Where Robots Meet Passengers

ICN’s AI-Powered Airport of the Future

Incheon Airport

Incheon Airport

INDEX

ICN's AI-Powered Airport of the Future

1. Why Robot?

Incheon Airport

Background of Robot Introduction at Incheon Airport

Enhancing Airport Operations and Passenger Service Innovation through Robotics

Problem

Surge in Passenger Demand

- ✓ Rapid recovery of passenger traffic
- ✓ Lack of facilities to accommodate the sharp increase in travelers

Infrastructure and Resource Limitations

- ✓ Physical and time constraints in expanding airport facilities
- ✓ Difficulty in securing skilled airport operations staff
- ✓ Inefficiencies in labor-intensive service models.

Strategic Solution
to Ease Congestion and Maintain Service Quality

Solution

Adoption of Unmanned and Automated technologies

- ✓ Leveraging robotics to improve operational efficiency and innovate passenger services
- ✓ Reducing human error to deliver consistent, high-quality service.

2. Current Deployment & Key Achievements

Incheon Airport

Key Robot Services at Incheon Airport

Deployment of robots across various areas, including passenger services, airport operations automation, and staff support.

Guide Robots
(Jul 2018)

Wearable Robots
(Sep 2020)

Cart Robots
(Oct 2020)

Quarantine Guide Robots
(Jul 2021)

Disinfection Robots
(Jul 2021)

Delivery Robots
(Jul 2022)

Cleaning Robots
(Oct 2022)

Patrol Robots
(Dec 2024)

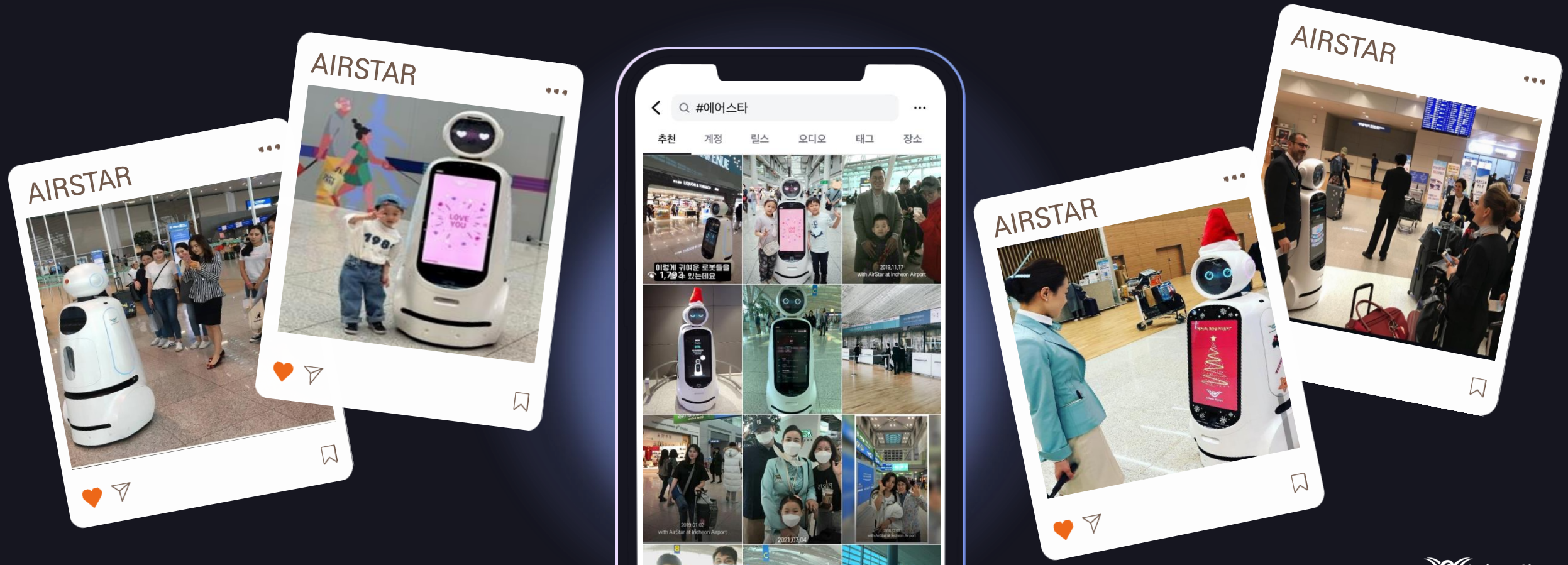
EV Charging Robot
(Apr 2025)

Guide Robot “AIRSTAR”

Provides a wide range of passenger-oriented services,
including facility information and wayfinding within the airport.

