fulfill their respective roles.

As the core of such collaboration, the Division of System Safety Engineering Research gathers and accumulates hazardous events and improvement examples through on-site investigations, and analyzes them by the latest methods. In addition, based on the knowledge obtained, we will develop educational or enlightened systems, and safety devices and safety systems for agricultural machinery.

Furthermore, we will develop and upgrade evaluation technologies that will help private companies develop safety technologies and promote their use in local areas, and we will work on social implementation through the development of standards and their standardization to contribute to sustainable agriculture creation.



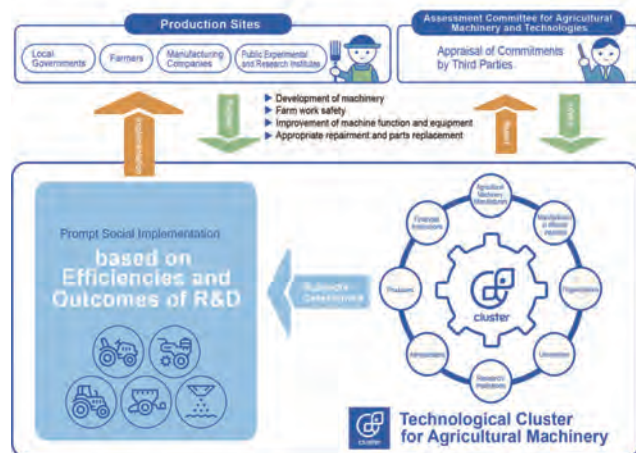
Farm Accidents Database Search System

Technological Cluster Projects for Agricultural Machinery Department of Mechanization Research Collaboration

The Department of Mechanization Research Collaboration organizes “Technological Cluster for Agricultural Machinery” as a platform for wide-ranging industry-academia-government collaboration to promote new agricultural mechanization.

The Technological Cluster for Agricultural Machinery brings together diverse stakeholders, including private companies, agricultural organizations, research institutions, universities, government agencies, and producers, to solve challenges faced at agricultural production sites. We collect requests from production sites for the development of agricultural machinery and farm safety and address the requests through R&D of agricultural machinery or other methods by the cluster members. These efforts are reported to a third-party organization, “Assessment Committee for Agricultural Machinery Technologies”, and we will receive advice or appraisals for proper operation.

Furthermore, we are working on disseminating agricultural work safety information to farming sites and examining the standardization of specifications for agricultural machinery.



Outlines for Technological Cluster for Agricultural Machinery <https://www.naro.affrc.go.jp/org/brain/iam/cluster/index.html>

Safety Inspection

Department of Safety Evaluation and Standardization

The Department of Safety Evaluation and Standardization conducts “safety inspections” for marketable various agricultural machinery and equipment and “OECD tests” for roll-over protective structures (safety cab/frame). We address testing and evaluation methods, sophistication and standardization of facilities, international standardization, etc.

“Safety Inspection” is a unique certification system implemented by NARO. Positively ensuring consistency with international safety standards, IAM will continue to make efforts to improve and promote agricultural machinery and eliminate farm work accidents through performance evaluations targeting all types of agricultural machinery and facilities.

Furthermore, we advance the research for technological developments to improve safety and reliability and methods for evaluation tests, and research on the sophistication of the facilities corresponding to them. IAM also promotes “domestic international standardization” to strengthen Japan's industrial competitiveness from a global perspective.



Rollover Protective Structure (ROPS) Test (Cush Test)

ISO17025



Safety Stickers



Inspection of Robots and Automated Agricultural Machinery

Research Support

Experimental Farm (Konosu City, Saitama Prefecture)

In the experimental farm, we conduct field management and cultivation of crops necessary for research, safety inspections, performance tests, and other business activities.



Facilities and fields of the experimental farm



Puddling by manned tractor and robot tractor



Performance test of robot combine

Site Tour (Saitama City, Saitama Prefecture)

The general tour course (required time: approximately 1 h 30 min) includes an explanation of the research institute and a guided tour of the Institute's "showroom" displaying the latest agricultural machinery and "museum" exhibiting old farm equipment and tools.

The displays in the showroom are the latest commercially available models borrowed from companies engaged in the manufacturing and distribution business of agricultural machinery in Japan.

The exhibits in the museum are characterized by their high historical value, such as being certified for mechanical engineering heritages by The Japan Society of Mechanical Engineers (JSME).



