Electronic Customs Declaration Gates to Reduce Congestion at Airport Customs Inspection Areas

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Abstract

The situation around us is changing practically every day as the novel coronavirus disease (COVID-19) continues to spread, the world population grows and tourists are invited to attend international events, and Japan's working population spirals downward. To help airports cope with the challenges arising from these changes, NEC provides the Electronic Customs Declaration Gates at customs inspection areas. The system aims to facilitate smooth entry of ever-increasing inbound passengers, shorten their waiting times, and reduce congestion at customs. NEC's world's No. 1 face recognition technology and spatial design will provide a secure, stress-free, and speedy customs process for passengers visiting Japan. As Japan, along with the rest of the world, goes through increasingly extreme and rapid changes, NEC aims to deliver a higher level of comfort by embracing the concept of NEC I:Delight.

Keywords

digitization, infection control measures, face recognition, barrier-free, design

1. Introduction

While the novel coronavirus disease (COVID-19) continues to spread, the number of foreign visitors to Japan is likely to increase again due to the growing world population and the invitation of tourists to international events. This is driving increased attention to infection control measures at airports, and the digitization of immigration procedures is also expected to accelerate. This paper provides an outline and introduces the features of NEC's Electronic Customs Declaration Gate designed to realize a secure, stress-free, speedy customs process for passengers.

2. Electronic Customs Declaration Gate

This section describes the Electronic Customs Declaration Gate (e-Gate).

2.1 Overview of the e-Gate

In order to facilitate smooth entry of ever-increasing inbound passengers, shorten their waiting times, and reduce congestion at customs, e-Gates have been installed at customs inspection areas at airports in Japan. While passengers wait for their baggage to appear on the carousel, they can electronically submit Declaration of Accompanied Articles and Unaccompanied Articles (Declaration) form through the Electronic Declaration Terminals. This eliminates the need to submit the Declaration in paper form. After picking up their luggage, passengers can proceed to the e-Gate and walk through seamlessly, thanks to the face recognition technology. This system does not only achieve speedy customs procedures through digitization but also contributes to COVID-19 infection prevention by reducing contact between people.

2.2 How to use the e-Gate

To use the e-Gate, passengers must download the Customs Declaration App on a smartphone or tablet and create a QR code containing the information on the Declaration. The Customs Declaration App can also be used offline. By downloading the app in advance, passengers can create the QR code after boarding the airplane even without Wi-Fi or other Internet connections. A QR code

Fig. 1 How to use the e-Gate.

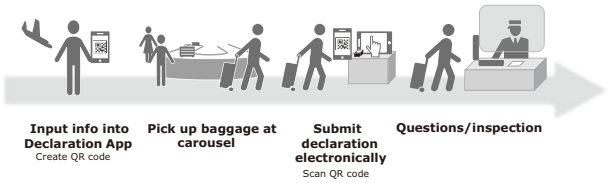

Fig. 2 Electronic Submission of Declaration of Accompanied Articles and Unaccompanied Articles.

can also be created using the information entered the previous time for the second and subsequent times.

Next, the passenger places the created QR code and IC passport on the reader of the Electronic Declaration Terminal installed at the customs inspection area to let it read the information on the Declaration. After completing the procedure by following the guidance displayed on the terminal screen, the passenger proceeds to the e-Gate.

After passing through the e-Gate*, the passenger enters the country by exiting the customs inspection area and moving into the arrivals hall.

During this process, face recognition is used for verifying identity (**Fig. 1**).

2.3 Airports where the e-Gates have been installed

As of April 2021, the e-Gate is available in seven airports in Japan including the Narita International Airport, Haneda Airport, Kansai International Airport, Chubu Centrair International Airport, Fukuoka Airport, New Chitose Airport and Naha Airport[1)].

In addition to the seven airports above, QR code readers are scheduled to be installed at customs inspection areas of other airports by the end of fiscal 2021[2)], enabling passengers to electronically submit the Declaration using the Customs Declaration App (**Fig. 2**).

3. Features of the Electronic Customs Declaration Gate

The following sections describe the features of the e-Gate.

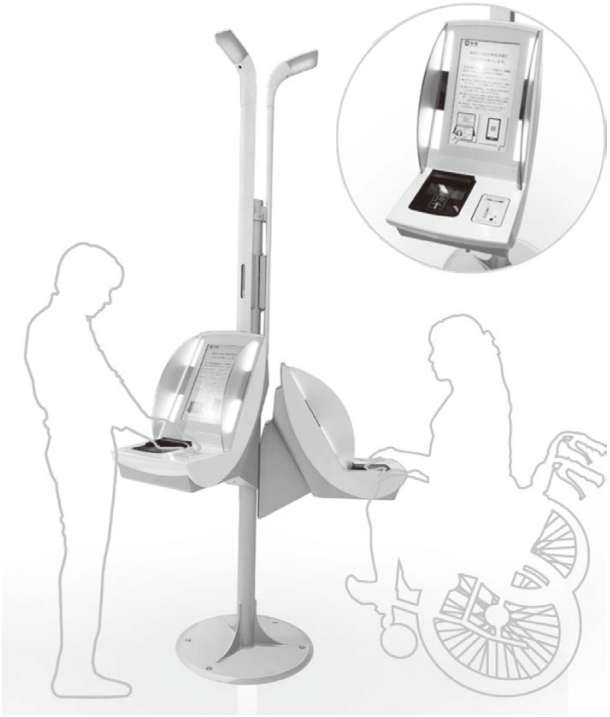

Fig. 3 Electronic Declaration Terminal with barrier-free design.

