

Touchless Elevator Call Solution and Anti-COVID-19 Measures in China

The outbreak of COVID-19 that began at the end of 2019 was followed by a rapid spread of the disease. Elevators, as one of the necessary tools for residents to move in buildings, are more likely to become hotbeds for virus transmission due to their limited space, closed cage, and large flows of people. How to help people to commute safely and sanitarily via elevators has become a topic of social research. In response to this, Hitachi, based on its excellent technical team and rich market experience, has launched a multi-dimensional touchless elevator call solution that allows the elevator to be used in a variety of ways, including biometric authentication such as voice recognition, smartphones, and QR codes, etc. In addition, Hitachi provides IoT interfaces between elevators and other facilities in buildings, effectively reducing the possibilities of virus spread. The company is the first to propose this sophisticated solution in China, and its innovation has been highly recognized by the society. This article describes the initiatives and development of solutions by Hitachi Elevator (China) Co., Ltd.

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1. Introduction

COVID-19 was confirmed in December 2019 and rapidly spread around the world. The regional and global risk levels were raised to the highest level (“very high”) by the World Health Organization (WHO) in February 2020. It was certified as a “global pandemic” in March 2020. As confirmed by health epidemiologists, COVID-19’s main means of transmission are direct transmission, aerosol transmission, and contact transmission. Contact transmission may cause a virus infection from mucosa transmission when someone comes in contact with respiratory droplets deposited on the surface of an object with their hands, and use their contaminated hands to touch their mouth, nose, or eyes.

Vertical elevators, as the main lift tools in residential buildings, feature limited space, a closed cage, and large flows of people. Viruses can easily adhere to the surface of the elevator control panel, especially the buttons for registering the destination floor. Human machine interface (HMI) operation in elevators requires direct finger contact with the elevator buttons, which can lead to the contact transmission described above.

In the absence of concrete measures to deal with the COVID-19 pandemic, the anxiety of people using elevators in the People’s Republic of China also increased. During the early stages of the COVID-19 global pandemic, it was possible to use indirect contact methods to call the elevator, for example, by using disposable toothpicks, disposable paper towels, or foot-operated equipment. However, those methods cannot substantially eliminate the possibilities of indirect

Figure 1 — Infection Prevention in Elevators in early Stage of Pandemic

The photo shows examples of foot-operated equipment made of wood (left) and operation that uses disposable toothpicks and gloves (upper right and lower right). Both of these methods are intended to prevent virus infection via the hands, but they have problems in terms of aesthetics and waste resources. In addition, the use of disposable toothpicks and gloves is not effective because of the possibility of the virus adhering to them.



virus spread. These measures do not fundamentally dispel people’s anxiety, and using and throwing away the tools used to press buttons is undesirable in terms of environmental protection, as it leads to waste of resources (see **Figure 1**).

To solve this problem, Hitachi launched a touchless elevator call solution to eliminate people’s anxiety and improve their quality of life (QoL).

2. Technical Solution to Prevent Infection

In response to the public’s avoidance of the use of elevators during the COVID-19 pandemic, Hitachi worked to effectively, hygienically, and safely operate elevators to eliminate the possibility of virus contact and infection at different premises, drawing on its technical capacity and experience accumulated over many years. In particular, it uses Hitachi technologies and Tencent Holdings Ltd.’s cloud platform to develop and supply many products and solutions based on big data, Internet of Things (IoT), and artificial intelligence (AI) identification to meet public health and safety needs. This section gives some examples of these solutions and products.

(1) Customized support for commercial buildings and residential buildings

Hitachi provides a variety of elevator call solutions using smartphones, QR codes*, voice recognition and other biometric authentication, integrated circuit (IC) cards, etc. via cloud. It also provides elevator interfaces for building IoT, enabling elevators to interact with access control, building visual intercoms, and big data clouds (see **Table 1** and **Figure 2**). Hitachi is the first company to propose such a multifaceted solution in China and the number of options it offers is the largest in the country.

Especially in the development of voice recognition solutions, Hitachi has collected a large number of voice test samples of different age groups, genders, and scenarios.

* QR code is a registered trademark of Denso Wave Incorporated.

Table 1 — Hitachi Solutions Meets Various Needs

Hitachi Elevator provides touchless solutions to meet the needs of its customers and buildings.

