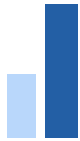




NEURON

Case Study:
Smart Restroom Solution



Traditional Restroom

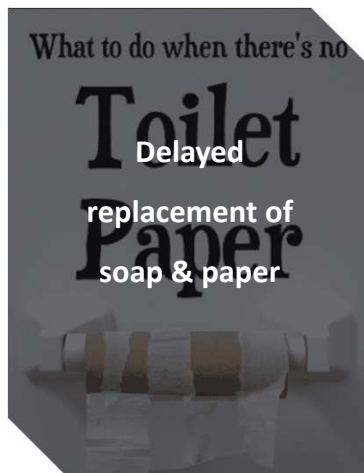


- Requires check for occupancy every time, when faced a row of closed toilet doors.
- Awkward to earth when someone accidentally enters an occupied.



- Users detect varying levels of odors.
- Some odors are noticeable, while others are not immediately apparent.
- Harmful gases have a negative impact on human health.

- Toilet paper and hand soap will be run out without in-time replenished.
- Delayed replacement leads to unsatisfactory experience or regular customer monitoring adds to labor costs



- Overflowing Trash Bins and Sewage in Restroom.
- Delayed cleaning leads to unsatisfactory customer experience or regular monitoring adds to labor cost

Our Smart Restroom



Revolutionize Restroom Experience by Technology



Embrace Refreshing Odor

- Breathe in freshness with IAQ sensor.
- Enhance your restroom experience with real-time monitoring of temperature, humidity, and CO2 levels.



A Vacant by a glance

- Instantly spot available cubicles with the door contact sensor.
- Effortlessly identify vacant cubicles within seconds with display lights on the doors.



Better Customer Experience

- Enhanced Safety: Built-in fall detection alarm and smart button.
- Ultimate Comfort: Fully stocked toilet paper & hand sanitizer, and real-time detectable bins.

Our Smart Restroom



Empower Restroom Operation Management by Technology



Better Service

- Provides better service under limited labor cost.
- Real-time service monitoring helps to avoid the inefficiency caused by older employees



High Efficiency

- Release cleaning staff from high-frequency restroom checking by people-counting.
- Manage traffic by display screens, contributing to greater efficiency in restroom operations.



Consumable Monitoring

- Monitor consumable usage to ensure the replenishment.
- Manage to plan resource and allocation more effectively.

Our IoT Hub Platform



We Provide:

- **Self-service IoT Platform**
 - Adding IoT devices into the IoT platform for monitoring & alarm handling
- **Diverse Space Templates**
 - Provide clarity and ability to have different workspace template for monitoring devices.
- **Customizable Digital Space**
 - User define monitoring space
 - Can be easy customized by Drag and Drop what is needed to monitor.
- **Integration with Physical Sensors**
 - Using field device to provide accurate monitor reading
 - Predict the maintenance needed for asset installed on-site
- **Flexibility in Visualization**
 - Flexible widget design to display what is important to you
- **Cross-Domain Applicability**
 - Browser-based monitoring without installation and easily across various operating domain



Mobile APP & Whatsapp
Alarm Message

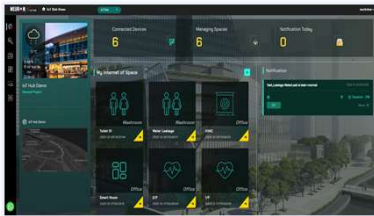
Our IoT Hub Platform



We Provide:

Space

Easily create IOT Space for monitoring



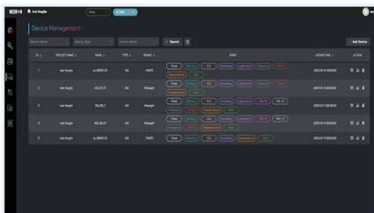
Dashboards

Drag & Drop self-service dashboard builder



Device

Onboard IoT Devices from various sources



Rule Engine

Self-defined rule condition for event triggering



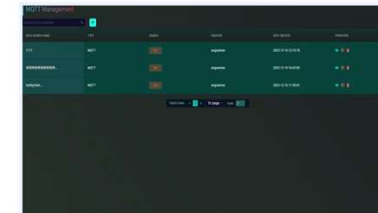
Analytic

Analytic portal and data export function



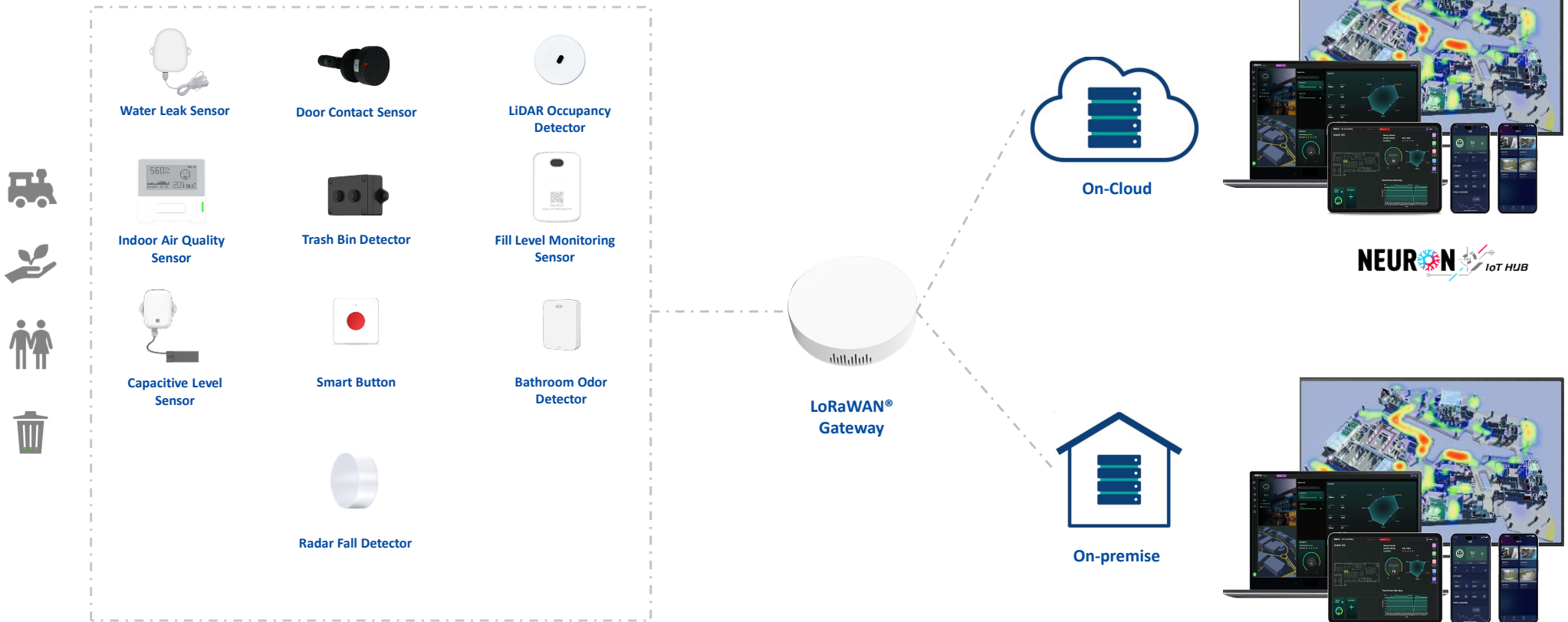
API

Open API for integration with other parties



Mobile APP & Whatsapp Alarm Message

Restroom IoT Devices Topology

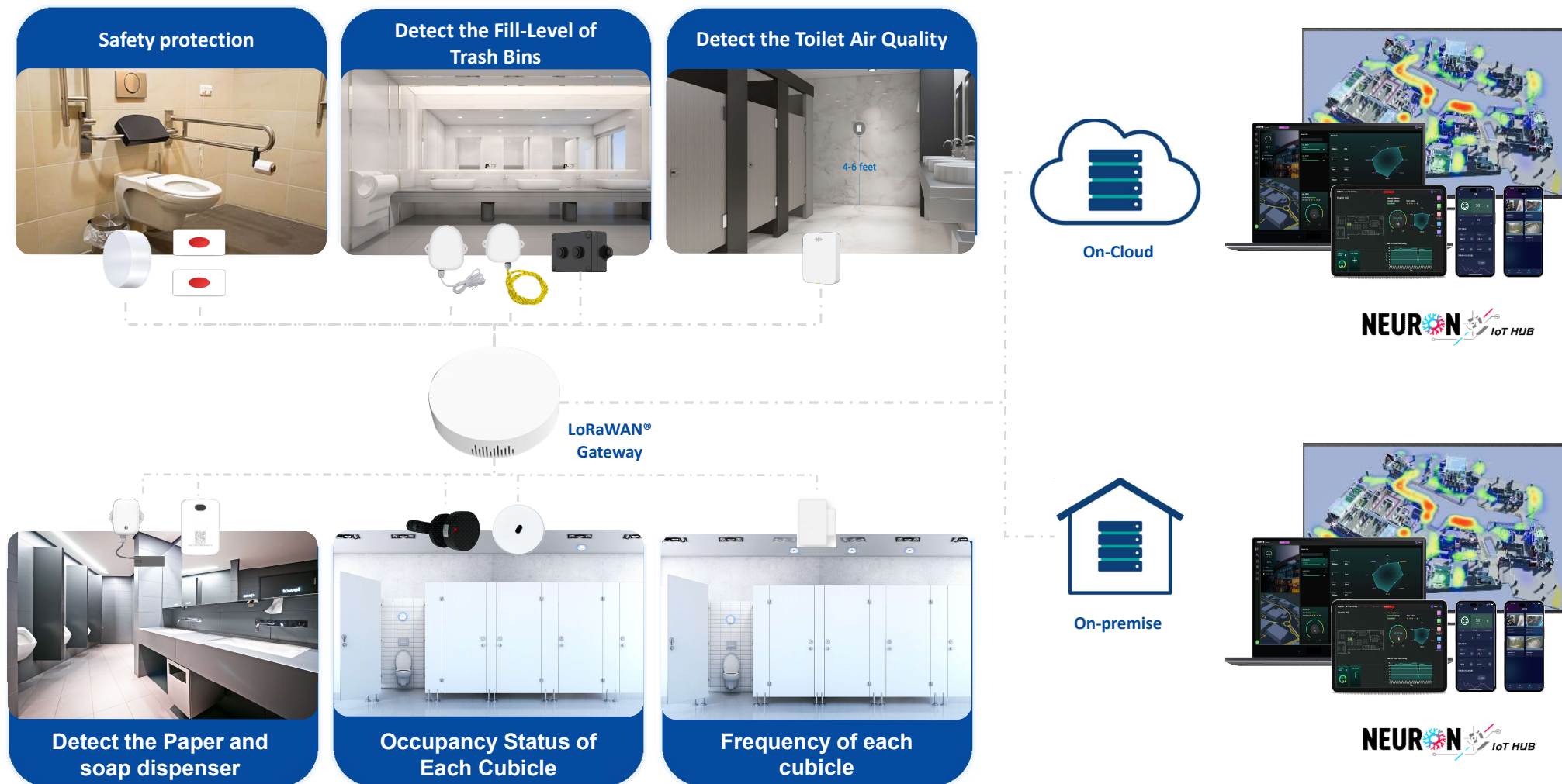


NEURON

NEURON IoT HUB

NEURON IoT HUB

Applicable Solution



NEURON

NEURON IoT HUB

NEURON IoT HUB

Toilet IoT Devices



- Most IoT devices are battery operated
- Replacement batteries used are easily available
- Long lasting battery
- Wireless deployment

Water Leak Sensor



- LoRaWAN® wireless
- Low power consumption
- Battery power supply
- Measurement Range: 1~ 500 meters
- ABS material
- IP67 protection

Door Contact Sensor & Cubicle Light



- Self- power supply technology
- Wireless RF433
- High Accuracy > 99.99%
- No power supply needed
- Functionality: signal sent to gateway after door opening or closing

Radar Fall Detector



- 60GHz radar technology
- 100% anonymous
- Ultra-low power consumption
- LoRaWAN® connectivity
- IP65 Protection

Trash Bin Detector



- Accurate distance detection
- Almost no blind spot with advanced ToF
- Up to 3 years battery life
- Sense spontaneous
- Wireless deployment with LoRaWAN®

Bathroom Odor Detector



- Ammonia (NH₃): 0 ~ 10 ppm
- Hydrogen Sulfide (H₂S): 0 ~ 5 ppm
- Temperature: -40°C ~ 85°C
- Humidity: 0% ~ 100% RH

LiDAR Occupancy Detector



- LiDAR Technology
- High Accuracy > 99.9%
- 100% anonymous
- Ultra-low power consumption
- LoRaWAN® connectivity

