

**“Telemedicine and Unmanned Drone Demonstration Experiment” was conducted for making islanders to be able to continue living peace of mind.**

On July 30, 2020, the demonstration experiment by using an unman control small drone was conducted between Awashima island and Suda-Port in Mitoyo City, Kagawa Prefecture in collaboration with Seto Inland Sea Regional Research Center, Kamomeya Inc. and Aioi Nissay Dowa Insurance Co., Ltd.



The experiment was to deliver a mobile electrocardiograph for diagnosis and prescription drugs for treatment in order to realize the telemedicine, namely “Online medical care in the remote islands”.

### **1. Background to the demonstration experiment**

Although Kagawa Prefecture is the smallest Prefecture in Japan, it has 24 manned remote islands. For the reason, how to maintain the medical care for the islanders is a very important issue.

In the Kagawa Prefecture as a whole, there are plenty of medical institutions include Kagawa University Hospital etc., therefore the medical is very convenient and familiar to the Kagawa people. However, islands having clinic are only less than half in 24 manned islands. The other islands have no medical facility at all.

Even on the islands where located clinic, it is difficult to keep doctors. In many cases, doctor is only dispatched to the island a few days a week, therefore, especially to maintain the medical service system of weekend and night is a serious issue. To improve such medical disparities, Kagawa Prefecture has introduced the Kagawa Telemedicine Network “K-MIX” since 2003. However, it had been difficult to spread to remote islands in fact.

Even though, the remote islands are originally the most suitable field for the telemedicine, the reason which has not been spread the telemedicine is the broadband internet has not been prevailed there, in addition the government actively has not promoted to introduce the telemedicine. However, it is becoming ready the environment which the telemedicine spreads rapidly, because the telemedicine was officially recognized in 2018 as “online medical care” moreover the new coronavirus epidemic was broken out.

Although the clinic in Awashima island where is the demonstration experiment

field had opened 4 times a week before, it has been decreased to twice a week in recently. Therefore, we tried "online medical care". As a result, it was very effectiveness and very pleased by the islanders.

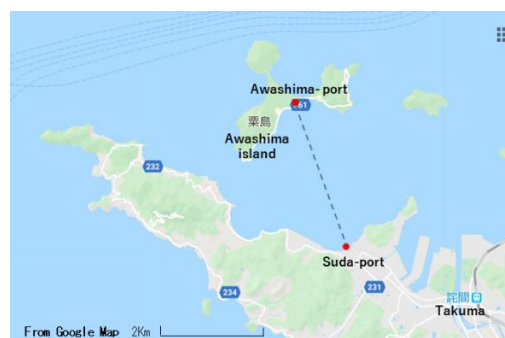
The remaining problems are that there are cases which need blood test due to sudden fever, etc. and need to prescribe drugs which is not in the clinic's inventory. In such emergency cases, we are faced with difficulties, because there has no urgent transportation ways. The solution is utilization of drone which will be reported this time

We had recommended of the utilization of drone in Awashima island, to various fields including Mitoyo City for more than 3 years, to solve these. Thanks to this demonstration experiment, we were able to finally take the first step. Therefore, we have thought what we have done is very meaningful.

## 2. Overview of demonstration experiment

The demonstration experiment was to transport supplies resembling medical equipment etc. by a single-rotor type drone, between Suda-port and Awashima-port where is about 4Km apart.

In the experiment, we assumed that an Awashima islander who is claming symptoms of palpitations and arrhythmias visited the clinic. In this case, it is able to think of two processes. The first is that we deliver a mobile electrocardiograph for accurate diagnosis to the Awashima clinic from Suda-port via Awashima-port by using the drone, and after that we carry the collected blood sample for investigation to Suda-port by drone in reverse. The second is that the doctor diagnoses the patient as atrial fibrillation from the electrocardiogram waveform etc. So, we transport the DOAC drug to prevent the blood coagulation by drone and pharmacist gives the drug to the patient after taking medication instruction.



On the same day of the experiment, about 70 of the 5th grade students in Takuma Elementary School of Mitoyo City had been studying in Awashima island for an out-of-school study "day camp". They watched the drone landing and cheered.

After landing the drone, we explained about the telemedicine and delivery logistics by drone to elementary school students who are "Scientists of the future". They eagerly listened into it.



In the future, we will aim to effectively use it not only in remote islands and remote areas but also medical support in disaster, by combination of the telemedicine and the technology of delivery logistics by drone which demonstrated experiment around Awashima island.

### 3. Role of participating members

(1) The Seto Inland Sea Regional Research Center of Kagawa University is aiming to establish a safe and secure life in remote islands and remote areas by constructing the models for the telemedicine and the delivery models of prescription drugs, with matching to the deregulated "Online medical care" and "Online medication instruction".

Furthermore, the Center is aiming to establish the medical system in remote islands and the support system in disaster, which link to a safe and secure life by realizing the construction of a delivery model for relief supplies in disaster.

In addition to these, the Center will conduct legal research to increase the social acceptance of telemedicine and drone.

(2) Kamomeya Inc. enables high-quality remote control for drone by operating the newly developed comprehensive drone operation support system "OceanMesh" and "Real-time precision meteorological live system" as a unit.

In this experiment, Kamomeya Inc. it is aiming to realize the society based on the premise of utilizing drone in not only daily but also in disaster, by verifying effectiveness and usage of these systems.

(3) Aioi Nissay Dowa Insurance Co., Ltd. is aiming to contribute to the resolution of regional issues through responding to the risks associated with experiment as well as developing insurance products・services for respond to drone control and mechanical failures.

Finally, the consortium centered on Mitoyo City and the participating members above, applied to “Smart island promotion substantive verification work in 2020 fiscal year” of government. As a result, the work was adopted fortunately.

We would like to work on improving the medical care in remote islands and remote areas throughout Japan from now on, by advancing further the telemedicine and drone project in Awashima which reported this time and overcome social issues and technical issues.