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# SERVICE ROBOT SOLUTION FOR HOSPITALITY INDUSTRY

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# Enhancing Hospitality Operations with Automation

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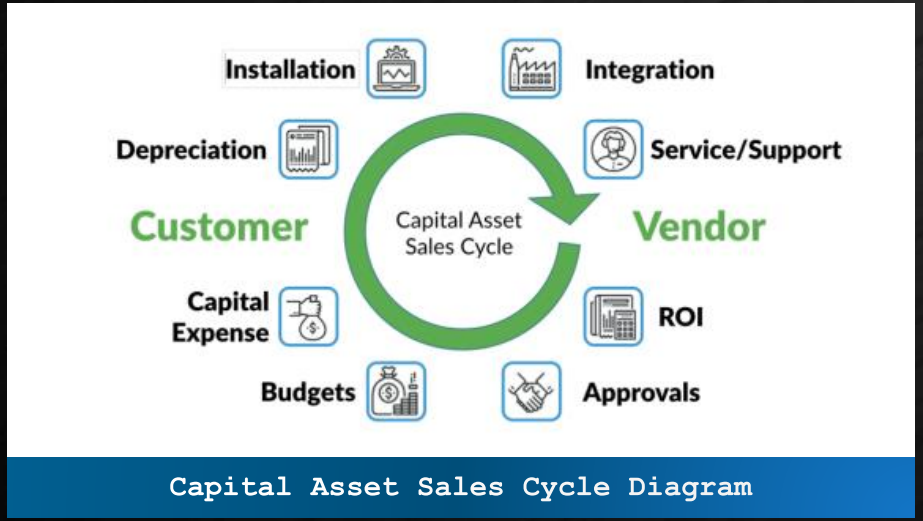
# 01

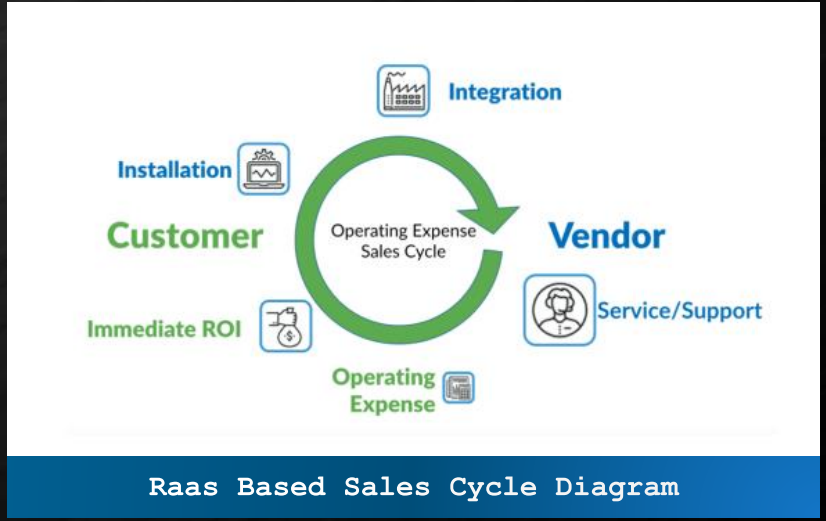
# ROBOT RELATED TERMS

# RAAS

***Robot as a Service (RAAS)*** *is a completely innovative robot application model that began to emerge in the early 21st century with the development of machine vision and the proficiency of mechanical automation. It is especially suitable for businesses that lack manpower but want to increase efficiency. It is the most efficient business model for network applications. For more than 30 years, the robotics market has operated on the "classic" product design and sales business model. Under this sales strategy, new products are developed to meet market demand, then marketed and sold to target customers as valuable assets. As a customer, he owns the equipment, depreciates the equipment as a fixed asset during its service life, and is responsible for the maintenance and repair of the equipment during the service life of the equipment. At the end of product life, he is also responsible for disposing of obsolete equipment. In a Robotics-as-a-Service contract, the customer pays only for what is consumed, and all deployment, integration, support and equipment maintenance costs are covered in the service level contract. As with any subscription business model, customers will get better prices by entering into long-term contracts with RaaS providers.*




Capital Asset Sales Cycle Diagram




Raas Based Sales Cycle Diagram

# ROS

***ROS (Robot Operating System)*** *is a software framework for creating robot applications. Its main purpose is to provide functions that can be used to create robot applications, and the created applications can also be reused by other robots. ROS consists of a series of software tools, software libraries, and software packages that simplify robot software development.*

Composition of ROS

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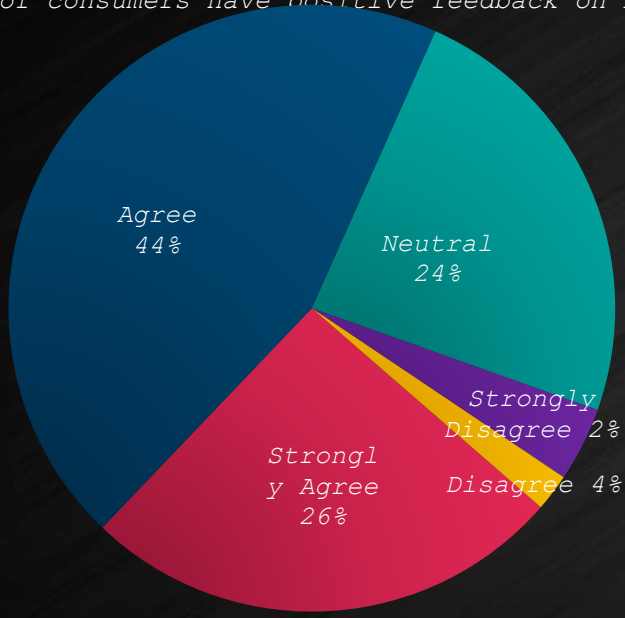
# 02