Capacitive Level Sensor



- Non-Contact capacitive sensing
- Reliable accuracy with strong anti-Interference ability
- Outstanding IP67 rated waterproof performance
- Flexible and easy to Install
- 10 years battery life

Fill Level Monitoring Sensor



- ToF technology
- Suitable for diverse toilet paper dispenser
- Up to 2 years battery life with one coin cell battery
- LoRaWAN® connectivity

Smart Button



- Effortlessly execute multiple press actions
- Ultra-wide distance wireless transmission
- Ultra low power consumption
- Up to 5 years of reliable battery Life
- Wireless deployment with LoRaWAN®

Magnetic Contact Switch



- Wire free and effortless installation
- Detection Distance 10-15mm
- Ultra low power consumption
- Long Lasting Battery life of 4-7 years
- Wireless deployment with LoRaWAN®

Applicable Locations of the Restroom IoT Devices



Application	Devices	Male/Female Restroom	Handicapped Restroom	In Baby Room	Outside Restroom
Display	Ultra-Thin 32-inch Display				
LoRaWAN Gateway	Indoor / Mini Gateway				
	Mini Gateway				
Vacancy Indication	Door Contact Sensor & Cubicle Light				
	Radar Occupancy Detector				
	Cubicle Occupancy Sensor				
Environment Sensor	Toilet Odor Detector				
	Water Leakage Sensor				
Consumable Sensor	Soap Dispenser Level Detector				
	Smart Fill Level Monitoring Sensor				
	Trash Bin Detector				
Emergency Alert	Smart Button				
	Radar Fall Detector				
Frequency - Usage	Magnetic Contact Switch				

Restroom Cubicle Occupancy Monitoring



“Detect” Occupied & Vacant Cubicles in Real-Time

- ✓ Detect the Real-time Occupancy Status of Each Cubicle
- ✓ Number of Available Cubicles in Real-Time
- ✓ Enhanced Customer Experience
- ✓ Quicker Response for Cleaning

Features

- Wireless RF433 Technology, **High Reliability**
- **0.1s** Response Time
- Industry-leading Accuracy **exceeding 99.99%**
- Compliant with **100% Anonymous** Detection
- Real-time Update & **Ultra-low Power Consumption**
- **No Power Supply** For Door Contact Sensor