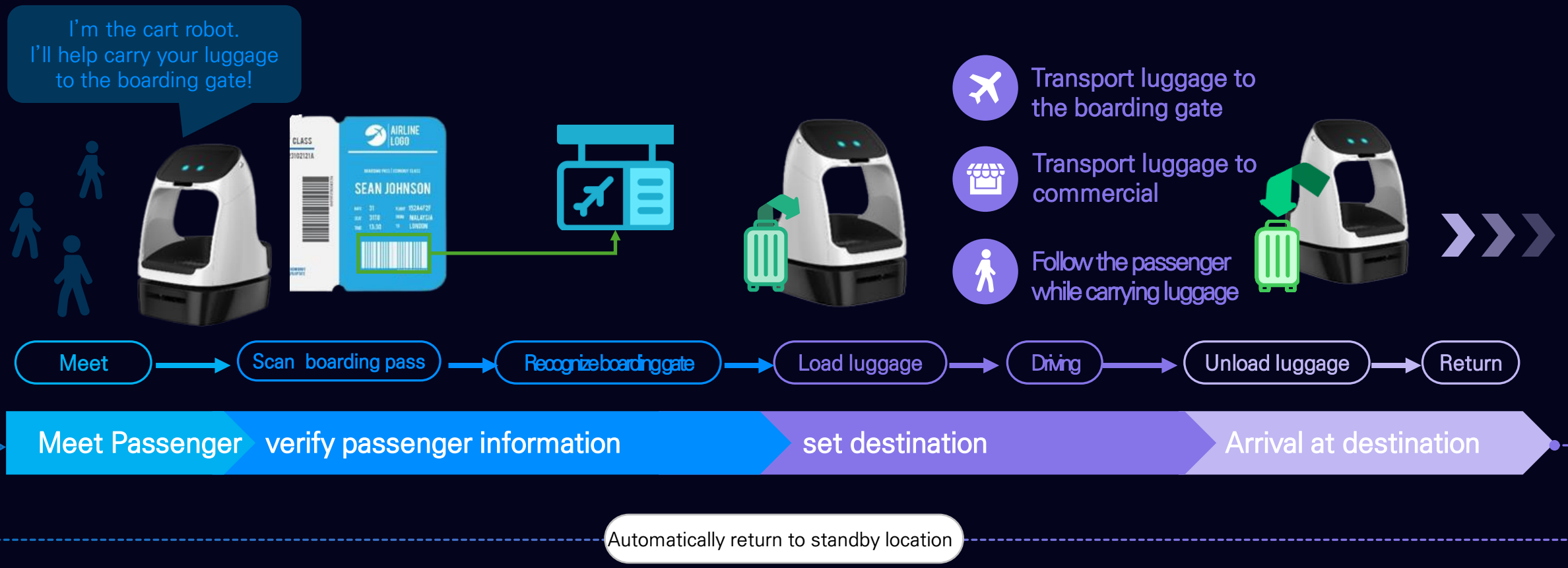
	L/S Departure Robot	A/S Departure Robot	Arrival Robot
Signage Services	▪ Security Screening Guidance ▪ Inform passengers about prohibited items	▪ Boarding Guidance by flight ▪ Facility location information	▪ Baggage Claim Guidance ▪ Customs Information ▪ Quarantine Information.
Escort Services	▪ Landside Departure Hall	▪ Airside Departure Hall	▪ Airside Arrivals Hall
Barcode-Based Services	▪ Check-in Counter Guidance	▪ Boarding Gate Guidance	▪ Carousel Guidance
Photo Taking	▪ For you/ With Robot	▪ For you/ With Robot	X
Other Services	▪ Collecting prohibited items. ▪ Providing destination weather	▪ Providing destination weather	▪ Recommending public transportation routes

Friendly design and warm service have made it a beloved mascot of Incheon Airport.