# ROBOTIC SOLUTION FOR HOSPITALITY

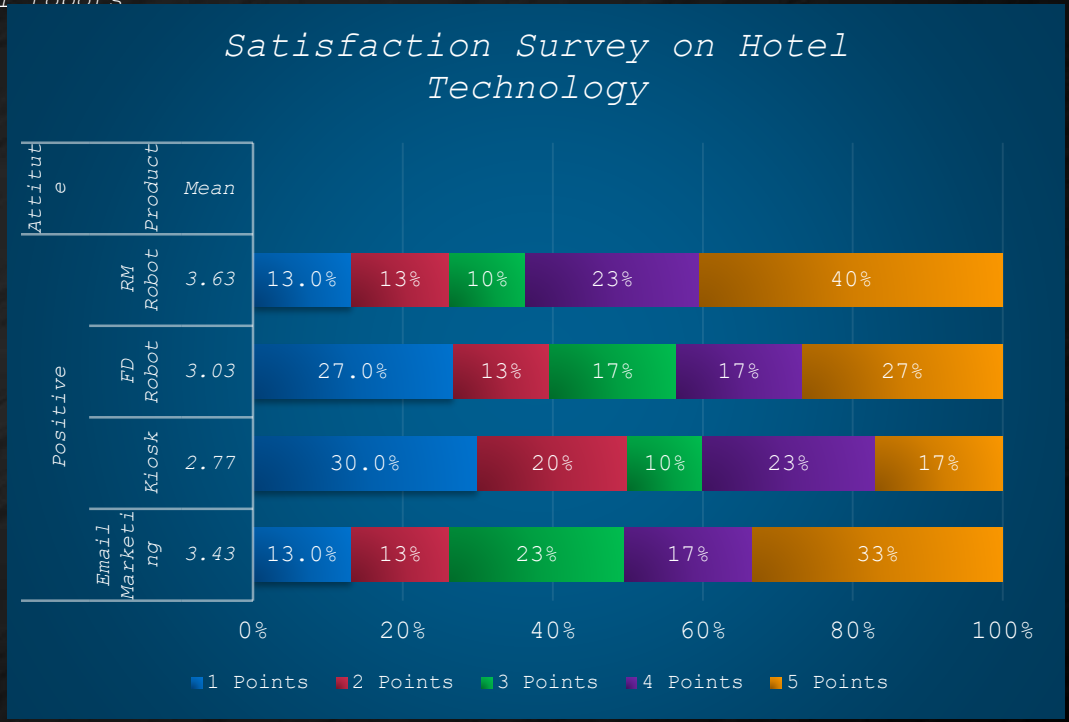
# CONSUMERS 'CHOICES OF HOTELS IN THE WAVE OF DIGITALIZATION REVOLUTION

Consumers start to cast importance on the hotel technology application under the effect of digital transformation. As shown by the investigation, 71% of consumers have preference for hotel technology while 60+% of consumers have positive feedback on hotel robots




Survey on Consumer Acceptance of Intelligence Technology in Hotels

- Data source: Skift and Oracle Hospitality survey on customers




- Data source: Michael Jae-Yoon Chung's online survey data presented in the IEEE Forum

# CURRENT BUSINESS PROCESSES OF HOTELS

# CURRENT CHECK-IN PROCESS OF HOTELS

**Welcome & Guiding**

The staff at the entrance of the hotel welcomes the guests and guide them to reception

**Check-in**

The receptionist checks the guests' booking info and their personal info

**Go to the Room**

Guests get the room card/key from the reception and go to the designated room

# CURRENT DELIVERY PROCESS OF HOTELS

*Guest*

*Call the Reception to Request Delivery Service*

***Receptionist***

*Answer the Phone to Get the Delivery Request*

***Housekeeping Attendants***

*Get the Call from Receptionist, Fetch Items and Take Elevators to Customer's Room*

***Housekeeping Attendants***

*Return to the Housekeeping Room*

# CURRENT CLEANING PROCESS OF HOTELS

Cleaner

Gets the broom, mop & vacuum cleaner from the housekeeping room

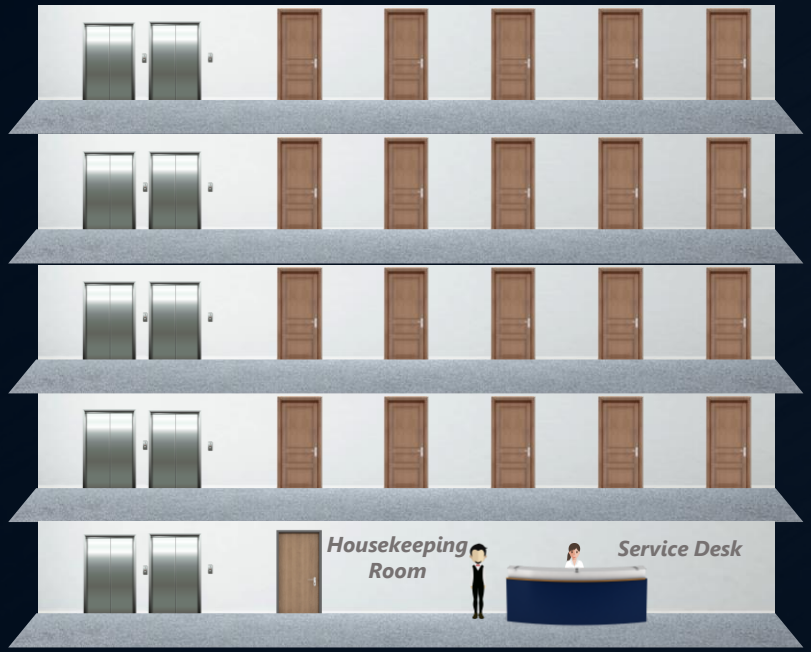
**Cleaner**

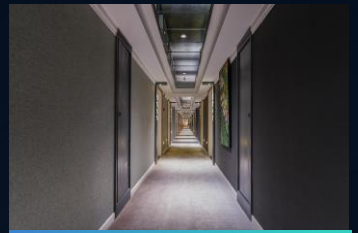
Cleans the lobby of the hotel

**Cleaner**

Cleans the corridor of each floor in the hotel

# TYPICAL LAYOUT OF HOTELS

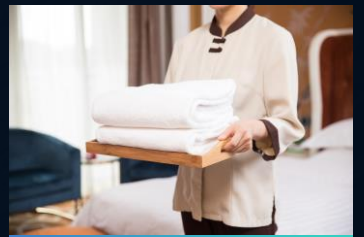


Long Delivery Distance

Room No. is large

There are multiple floors



High Demand for Room Service

Value Service Processes

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# ROBOTIC SOLUTION FOR HOTELS

# OVERALL SOLUTION DESIGN FOR CHECK-IN IN HOTELS

Welcome Function

Welcome to **Hotel,
Let me introduce hotel to you…
If you want to Check-in,
Pls touch my screen and
choose destination