Wireless signal



Door Contact Sensor & Cubicle Display Light

Restroom Cubicle Occupancy Monitoring - Radar

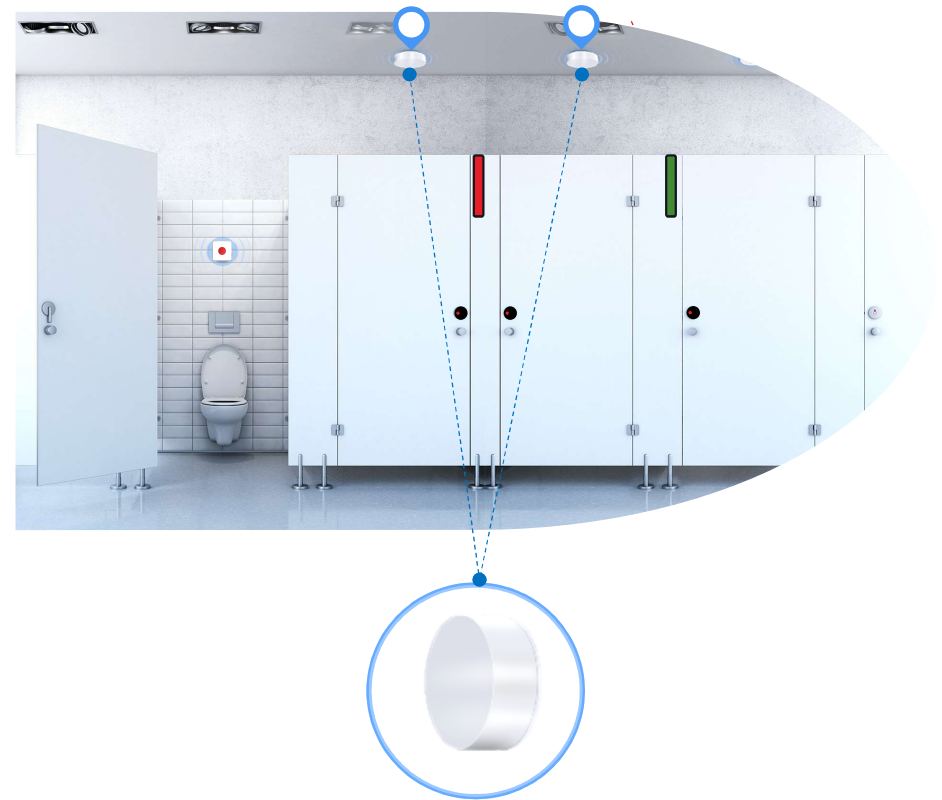


“Detect” Occupied & Vacant Cubicles in Real-Time

- ✓ Detect the Real-Time Occupancy Status of Each Cubicle
- ✓ Tell the Real-Time Available Cubicles
- ✓ Better Customer Experience
- ✓ Easy Top-mount Installation

Features

- **Laser Radar without Disturb from Temperature and Humidity**
- **No False Alarms even** in a Stationary Status
- Wireless Deployment with LoRaWAN®
- **Self-learning Mode** Setting Improves the Detection Accuracy in Different Environments
- Compliant with **100% Anonymous** Detection
- Real-time Update & **Ultra-low Power Consumption**
- **Easy to Install** without Replacing Existing Cubicle Locks



Radar Occupancy Detector

Restroom Cubicle Occupancy Monitoring – PIR & ToF

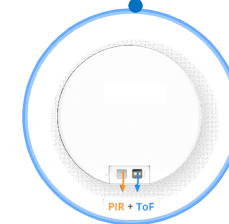
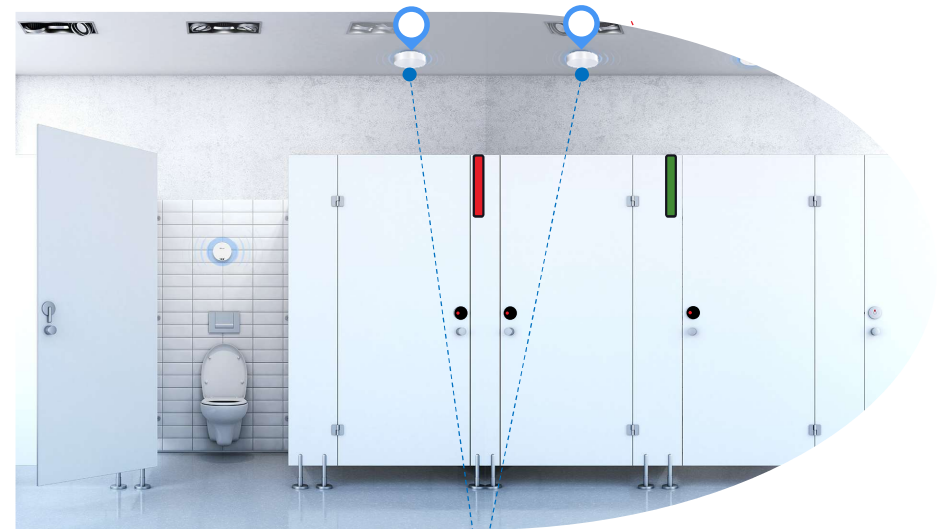
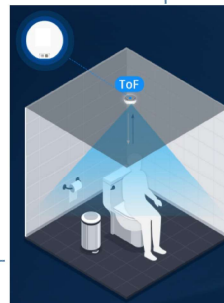
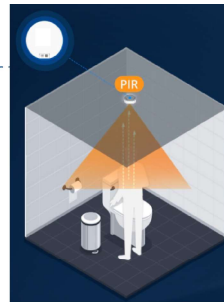
NEURON

“Detect” Occupied & Vacant Cubicles in Real-Time

- | | |
|---|---|
|  100% Anonymous (GDPR Compliant) |  Ultra-low Power Consumption (Minimum 4 years) |
|  Self-calibration Algorithm |  Industry-leading Accuracy (Exceeding 99.5%) |

Features

- Dual Technology of **PIR** and **ToF**
- Industry-leading Accuracy exceeding **99.5%**
- Compliant with GDPR
- **100% Anonymous** Detection
- **Real-time** Update
- **Ultra-low Power** Consumption
- Artful Design with a **Rotatable** of **0~75°**



Cubicle Occupancy Detector

Restroom Water Leakage Detection

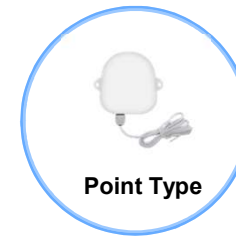


“Detect” restroom water leakage in Real-Time

This Water Leak Sensor is a contact type water immersion sensor that uses the principle of liquid conductivity to detect. When the sensor probe comes into contact with water, it will report an alarm message. This device uses LoRaWAN reporting and can be connected to the gateway and on premise or cloud platform.

