

Development and Implementation of Connected Drones with Agriculture as a Starting Point

Akira Yamasaki, Yuji Sekiguchi, Shinya Suzuka, Susumu Kitagawa, Hodaka Sase, and Yoshito Tsutsumi

Abstract

In February 2021, the drone manufacturer NTT e-Drone Technology was established with a mission to promote the implementation of drones for creating a sustainable society. We, NTT e-Drone Technology, began operations by helping to build a regional hub by promoting the use of drones, starting with agriculture, which is a major industry in rural regions. Our efforts in the agricultural sector are primarily focused on in this article.

Keywords: drone, smart agriculture, IoT

1. Background to establishment of NTT e-Drone Technology

Established in February 2021 as a joint venture by NTT EAST, OPTiM Corporation, and WorldLink & Company Co., Ltd., NTT e-Drone Technology is a manufacturer of drones (Fig. 1). All three investors have been involved in smart agriculture for some time, saw the increasing use of drones in various agricultural operations (such as pesticide spraying, fertilizer application, sensing, and seeding) as a business opportunity, and decided to establish NTT e-Drone Technology. In close cooperation with the three investors, NTT e-Drone Technology is aiming for the implementation of drones that contribute to solving social issues, and starting with agriculture, we are engaged in a wide range of businesses from development of drones and contracting of their operation to development of human resources.

Unusually for an NTT Group company, NTT e-Drone Technology has the function of a manufacturer involved in the development of drones. We have been approached by a wide range of clients, from NTT laboratories to operating companies, and received inquiries both internally and externally. Our

efforts in the agricultural sector, the theme of the Feature Articles in this issue, are introduced in this article, which are divided into current efforts and initiatives for the future.

2. Current efforts in the agricultural sector

2.1 Agricultural drone AC101

The AC101 2022 model drone, which was designed according to our motto “All for long and safe use,” further strengthens the conventional airframe concept of “lightweight,” “compact,” and “energy-saving” to suit Japanese farm fields and offers a lighter, stronger, and more user-friendly airframe for first-time users (Fig. 2). In addition to those features, on the basis of numerous users’ voices, such as “It will be problematic for agricultural equipment if parts supply is interrupted in two to three years,” we guarantee seven-year support for the first time in Japan, which defies common practice in the drone industry. We also focused on the voices of those who wanted to “eliminate the trouble of recharging the battery” and “spray longer with a single battery charge,” and designed the propeller to be made of carbon materials. The synergistic effect of a lighter airframe and user-friendliness

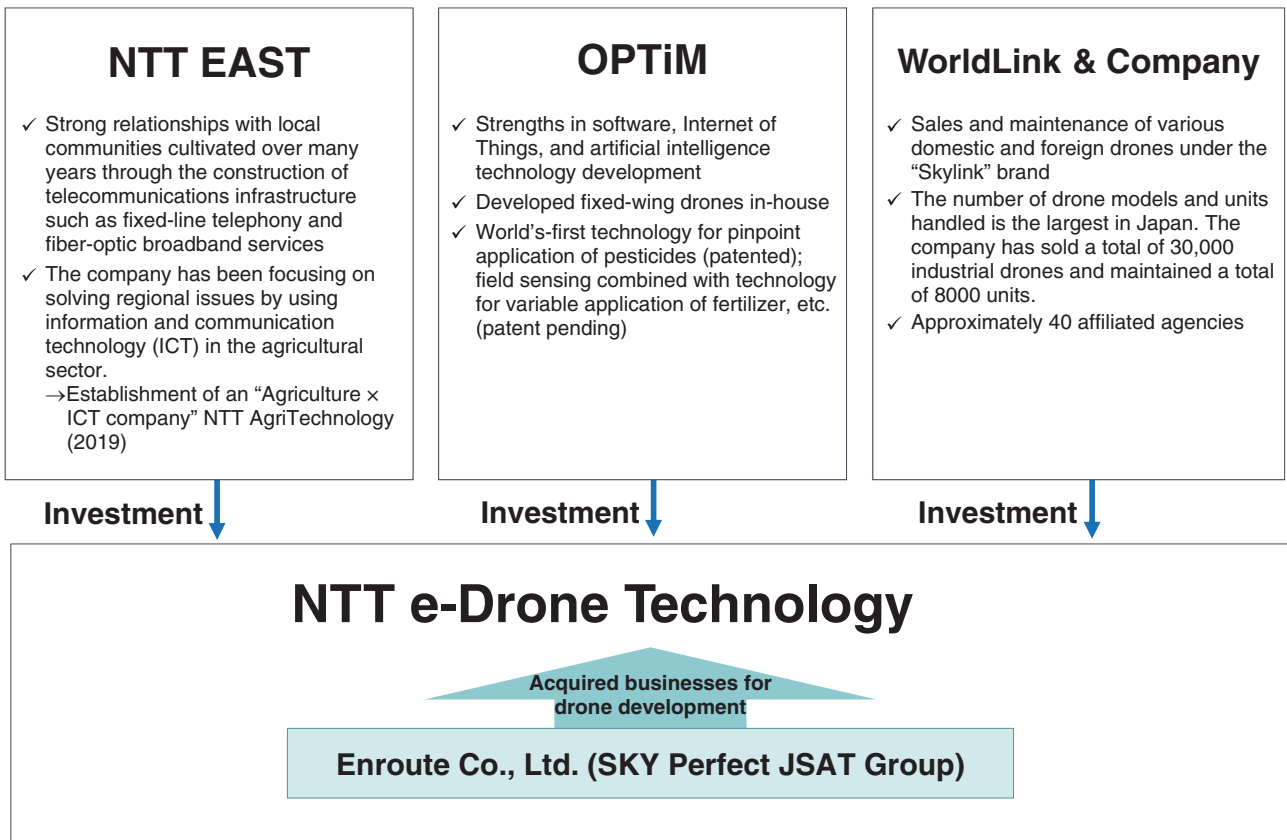


Fig. 1. Overview of NTT e-Drone Technology.