Guide the guests to Reception

Staff chooses "Elevator" as the destination

The robot guide the guests to take the elevator

The robot goes back to the entrance and wait for next task

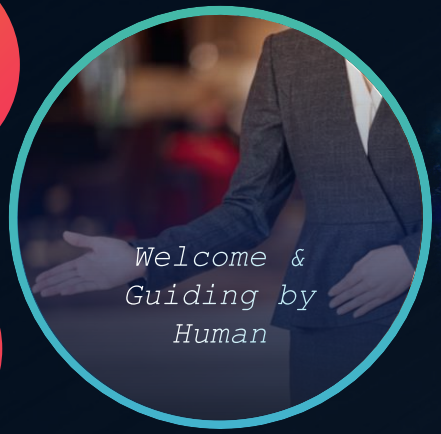
# SOLUTION FOR CHECK-IN CURRENT SERVICE VS. ROBOTIC APPLICATION

Multiple Round Trips

More Cost for training

The distance is quite long

Long Waiting Time for Guests




VS

No Cost for Training Staffs

Save Time

Improve Customer Satisfaction

Improve Serving Speed

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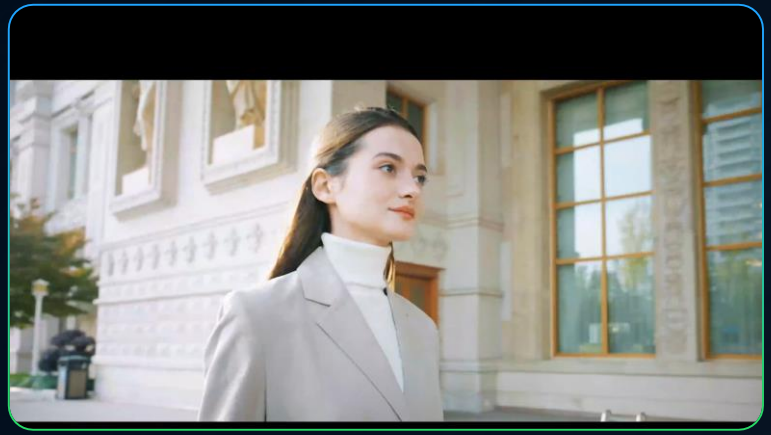
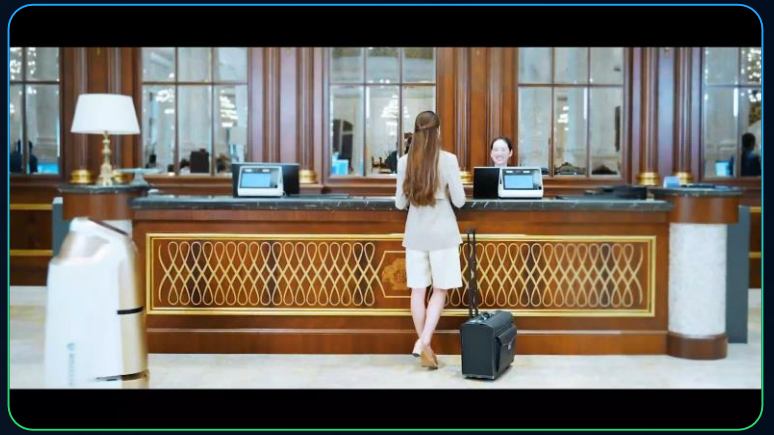
# SOLUTION FOR CHECK-IN INTELLIGENT WELCOME & GUIDING FUNCTIONS



Welcome Function



Guiding Function

Saving Huge Labor for Hotel Staffs

# OVERALL SOLUTION DESIGN FOR ITEM DELIVERY IN HOTELS

Requests from guests

The staff put the item in and set the robot

The robot plans the route

The robot rides the elevator

The robot informs the guest

The guest takes the item

Continue delivering or return

# SOLUTION FOR ITEM DELIVERY

## CURRENT SERVICE VS. ROBOTIC APPLICATION

Multiple Round Trips

Need Staffs to take shifts for delivery

The distance is quite long

Long Waiting Time for Guests

VS

Save Time

Less staff involvement

Improve Serving Speed

Improve Customer Satisfaction

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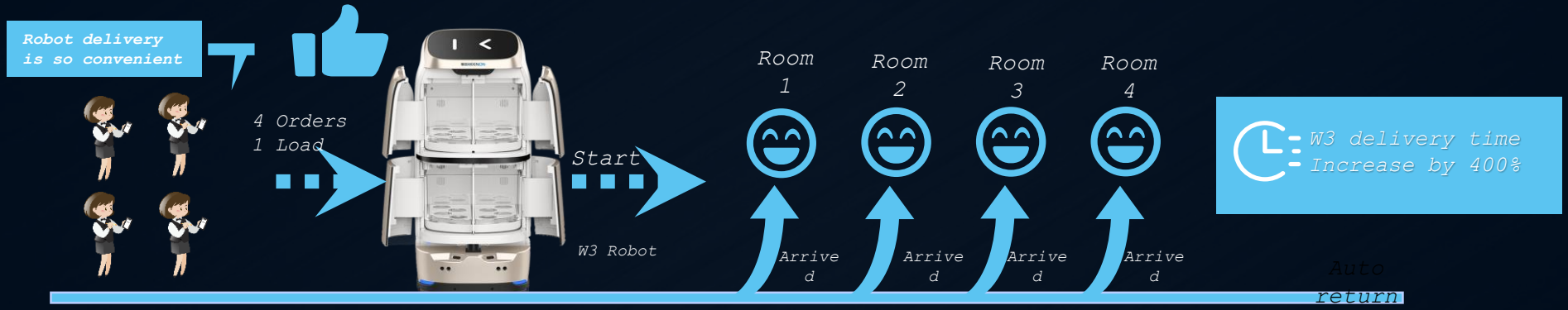
# SOLUTION FOR ITEM DELIVERY

EXTRA LARGE DELIVERY SPACE

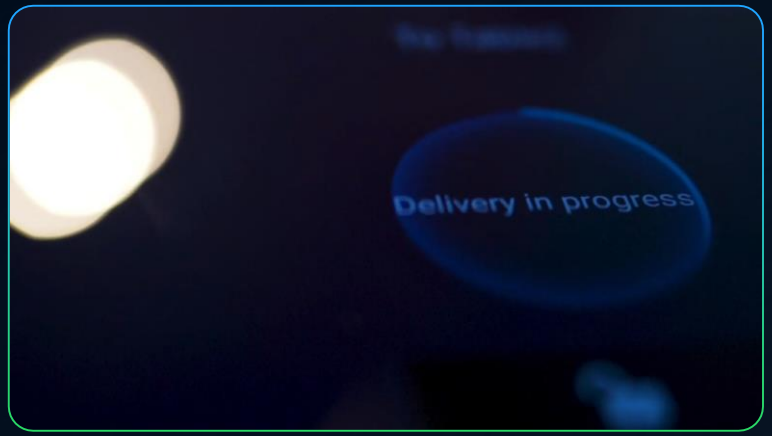
Large Delivery Space, High Delivery Efficiency