Cart Robot “AIRPORTER”

Transports carry-on baggage and other items
from the terminal’s duty-free zone to the boarding gate



Offers wayfinding and luggage transport/storage services for passengers with reduced mobility, helping to ease the burden of carrying heavy baggage.

Quadruped Robots “AIRBOT & STARBOT”

Operate in various environments using additional equipment such as cameras and robotic arms.

Passenger Services

- ✓ Support major events and activities
- ✓ Provide entertainment, such as performances and exhibitions, at passenger touchpoints

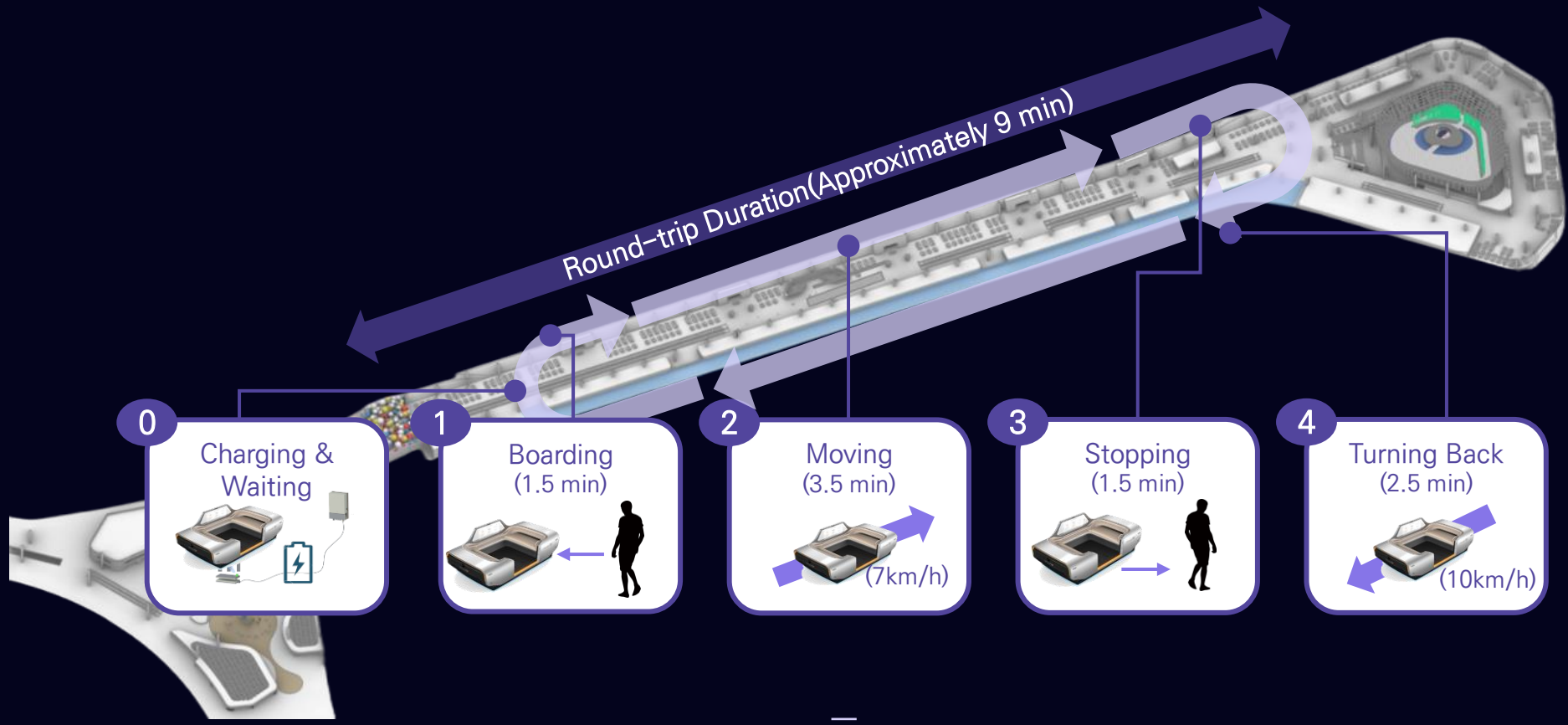
Security

- ✓ Unmanned patrols using AI video analytics.
- ✓ Provide remote support for EOD operations and
- ✓ inspections using robotic arms, sensors, and other equipment.