3.1 Electronic Declaration Terminal

Electronic Declaration Terminals are installed at customs inspection areas at the airport. By scanning their passport and the QR code created with the Customs Declaration App and advancing through the procedure by following the displayed guidance, passengers can complete the declaration procedure at the terminals. During the procedure, the terminal takes a photo of the passenger's face and collates it with the facial image stored in the IC chip embedded in the passport to verify the identity of the subject. The photos taken are used exclusively for identity verification and for face recognition when passing through the gate, and deleted promptly after use.

The Electronic Declaration Terminal features a barrier-free design. With a variable cabinet height and pole-shaped design, the control panel is accessible to all passengers, including children and wheelchair users. Furthermore, voice guidance and animation display are provided during the procedure so that even first-time users can complete the declaration procedure smoothly (**Fig. 3**).

* Passengers may be questioned or have their baggage inspected by Customs officers.

Photo 1 e-Gate.

Photo 2 Pictograph signs on walls and floor surfaces.

3.2 e-Gate

The passenger completes the procedure at the Electronic Declaration Terminal and then advances to the e-Gate. Before reaching the exit gate, another photo is taken of the passenger's face and face recognition is performed, allowing the passenger to pass through the gate smoothly without stopping. The photo taken is used to perform face recognition when passing through the gate and deleted promptly after use (**Photo 1**).

The gate is wide enough for people to pass through with their baggage carts and suitcases. Wheelchair users can also pass through on their wheelchairs. The system can also detect sunglasses and any other items covering the face that can hinder face recognition, and will notify passengers to remove these items so that identity verification can be performed promptly.

Photo 3 Banners and digital signage indicating e-Gate.

3.3 Space design using pictograph signs and other signage

To make it easy for passengers to visually recognize the locations of the Electronic Declaration Terminals/e-Gates and the line of flow, pictograph signs are attached to the walls and floor surfaces (**Photo 2**), banners are hung from the ceilings and guidance is displayed on digital signage (**Photo 3**). These tools are intended to ensure a pleasant experience for all passengers at the e-Gates at customs inspection areas.

4. Incorporated Technologies

The e-Gate incorporates the following NEC technologies.

4.1 World's No.1 face recognition technology

The e-Gate makes use of NEC's world's No.1 face recognition technology[3]. NEC's technology achieved the highest matching accuracy in the Face Recognition Vendor Test (FRVT) 2018 performed by the US National Institute of Standards and Technology (NIST). With an error rate of 0.5% when registering 12 million people, the test results placed NEC significantly ahead of the runner-up (**Fig. 4**).

4.2 Excellent design

The Electronic Customs Declaration Gate was selected as a Good Design Best 100 in the Good Design Award 2019. The e-Gate was highly appraised for its compre-

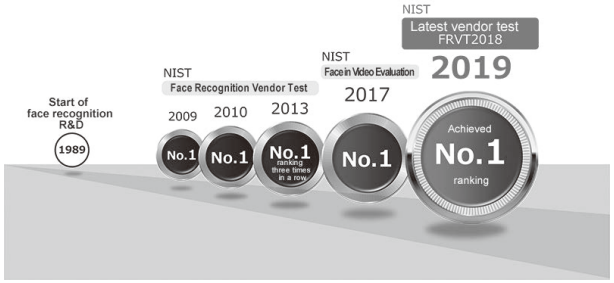

Fig. 4 No. 1 in face recognition accuracy.

Fig. 5 Good Design Best 100 in the Good Design Award 2019.

Fig. 6 iF Design Award 2020.

hensive service design featuring facial recognition that allows procedures to be completed electronically at customs inspection areas (**Fig. 5**). In addition, the e-Gate also won the iF Design Award 2020, which is regarded as the academy awards in the field of design (**Fig. 6**).

5. NEC I:Delight

NEC I:Delight (**Fig. 7**) is a concept that uses biometric authentication such as face or iris recognition as a universal ID, making it possible to offer users a consistent experience by connecting multiple touchpoints and services. Seamless connection of services in various scenarios such as traveling, shopping, and commuting makes it possible to offer a safe, secure, and pleasant experience.

Fig. 7 NEC I:Delight.

In addition, users are able to enjoy a unique experience carefully tailored to suit their tastes and preferences. Each individual exercises autonomous control over their own personal ID and data, while connecting to multiple corporate and local government services to access them.

NEC is committed to delivering these personalized experiences, while also delivering the safe, seamless and secure experience introduced in this paper.

6. Conclusion

The spread of COVID-19 has completely changed the global situation. In the future, more measures against infectious diseases through non-contact and non-face-to-face procedures will be required. In addition, there is a possibility that the number of foreign visitors to Japan will increase in the future due to the increase in the world population, the invitation of tourists to international events, and the decrease in the working population in Japan. NEC aims to leverage the cutting-edge technologies introduced in this paper to evolve and adapt to the changes taking place and Japan and around the world to deliver even better experiences for all.

* QR code is a registered trademark of DENSO WAVE INCORPORATED.
* Wi-Fi is a registered trademark of Wi-Fi Alliance.
* All other company names and product names that appear in this paper are trademarks or registered trademarks of their respective companies.

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https://wisdom.nec.com/ja/feature/smartcity/2020032301/index.html

Face Recognition: Biometrics Authentication
https://www.nec.com/en/global/solutions/biometrics/face/index.html

NEC's airport solution selected for Good Design Best 100 in the Good Design Award 2019 (Japanese)
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