# SOLUTION FOR ITEM DELIVERY MULTI-POINT DELIVERY




One Trip for Multiple Rooms, No More Waiting

# SOLUTION FOR ITEM DELIVERY ADVANCED CORE TECHNOLOGY




Intelligent Obstacle Avoidance

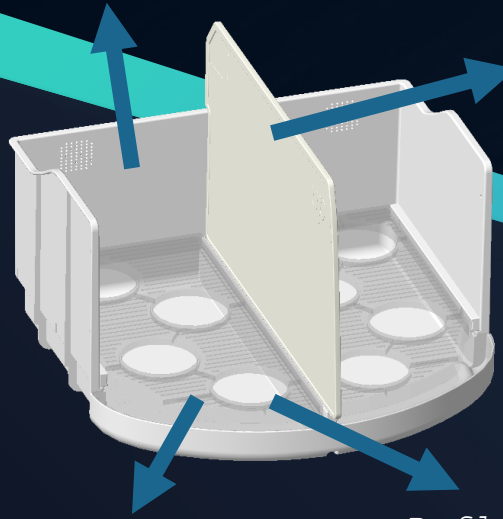
Smooth Scheduling for Multiple Robots

Multiple robots run together smoothly, Worry-free

## SOLUTION FOR ITEM DELIVERY

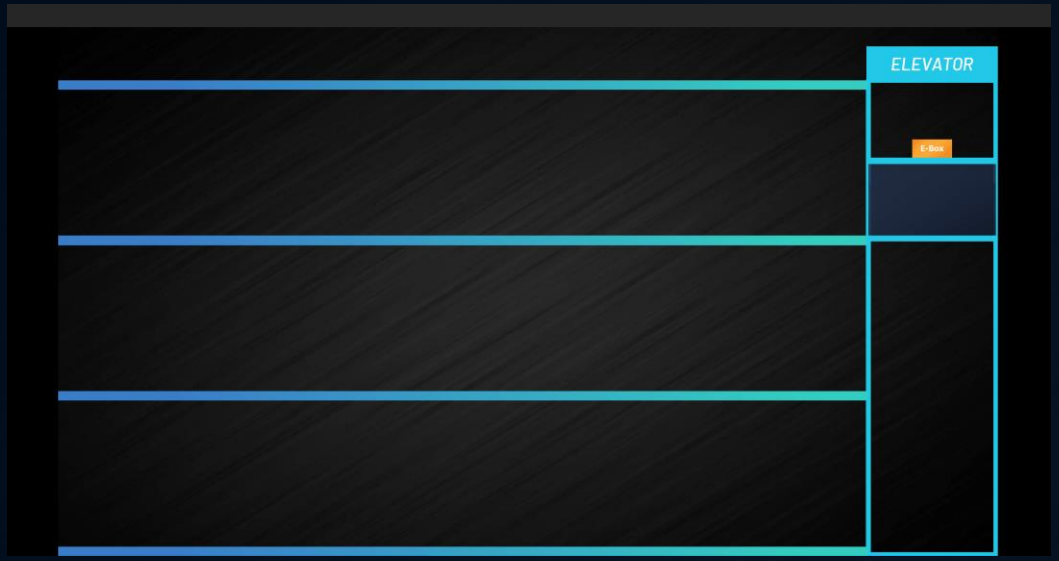
ROBOT COMES WITH FULL ACCESSORIES

# Open drinks are prone to spilling when the robot is running



# Use Cup Holder to Effectively Avoid Spillage

# SOLUTION FOR ITEM DELIVERY GLOBAL IOT




Automatically Elevator Taking

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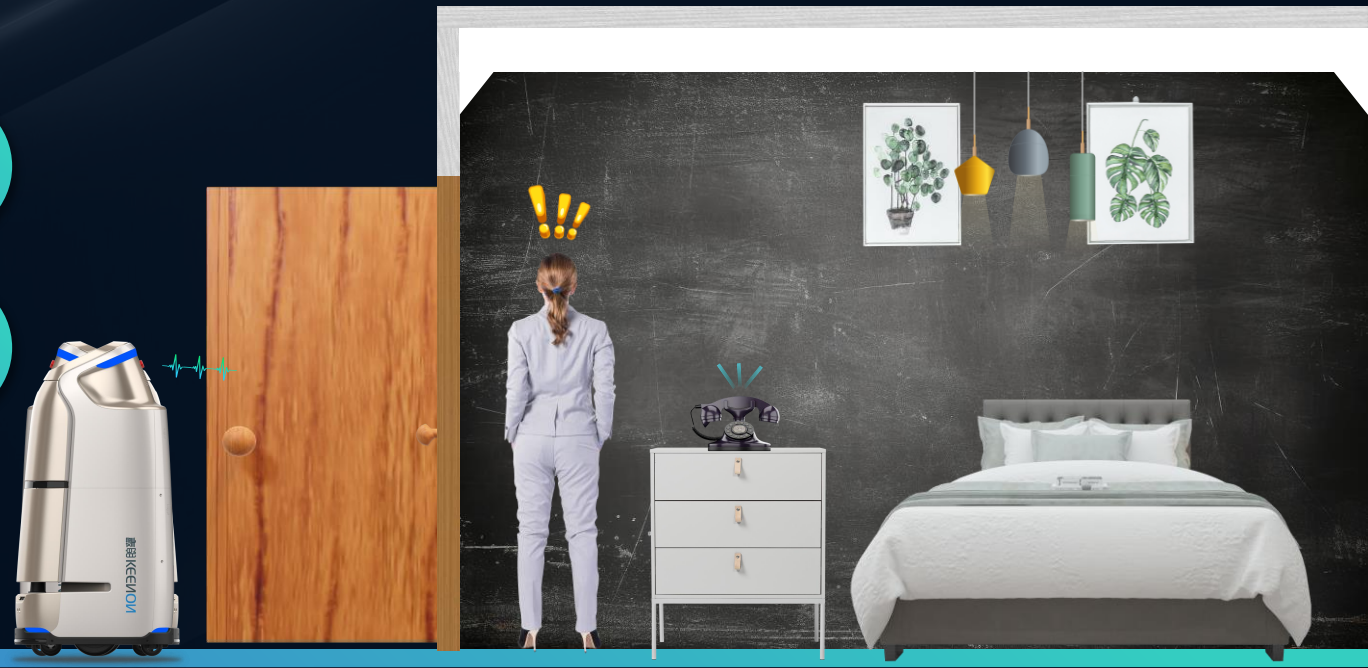
# SOLUTION FOR ITEM DELIVERY MULTIPLE NOTIFICATION WAYS