Solutions	Media	Advantages
Cloud elevator call solution	Mobile app WeChat ¹ official accounts	<ul style="list-style-type: none"> • Touchless identification of elevators • Changing destination floor as needed • Easy for big data and IoT management of elevators • Facilitating building IoT management
	Call by QR code on smartphone	<ul style="list-style-type: none"> • Touchless identification of elevators • Changing destination floor as needed
	Call by voice recognition and other biometric authentication	<ul style="list-style-type: none"> • Hands-free authentication • Touchless identification of elevators
	IC card/Smartphone NFC	<ul style="list-style-type: none"> • Touchless identification of elevators • Changing destination floor as needed
	Bluetooth ² on smartphone	<ul style="list-style-type: none"> • Touchless identification of elevators • Changing destination floor as needed
	Intelligent interface linked with building IoT	<ul style="list-style-type: none"> • Realize the interconnection and interaction between elevator and each subsystem of the building
Smart solution linked to robots	Robot interface linked to elevators	<ul style="list-style-type: none"> • Robots independently use elevators • Achieve unmanned delivery

IoT: Internet of Things IC: integrated circuit NFC: near field communication

¹ WeChat is a registered trademark of Tencent Holdings Ltd.

² Bluetooth is a registered trademark of Bluetooth SIG, Inc.

Figure 2 — Elevator Call Using Voice Recognition (Left) and Registration of Destination Floor with QR Code (Right)

The use of voice and QR codes reduces the risk of contact transmission. The system is completely hands-free through voice identification, and allows the user to register the destination floor without pressing the elevator call button by simply scanning the QR code with a smartphone.



Moreover, the company’s hands-free elevator call system, the first of its kind in China, uses voice (without wake-up) to call elevators, and can respond to the variety of local dialects in China. In order to access to international markets, it has also focused on the development of different international voice editions, including English and Japanese.

(2) Delivery by Robots Linked with Elevators

One infection control measure for COVID-19 is the use of robots in transportation and delivery operations. By having robots perform transportation and delivery tasks instead of people, the possibility of people going out and becoming infected can be greatly reduced. However, the robots need to interact with elevators. So, Hitachi developed and designed a smart solution to link robots to the associated elevator linkage interfaces. This enables the robots to independently “use” elevators to achieve intelligent unmanned delivery (express and take-away) to customers on each floor.

Hitachi Elevator has collaborated with several robot manufacturers on the custom development of robot interfaces based on protocols. And it has become one of the

first companies in the elevator industry to open up vertical movement channels for service robots.

3. Promotion and Application of Solutions

With the rapid spread of COVID-19, Hitachi has developed integrated solutions for infection prevention (including design, installation, and use) to meet customers’ urgent needs. Giving full play to the advantages of teamwork, the company has worked hard toward the common goal of infection prevention by providing free promotion and installation support for customers. The first project to implement these solutions was at Xinfugang in Guangzhou and was developed and installed in just one week, receiving high praise from customers. With an excellent team and rich experience in the Chinese market, Hitachi is seriously addressing customer challenges and promoting its solutions as required (see Table 2).

Table 2 — Measures to Introduce and Expand Solution Sales According to the Situation

Hitachi Elevator (China) is implementing sales promotion measures for elevators in each market, such as existing and new installations. Considering the current state of the COVID-19 pandemic, the company is promoting sales both online and offline.

Market	Situation	Implementation
Retrofitting	<ul style="list-style-type: none"> • Users are eager to realize touchless elevator call function for existing elevators as soon as possible • Eliminating probability of infection from touching buttons as soon as possible 	<ul style="list-style-type: none"> • Coordinate with relevant departments • Take safety measures during operation • Carry out standardized retrofitting according to customer demands • Deliver for use as soon as possible
Optional functions for new elevators	<ul style="list-style-type: none"> • Adding touchless elevator call function subsequently according to scenarios • For convenience of subsequent use and for public health and safety 	<ul style="list-style-type: none"> • Cooperate with sales department and honestly recommend different solutions as required • Integrate elevator into building IoT and big data systems
Marketing and promotion	<ul style="list-style-type: none"> • Unable to conduct field promotion activities under the pandemic • Customers’ insufficient understanding of innovative products in the market 	<ul style="list-style-type: none"> • Take the initiative to contact real estate companies • Promote the solution and products online • Cooperate with real estate companies for offline promotion

4. Conclusions

The COVID-19 pandemic has significantly changed people's way of living and behaviors in public spaces. A COVID-19 infection makes people feel horrible. In order to meet societal needs, Hitachi will always take advantage of technology integration as One Hitachi to improve people's QoL and the resilience of urban development.

By responding to the needs of society at an early stage, Hitachi Elevator (China) has provided concrete measures to prevent infection in elevators, facilitated their wide use by customers, and has become a good example of infection control in elevators. The company will continue to contribute to controlling the COVID-19 pandemic and making the world more vibrant through its Social Innovation Business.

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Building Market Department, Hitachi Building Technology (Guangzhou) Co., Ltd. *Current work and research:* Solution planning for elevators and escalators.