Features

- Detect the presence of conductive liquids **using a small water probe**
- Highly sensitive alarm immediately when exposed to water
- Replaceable built-in battery with wireless power supply **life of up to 5 years**
- **IP67 waterproof** enclosure for harsh environment applications
- **Embedded with a buzzer** for real-time alarming



Water Leakage Sensor

Restroom Air Quality Monitoring – 4 in 1



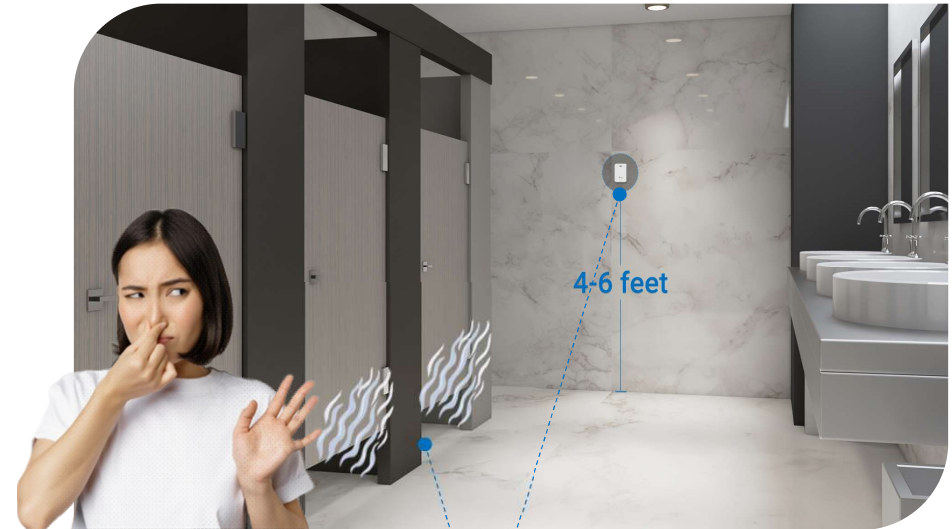
“Smell” the Toilet Air Quality

This Toilet Odor Detector is a 4-in-1 LoRaWAN® detector to detect ammonia (NH_3) and hydrogen sulfide (H_2S) gas according to electrochemical principle.

It is also able to detect temperature and humidity to have full awareness of the environment in the restroom.

Features

- Detect Special Odors such as NH_3 & H_2S with Higher Accuracy
- Keep Safe with Gas **Threshold** and **Trigger Event**
- **Built-in Buzzer & Traffic Light Indicator** for Alarming
- Wireless Deployment with **LoRaWan®**
- Up to **3 Years** Battery Life
- Easy Configuration Via NFC



4-6 feet



Toilet Odor Detector

Restroom Air Quality Monitoring – 3 in 1 IAQ



“Detect” the Toilet Air Quality

3 in 1 IAQ (Indoor Air Quality) Sensor is a compact indoor ambience monitoring sensor for measurement of temperature, humidity and Carbon Dioxide (CO₂). These data will be shown on the E-ink screen in real-time, which allow to quantify the indoor environment and comfort.

Features

- **Visual data and clear emoticon** to understand the comfort level easily via E-ink screen
- **Ultra-low power consumption** with **smart sleep** feature
- **Built-in Buzzer & Traffic Light Indicator** for Alarming
- **More than 3 years** work without replacing batteries
- Easy Configuration Via NFC