## KEENON T-Box solution triggers the landline

EASY TO USE

SIMPLE CONFIGURATION

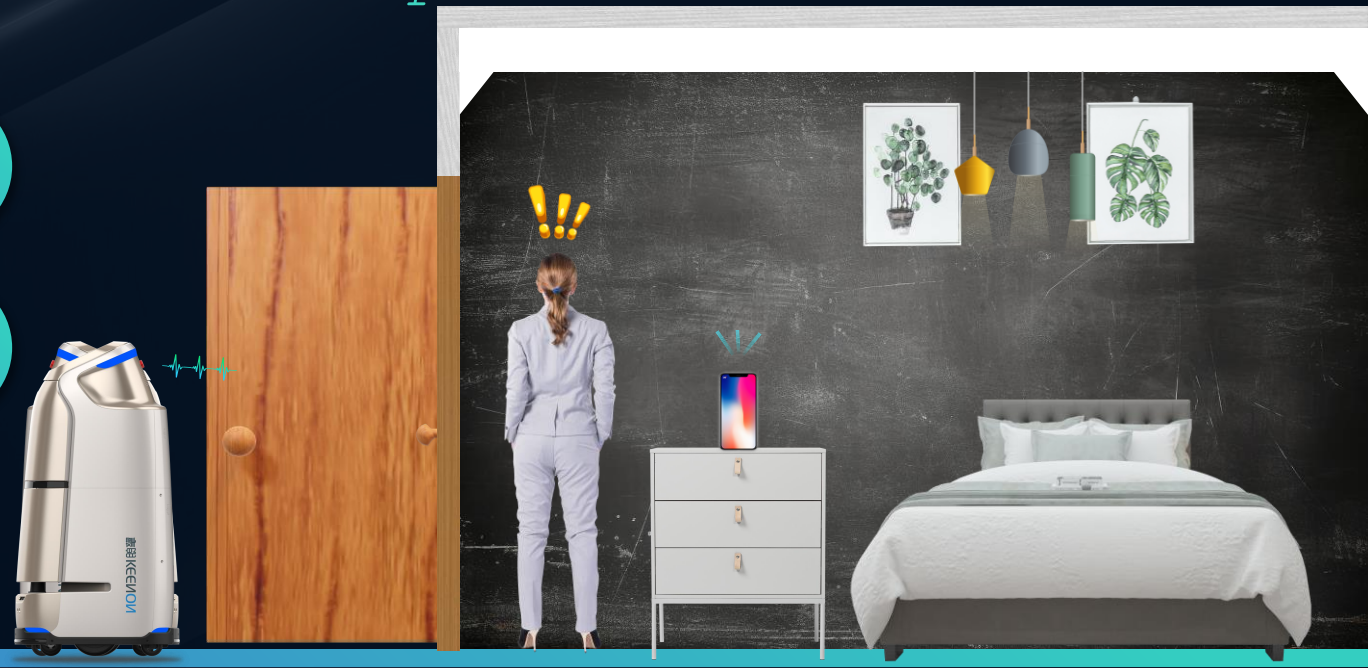


# SOLUTION FOR ITEM DELIVERY MULTIPLE NOTIFICATION WAYS

## KEENON & Carrier solution triggers the cell phone

EASY TO USE

SIMPLE CONFIGURATION

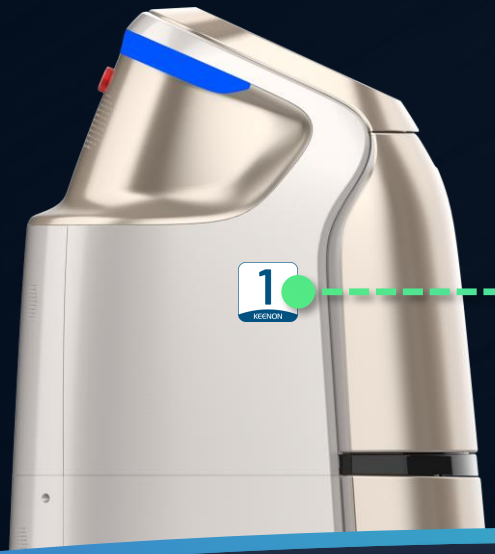


# SOLUTION FOR ITEM DELIVERY

ROBOT NUMBER STICKERS ENSURE ORDERLY OPERATION

Help Staffs to Identify Robots

Help Staffs to Efficiently Allocate Tasks




Robot Number Sticker

Accurate Allocation, Reducing Chaos

# SOLUTION FOR ITEM DELIVERY OPERATION GUIDE

# Operation Guide for Item Delivery Robot

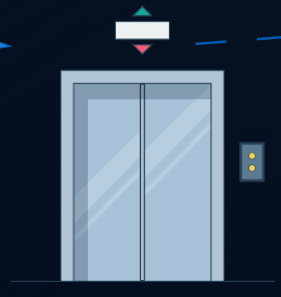
# OVERALL SOLUTION DESIGN FOR CLEANING IN HOTELS