A special exhibition featuring a quadruped robot that draws pictures and interacts with passengers.

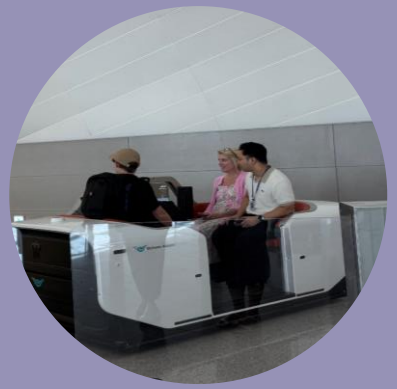
Autonomous Mobility “AIRRIDE”

A four-seater autonomous mobility vehicle
designed to assist passenger movement across the expanded terminal.



Providing support for quick and convenient travel across long-distance sections within the airport

Passenger #1



It's so much more comfortable and faster than walking, I'm really enjoying it.

Passenger #2

I had a lot of luggage and was worried about getting around, but it was so easy to use.

Passenger #3

I kept exclaiming in amazement because it's so fascinating to see it move.

Passenger #4

It felt like riding an amusement park ride, truly amazing

3. Next-Gen Robot Introduction Plan

Incheon Airport

New Robot Introduction Plan

Deployment of 31 units across 3 robot types,
including guide/patrol robots, docent robots, and self check-in robots.

Guide/Patrol Robots

- ✓ Multilingual interactive services.
- ✓ Facility and flight information provision.
- ✓ Congestion monitoring and personalized route guidance.
- ✓ Multi-functional robots capable of both guidance and patrol tasks.

Docent Robots

- ✓ Provide cultural and art exhibition guidance inside the terminal.
- ✓ Offer multilingual interactive docent services.
- ✓ Deliver personalized docent experiences.
- ✓ Provide exhibition statistics and analytics functions.

Self Check-in Robots

- ✓ Provide mobile check-in services.
- ✓ Issue boarding passes and bag tags.
- ✓ Relocate according to congestion levels.
- ✓ Help reduce congestion in the departure hall.

Guide/Patrol Robots

Smarter,
Multi-Role in One!
Expanding Robot Utilization

Guide Mode

- ✓ Provide natural, multilingual, interactive guidance based on AI voice recognition.
- ✓ Offer personalized services, from airport arrival to escort.

Patrol Mode

- ✓ Transmit real-time on-site footage during events or incidents.
- ✓ Deliver emergency alerts and essential information through the robot.

Docent Robot

Introduces exhibition spaces and artworks,
providing personalized docent services in multiple languages.

Encourages exhibition

- ✓ Encourages exhibition viewing through both screen and voice guidance

Exhibit Guidance

- ✓ Provides docent explanations for artworks in each exhibition space
- ✓ Offers guidance in four or more languages.

Additional Functions

- ✓ Provides statistics on docent service usage.
- ✓ Offers a photo-taking function.

Self Check-in Robot

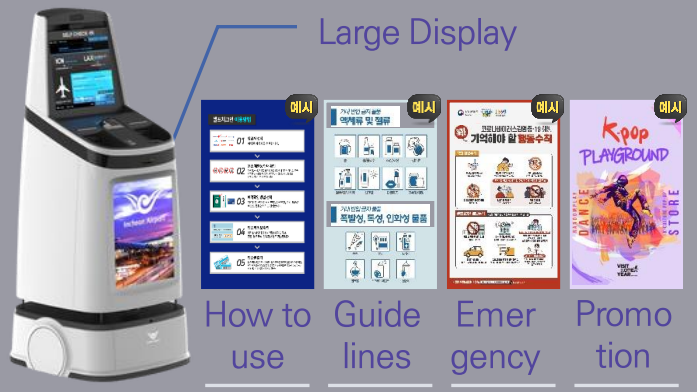
"No-queue airport": Provides a mobile, autonomous-driving self check-in service that comes to the passenger.