Fig. 2. Agricultural drone AC101.

makes it easier than ever to spray up to 2.5 ha on a single battery charge, even when hovering for slightly longer periods or when spraying over time in irregu-

larly shaped fields.

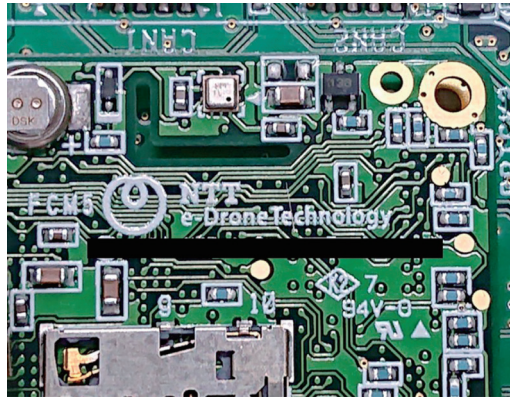


Fig. 3. NTT e-Drone Technology's flight controller (part of the printed circuit board).

2.2 Toward the widespread use of agricultural drone AC101

Since the company was established, we have held more than 100 events, such as demonstrations, and met with more than 2000 farmers, JA (Japan Agricultural Cooperatives) officials, and agricultural policy makers to exchange opinions on the use of drones in agriculture. We have received requests for remote control and fully automated navigation to save manpower and for expanding the range of crops that can be sprayed with pesticides by using drones. Japan's Ministry of Agriculture, Forestry and Fisheries is promoting the expansion of types of pesticides that can be sprayed by drones, and we are actively conducting test spraying and demonstrations with the AC101. Recently, test spraying of cabbage with the AC101 was conducted, which resulted in the purchase of the drone. We are also investigating using drones for pollination of apples. We will continue to promote the further popularization of the AC101 by answering requests from the field.

3. Initiatives for the Future—Development of connected drones and training of human resources

In July 2021, we announced a partnership with Aterion [1]. As a US, Switzerland, and Germany-

based company, Aterion provides an open-software platform for drones that enables enterprises and government agencies to easily integrate airframes, payloads, and applications in a manner that meets their specific needs. Through this partnership, we are developing connected drones. These drones enable remote control of drones and real-time transmission of data acquired by drones to remote areas by making it possible for drones and the cloud to be constantly connected via wireless communication, i.e., LTE (Long Term Evolution), fifth-generation mobile communication systems (5G), and private 5G. We are developing connected drones because we believe they should be implemented as agricultural drones and drones for surveying, inspection, disaster countermeasures, and logistics. We have developed a prototype flight controller, a device for controlling a drone, and are developing it for mass production (Fig. 3). We are also developing efficient and highly functional applications for cloud computing through joint development with Aterion (Fig. 4).

Through the type of development described in this article, NTT e-Drone Technology intends to promote the implementation of drones to contribute to solving social issues. For our efforts in sectors other than agriculture, please check our official website and social media [2–5].

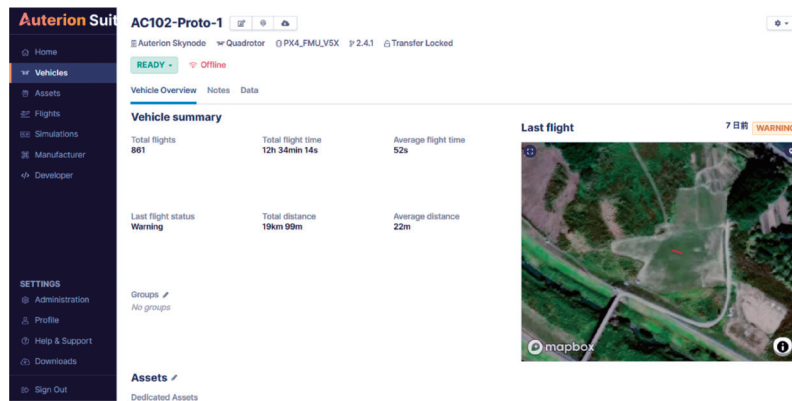


Fig. 4. Screenshot of image taken by drone and stored on the cloud.

References

- [1] Website of Auterion, <https://auterion.com/>
- [2] Website of NTT e-Drone Technology (in Japanese), <https://www.nttedt.co.jp/>
- [3] NTT e-Drone Technology official YouTube channel, <https://www.youtube.com/c/NTTeDroneTechnology>
- [4] Facebook page of NTT e-Drone Technology, <https://www.facebook.com/NTTdrone>
- [5] Twitter account of NTT e-Drone Technology, <https://twitter.com/NTTdrone>



Authors (from left): Susumu Kitagawa; Hodaka Sase; Akira Yamasaki, Representative Director; Yuji Sekiguchi, Executive Officer of R&D Department; Yoshito Tsutsumi; and Shinya Suzuka; NTT e-Drone Technology Corporation