Scheduled Tasks are set in the robot

*The robot plans the route*

*The robot cleans the hotel lobby*

*The robot rides the elevator*



*The robot cleans the corridor*

*The robot returns to the charging pile automatically*

# SOLUTION FOR CLEANING PAIN POINTS & DIFFICULTIES

Cost huge labor for cleaning

Need Staffs to Take Shifts Everyday

The area is quite large

Affect the Beauty of the Hotel

VS

Save Labor

Less Staff Involvement

Improve Hotel Environment & Attract More Customers

Increase Cleaning Speed

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# SOLUTION FOR CLEANING CUTE & FRIENDLY DESIGN

## AN ADORABLE AND CAPABLE CLEANING ASSISTANT

CUTE

FRIENDLY

CAPABLE

# SOLUTION FOR CLEANING 3 IN 1 PROCESSIONAL CLEANING

VACUUMING

11000 Pa

Suction Power

SWEEPING

2 X 1 X

Side Brushes Rolling Brush

DUST PUSHING

0.8 kg

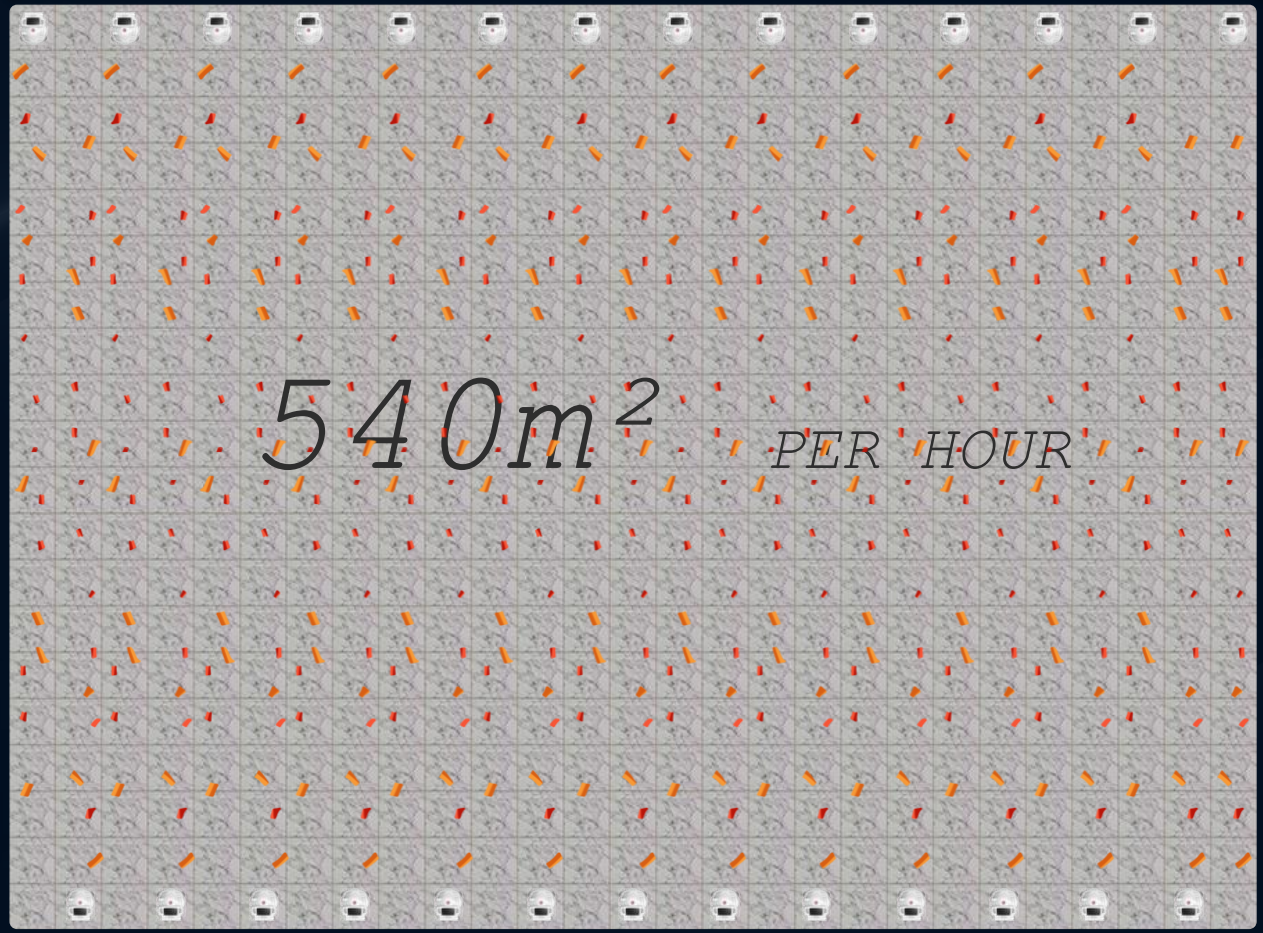
Downward Pressure

## 3 IN 1, Powerful Function & High Cleaning Efficiency

# SOLUTION FOR CLEANING

HIGH CLEANING EFFICIENCY

27m



20m

540m²

PER HOUR

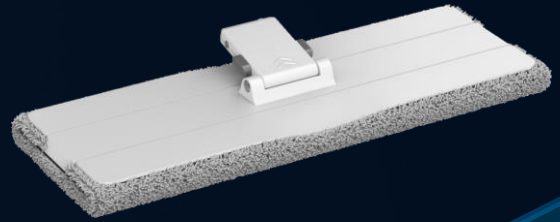
1500m²

PER TASK

# SOLUTION FOR CLEANING SUITABLE FOR VARIOUS FLOORS

## EASILY CLEAN FLOORS
## WITH A WIDE VARIETY OF MATERIALS

0.8 kg
Downward Pressure



Tile Floor

Wooden Floor

Carpet

Marble Floor

Hard Ground
•••

# SOLUTION FOR CLEANING MULTI-SENSOR & SAFETY CARE

EMERGENCY SENSING STRIPE

THREE STEREO VISIONSENSORS

WIDE RANGE LiDAR

# SOLUTION FOR CLEANING SUPPORT TAKING ELEVATOR

## MULTI-FLOOR CLEANING IN ONE TASK

## SUPPORT ELEVATOR RIDES

### ELEVATOR

# SOLUTION FOR CLEANING INTUITIVE & CONVENIENT OPERATION INTERFACE

- Easy To Switch Multiple Modes
- Easy To Schedule Tasks
- Visual Display Of Task Status
- Easy For Map Building

## C30

CLEANING ROBOT

# SOLUTION FOR CLEANING REMOTE MANAGEMENT

## CLOUD MANAGEMENT APP

- Cloud Account Management
- Add and Manage Robots
- Create and Start Cleaning Task
- Maintenance Reminder and Upgrade
- Task Status and Remote Control
- Task Data Statistics

# 04

# KEY POINTS FOR DEPLOYING ROBOTS IN HOTELS

# KEY POINTS FOR DEPLOYING ROBOTS ENVIRONMENT REQUIREMENTS

Slope ≤ 5°

Ridge ≤ 15mm

Gap ≤ 30mm

Avoiding Robot Access through Tags & Restricted Areas in the Map

# KEY POINTS FOR DEPLOYING ROBOTS ENVIRONMENT REQUIREMENTS

Tile Floor

Wooden Floor

Carpet

Marble Floor

Robots can adapt to various types of ground environments, including ceramic tiles, wooden floors, hard carpets, marble floors, etc.

# KEY POINTS FOR DEPLOYING ROBOTS *POINT DEPLOYMENT*

## W3 Robot for Welcoming & Guiding

*Origin: Facing directly to the entrance with a distance of around 2-3m*

*Charging point: As close as possible to the power outlet, with an open surrounding environment*

# KEY POINTS FOR DEPLOYING ROBOTS *POINT DEPLOYMENT*

*Origin: Closed to reception*

*Charging point: As close as possible to the power outlet, with an open surrounding environment*

*Target point: The robot is facing to the room door with a distance of 50cm, facilitating interactive prompts*

*Waiting point: Located near the reception, in an open environment, with a robot interval of 1.5m*

## *W3 Robot for Item Delivery*

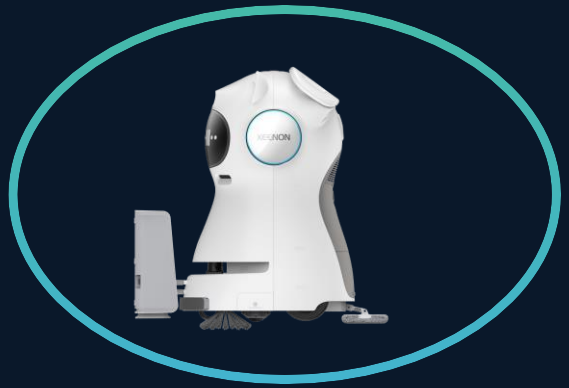
# KEY POINTS FOR DEPLOYING ROBOTS *POINT DEPLOYMENT*

## C30 Robot for Cleaning

*Origin: Closed to housekeeping room*

*Charging point: As close as possible to the power outlet, with an open surrounding environment*

# KEY POINTS FOR DEPLOYING ROBOTS CHARGING PILE INDICATOR STICKER



*Intuitive*

*Wall Sticker Instructions*

*Ensure the Safety of Using Robot's Charging Pile*

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# 05

# PRODUCT INTRODUCTION

# ROBOT QUANTITY CALCULATION FOR ITEM DELIVERY PROCESS

| Parameter | | Values | Sub Result |
|---|---|---|---|
| Total Peak Hour Items Per Day | Total Number of Rooms | 200 | 200x60%x0.15x6x1.5=162 |
| | Attendance Rate | 60% | |
| | Peak Hour Room Service Times Per Room Per Hour | 0.15 | |
| | Peak Hour Duration (h) | 6 | |
| | Number of Delivery Requirements during Peak Hour | 1.5 | |
| Time for One Delivery (min) | Average Usage Time of Elevator (Min) | 2 | 2x2+(4-1)x(60+20)/(0.8x60)=9 |
| | Average Distance from Reception to Room (m) | 60 | |
| | Average Distance from Room to Room (m) | 20 | |
| | Average Number of Items Per Robot Delivery | 4 | |
| | Walking Speed (m/s) of Robots | 0.8 | |