Interactive Check-in Service

- ✓ Integrates with existing self check-in systems to offer a quick and easy check-in process.

Airport Information Guidance

- ✓ Uses a large display to provide various information.



Congestion Reduction

- ✓ Provides mobile check-in services based on demand to help reduce congestion.

Evolving into a Future-Oriented Digital Airport Model that Designs Human Experiences through Robotics

Phase 1 2018~2021
Familiarization Phase

Goal Build positive feelings toward robots.

Service Guide Robots

Impact Reduce resistance to robots by positioning them not as "technology" but as "friendly companions."

Phase 2 2021~2024
Assistnace Phase

Goal Use robots to address passenger inconveniences and operator challenges.

Service Cart Robot, Quarantine Guide Robots, Disinfection Robots

Impact Enhance convenience for passengers with reduced mobility. Reduce waiting times and stress. Relieve staff workload, improving operational efficiency.

Phase 3 2025~
Peronalized Care Phase

Goal AI-Powered Personalized Services Robots proactively offer suggestions and predictions

Service Guide/Patrol Robots, Docent Robots, Self Check-in Robots.

Impact Improve perceived service quality for passengers. Strengthen airport competitiveness and brand.

4. Intelligent Integrated Management System

Incheon Airport

5G Digital Twin-Based Integrated Control Platform

- ✓ Built on ultra-low latency and ultra-high-definition 5G wireless communication.
- ✓ Applies virtual and immersive digital twin technology.
- ✓ Enables integrated management of all mobile units within the airport (robots, autonomous vehicles, etc.).

Private 5G Wireless Network

- ✓ Utilizes an ultra-fast, broadband wireless network.
- ✓ Supports transmission of large-volume data, including real-time video.

Digital Twin-Based Integrated Control Platform

- ✓ Provides integrated monitoring and control.
- ✓ Delivers an intuitive control view through a 3D-based control environment.

Robot, Autonomous Mobility

Operates a wide range of devices, including robots, autonomous vehicles, CCTV, and IoT devices.

Implementation of a digital twin-based intelligent mobility integrated control platform.

With broader device integration and application coverage

Advancing digital twin technology to enable DX-based integrated control

Control Scope Expansion

Expand service areas and targets for proactive, predictive responses to future scenarios.

+

Infrastructure Expansion

Extend integration to robots, autonomous mobility, IoT, CCTV, and more via standardized device interfaces.

5. Future Roadmap & Expected Impact

Incheon Airport

Future Implementation Plan

Before

Airport Operations Support

Robots are added to the existing airport operations framework to partially support specific roles.

- ✓ Improve efficiency in designated tasks such as guidance, baggage transport, and cleaning.
- ✓ Robots operate independently while partially interfacing with the existing operations system.