Museum and Showroom

Contacts

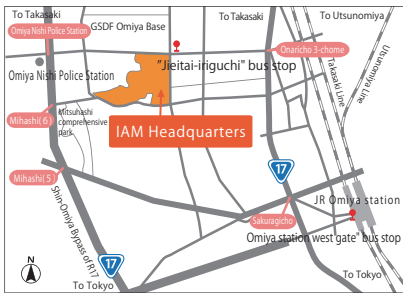
The Institute of Agricultural Machinery (IAM) engages in joint research, technology transfer, accepting trainees, and providing information to private companies, universities, public inspection research organizations, and others.

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|---|--|
| <ul style="list-style-type: none"> ■ Technological cluster projects for agricultural machinery, industry-academia-government collaboration | <p>Department of Mechanization Research Collaboration</p> |
| <ul style="list-style-type: none"> ■ Joint research, technology transfer, or other conforming matters <ul style="list-style-type: none"> Joint research Contract research Contract research outsourcing Technical advice Technical training Technical consultation | <p>Research Promotion Office, Department of Research Promotion</p> |
| <ul style="list-style-type: none"> ■ Acceptance or dispatch of researchers and intellectual property management <ul style="list-style-type: none"> Dispatch upon request Technical lectures Acceptance of researchers Examiners in various fields Intellectual property management | <p>Research Promotion Office, Department of Research Promotion</p> |
| <ul style="list-style-type: none"> ■ Collection and Provision of Information <ul style="list-style-type: none"> Research presentations Published materials Exhibition of agricultural machinery Agricultural books and catalogs | <p>Public Relations Team, Department of Research Promotion</p> |
| <ul style="list-style-type: none"> ■ Site tour | <p>Public Relations Team, Department of Research Promotion</p> |
| <ul style="list-style-type: none"> ■ Information Disclosure | <p>Department of Administration for Saitama Area</p> |

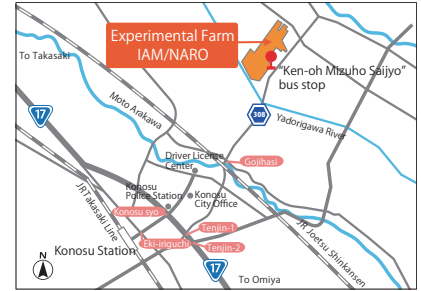
For inquiries and applications of the items stated above, please contact us
 Mail : iam-koho@ml.affrc.go.jp

Map

IAM Headquarters



Experimental Farm (Konosu City, Saitama)



Tsukuba Research Center



Location and Traffic Guide

IAM Headquarters

1-40-2 Nisshin, Kita-ku, Saitama City, Saitama Prefecture, 331-8537, Japan

● From the JR Omiya Station west exit
Get on the Tobu Bus for "[61]Sanshin Jidousha" or "[61]/[69]City Heights Mihashi" from bus stop No. 6 or No. 7, and get off at the "Jieitai-iriguchi" bus stop. The institute is approximately a 5-min walk from the bus stop.

Experimental farm

1389, Sakai, Konosu City, Saitama Prefecture, 365-0013, Japan

● From the JR Takasaki Line "Konosu" station east exit
Get on the Konosu City Community Bus "the Flower" for the "Kyowa Course," and get off at "Ken-oh Mizuho Saijyo." The experimental farm is approximately a 5-min walk from the bus stop.

Tsukuba Research Center

1-31-1, Kannondai, Tsukuba City, Ibaraki Prefecture, 305-0856, Japan

● From the JR Joban Line "Ushiku" station west exit
Get on the Kanto Railway Bus for "Tsukuba Center" and get off at the "Norin Danchi Chuo" bus stop. The Tsukuba Research Center is approximately a 15-min walk from the bus stop.

● From the Tsukuba Express (TX) "Midorino" station
Get on the Kanto Railway Bus for "Ushiku-eki," and get off at the "Nakajyuku" bus stop. The Tsukuba Research Center is approximately a 7-min walk from the bus stop.

● From the Tsukuba Express (TX) "Tsukuba" station
Get on the Tsuku Bus for "Kukizaki Rojin Fukushima Center," and get off at the "Norin Danchi Chuo" bus stop. The Tsukuba Research Center is approximately a 15-min walk from the bus stop.

Contact

Institute of Agricultural Machinery (IAM) National Agriculture and Food Research Organization (NARO)

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URL : <https://www.naro.go.jp/english/laboratory/iam/index.html>

Mail : iam-koho@ml.affrc.go.jp



* "NARO" is a common name of the National Agriculture and Food Research Organization