**Calculation Result**

*Total Peak Hour Delivery:* Total Peak Hour Items Per Day/Average Number of Items Per Robot Delivery=162/4=40.5

*Total Time for Peak Hour Delivery:* Total Peak Hour Delivery*Time for One Delivery=40.5x9=364.5 min

*Required Robot Quantity:* Total Time for Peak Hour Delivery/Peak Hour Duration=364.5min/(60minx6)=1.0125units

Round up to 2 Units

# PRODUCT PORTFOLIO OVERVIEW

Robot

1 X

W3

Check-in

2 X

W3

Item Delivery

1 X

C30

Cleaning

# PRODUCT PORTFOLIO OVERVIEW CHECK-IN

Robot

1 X

W3

Check-in

# PRODUCT PORTFOLIO OVERVIEW *ITEM DELIVERY*

Robot

2 X

W3

Item Delivery

# PRODUCT PORTFOLIO OVERVIEW CLEANNING

Robot

1 X

C30

Cleaning

# PRODUCT SPECIFICATION W3

## KEENON W3 Hotel Robot

| | | | |
|---|---|---|---|
| **Maximum Speed** | 0.8 m/s | **Localization Way** | Laser |
| **Minimum Passage Width** | 70 cm | **Battery Life** | 9-12 h(actual results may vary) |
| **Multi-robot Collaboration** | Maximum 20 robots | **Load Capacity** | 20kg (5kg per layer, with bottom layer capacity at 10kg) |
| **Multi-point Delivery** | Up to 4 rooms (Single journey) | **No. of Cabins** | 2/3/4 |
| **Maximum Climbing Angle** | Slope≤7° | **Overpass Height** | Max 15mm |
| **Cabin Size** | 390*385*300mm/15.35*15.16*11.81inch (contain 66 bottles of 550ml water) | | |

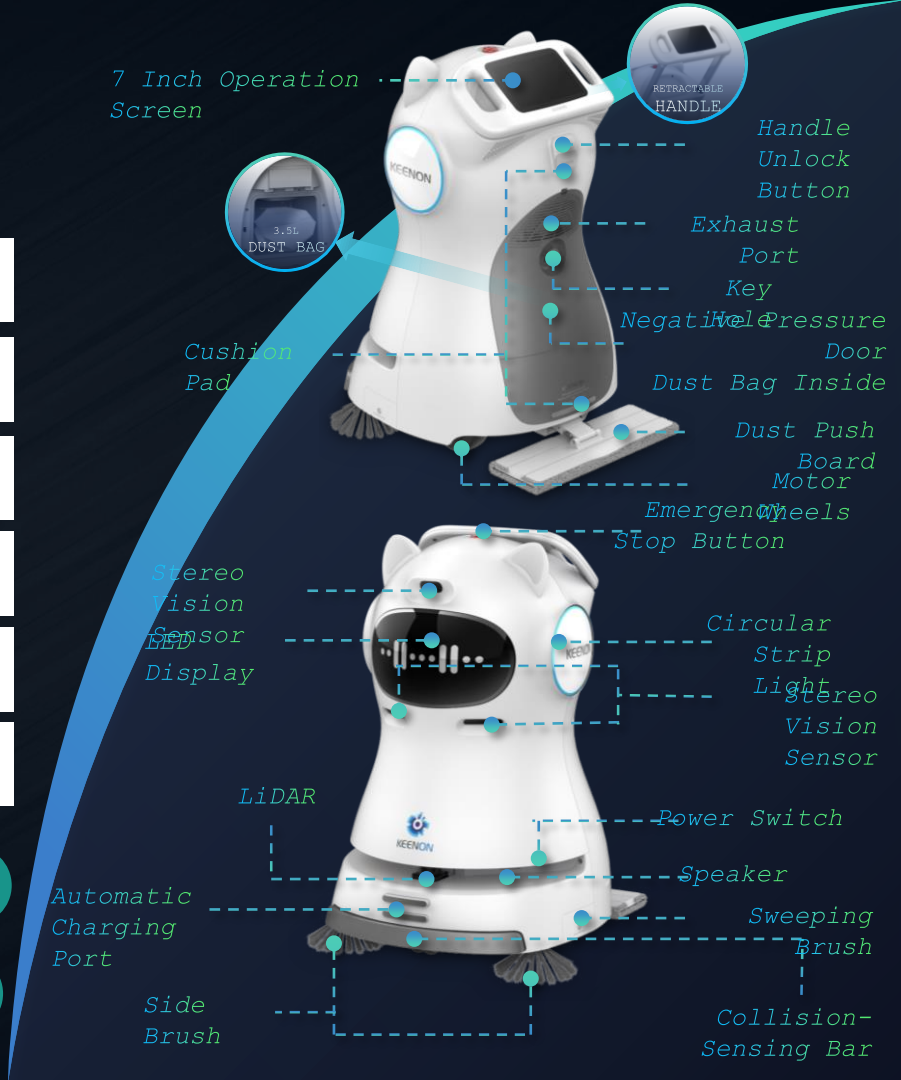
- **Welcome & Guiding in a Hotel**
- **Food & Item Delivery in a Hotel**
- Large Delivery Space
- Automatically Taking Elevator
- Multiple Notification Ways
- Multi-point Delivery

# PRODUCT SPECIFICATION C30

## KEENON C30 Cleaning Robot

| | | | |
|---|---|---|---|
| Cleaning Area | 1500 ㎡/Task (Under Full Charge) | Moving Speed | 0.7 m/s |
| Cleaning Efficiency | 540 ㎡/h | Battery Life | 3-4 Hours (Sweeping/Vacuuming Mode) 10 Hours (Dust-pushing Mode) |
| Maximum Cleaning Power | 450 W | Charging Time | 2-3 Hours |
| Maximum Vacuum Degree | 11,000 Pa | Noise | 60 dB |
| Maximum Cleaning Width | 455 mm (Double Side Brush + Rolling Brush) | Maximum Slope Angle | ≤ 7° |
| Dust Collection Ability | 3.5 L/Bag | Carpet Cleaning Ability | 10 mm |

- **Cleaning Floor in a Hotel**
- **Scheduled Task Everyday**
- 3 IN 1 Processional Cleaning
- Automatically Taking Elevator