After

Robot-Integrated Airport

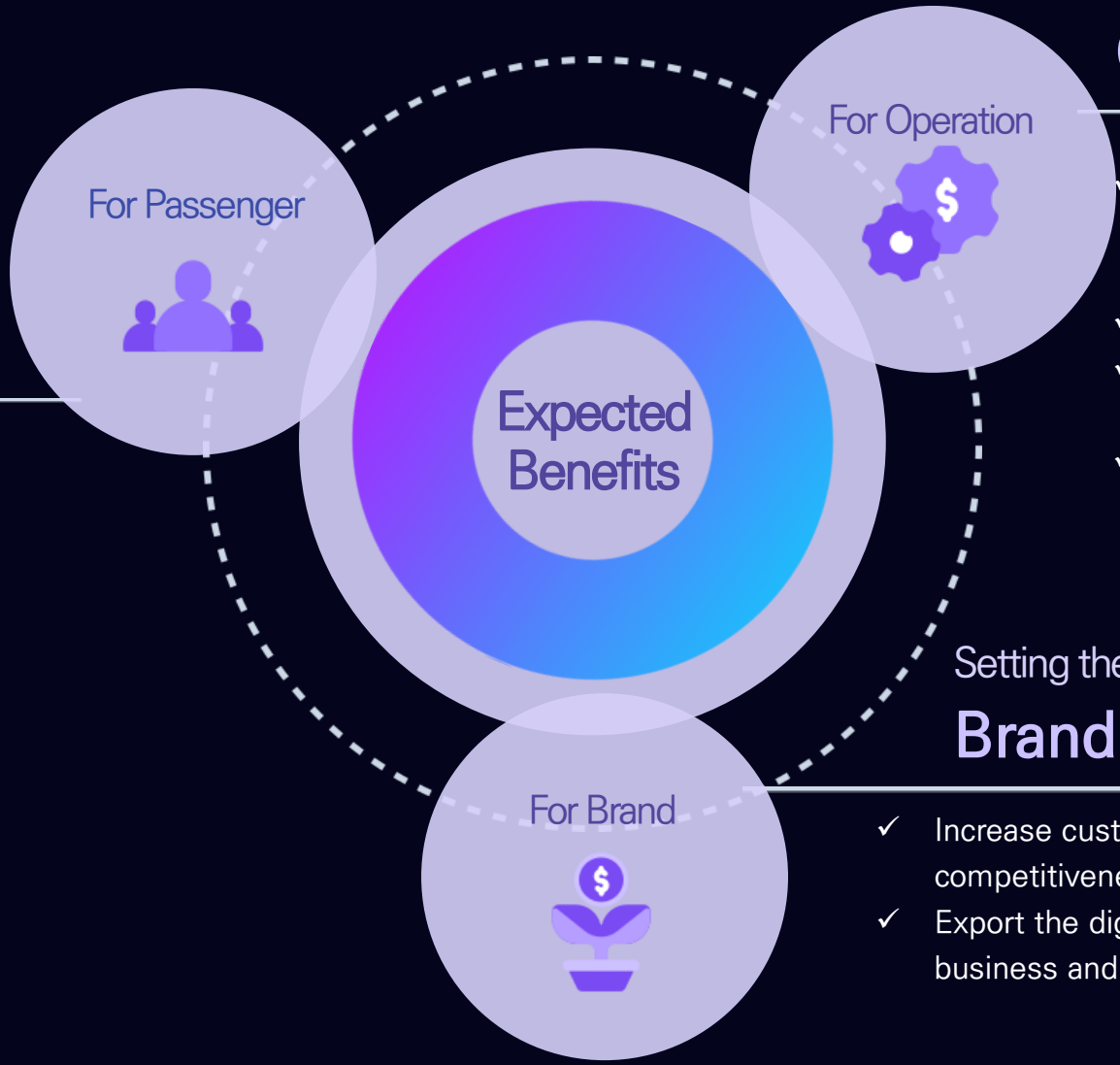
Robots are embedded within airport facilities, making automation and unmanned operations a core part of overall airport management.

- ✓ Robots across all airport sectors function as part of a single integrated system, sharing and coordinating roles organically.
- ✓ he boundary between humans and robots becomes blurred, with services operating seamlessly in the background.

Transforming Robots from
'Tools' into Part of the 'Airport'

Customer Experience Innovation

- ✓ Reduce waiting times and ease congestion through immigration and departure support.
- ✓ Improve service accessibility for passengers with reduced mobility, enhancing overall convenience.
- ✓ Provide AI-powered personalized services.
- ✓ Eliminate language barriers with multilingual support.



Efficiency Through Centralized Control

Operational Efficiency

- ✓ Allow human resources to focus on high value-added tasks, optimizing operations and reducing costs.
- ✓ Provide uninterrupted 24/7 service.
- ✓ Enable rapid emergency response through remote robot operations.
- ✓ Support high-risk tasks, improving working conditions.

Setting the Global Smart Airport Standard

Brand Value Enhancement

- ✓ Increase customer loyalty and strengthen competitiveness through improved service quality.
- ✓ Export the digital airport model, fostering overseas business and building international cooperation networks.

6. Conclusion

Incheon Airport

Incheon Airport is redefining the airport experience with robotics and automation

Moving beyond Innovation to Create a New Paradigm

Combining AI, 5G, and IoT, it is building a next-generation digital airport ecosystem that enhances both operational efficiency and customer experience.


Thank you
Incheon Airport
Incheon Airport