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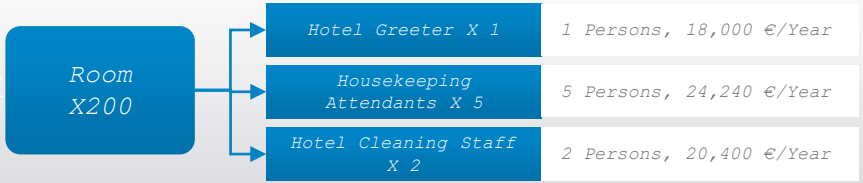
# 06

# CUSTOMER VALUE OF HOTEL SOLUTION

# CUSTOMER VALUES QUANTITATIVE ANALYSIS

Average Saving: 88,572

## Traditional Soluti



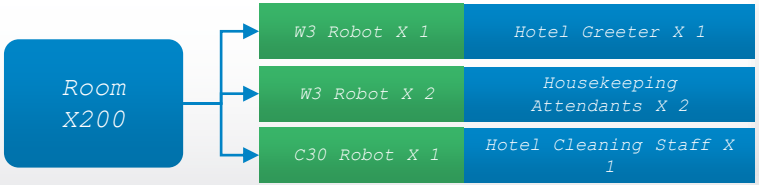

Labor Plan Cost :

1x18,000+5x24,240+2x20,400=

180,000€

VS

## Robot Solution




- W3 robot helps the Hotel Greeter to welcome the customers and guide them to the elevator while the Hotel Greeter can focus on other services.
- The task of delivering food & item is completely delegated to 2 W3 robots while 2 Housekeeping Attendants take shift to put food or item into the W3 robot.
- The task of cleaning hotel's floor is completely handed over to C30 robot while the Hotel Cleaning Staff is responsible for changing dust bag or cleaning dust push cloth.

| | |
|---|---|
| Average Installation Cost | 123€/M |
| Average Leasing Cost | 792€/M |
| Average Maintenance Cost | 222€/M |

Robot Solutions Combined with Labor Costs:

(1+2+1)x(123+792+222)x12+1x18,000+2x24,240+1x20,400=

91,428€

# CUSTOMER VALUES QUALITATIVE ANALYSIS

| | |
|---|---|
| • The tedious & repetitive work greatly reduces the efficiency of hotel staffs and affects the quality of service | ✓ Improve Delivery Efficiency & Enhance Hotel Service Quality |
| • Hotel Staffs have high work intensity, high work pressure, and often complain or even resign, making it difficult for the hotel to rehire | ✓ Reduce Labor Intensity, Enhance Employee Happiness, Make Employees More Stable and Professional |
| • The proportion of labor costs in hospitality operations is constantly increasing | ✓ Save Labor Costs and Improve Profit Levels |
| • Hotel Staffs need to work in shifts and cannot be on standby at any time | ✓ Robots are on standby for 7x24 hours, ready to respond to delivery & cleaning needs at any time |
| • The competition in the hospitality market is fierce, and uniform marketing makes it difficult to attract customers | ✓ Attracting new customers with novelty, creating differentiation and marketing highlights in the fiercely competitive hospitality market |

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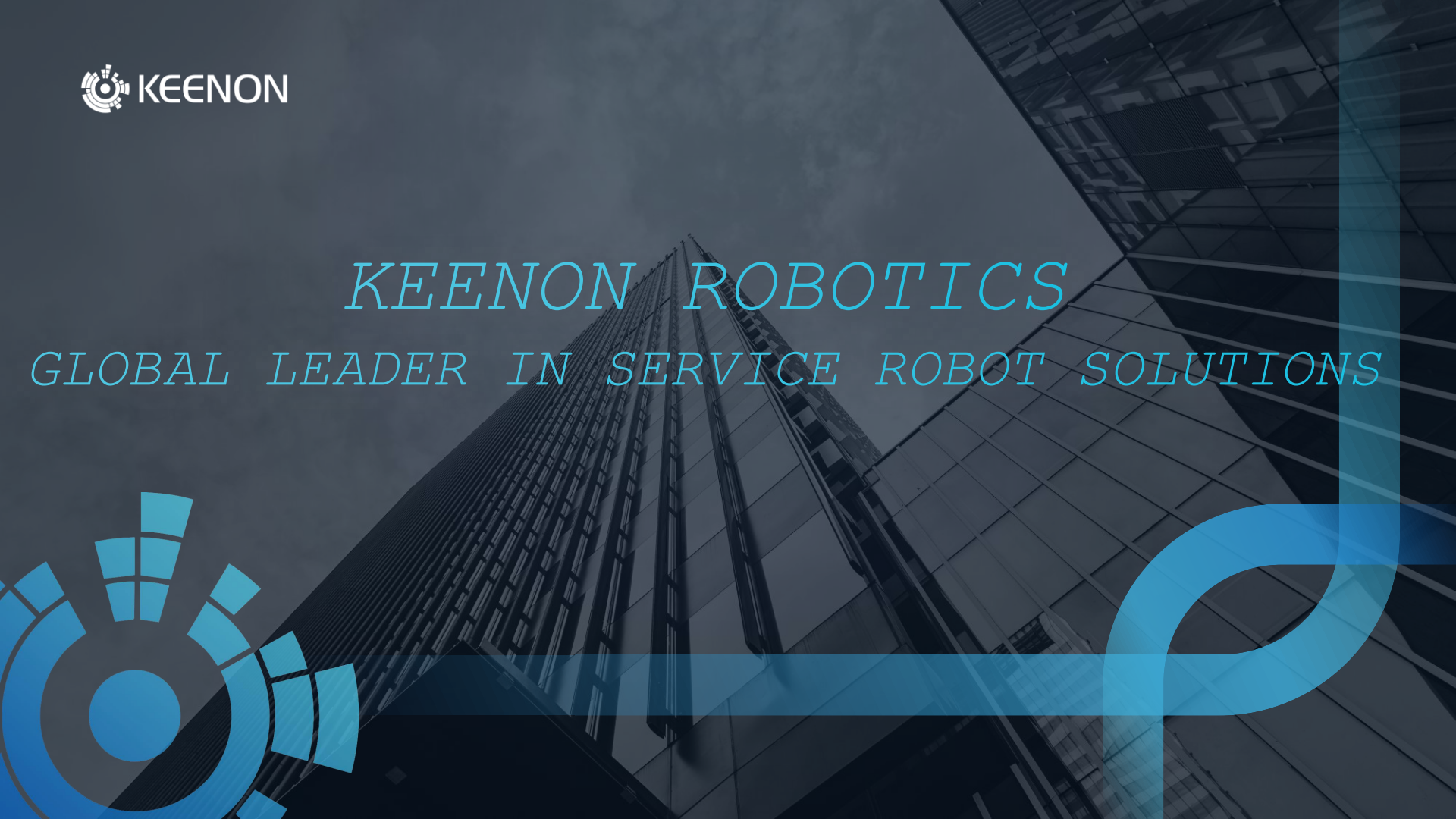
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