3 in 1 IAQ Sensor

Restroom Soap Dispenser Management

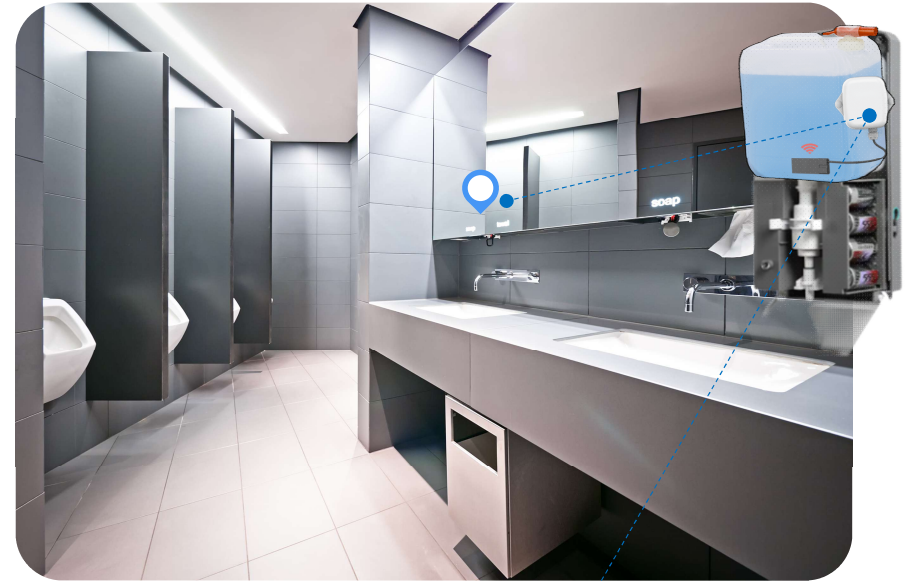


“Detect” the Soap Dispenser Level

A non-contact liquid level sensor based on LoRaWAN®, which relies on capacitive sensing principle. It is mainly used to monitor hand wash in restrooms and sending out alarms when there is insufficient hand wash left.

Features

- High sensitivity **real-time liquid level status** monitoring
- Strong **anti-interference capability and high accuracy**
- Suitable for a variety of media including **liquid hand soap, foam hand soap and water**
- Wireless deployment with **LoRaWan®**
- **IP67 waterproof** performance for high applicability
- A built-in 4000mAh replaceable battery and works for **10 years without replacement**



Soap Dispenser Level detector

Restroom Toilet Paper Management

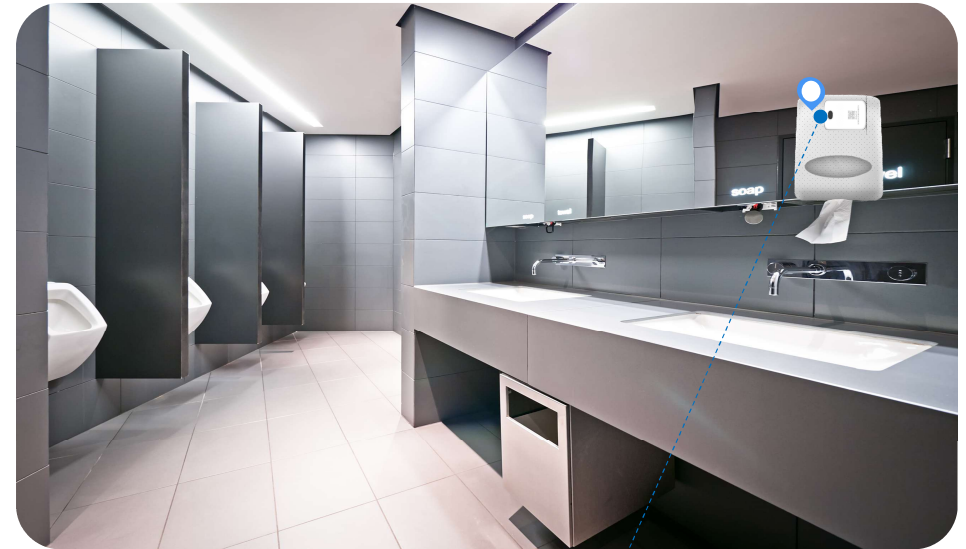


“Detect” the Remaining Toilet Paper

A wireless fill-level monitoring sensor that securely monitors a small container's fill level especially tissue boxes. Equip with the ToF technology with a high-focusing detecting range. With a special structure design and damp-proof coating, WS201 can work stably in the metal environment and multiple scenarios.

Features

- High-focusing detection ranges from **1 to 55 cm**
- Long Service Life of **2 - 4.5 Years**
- Exquisite Design with **Ultra-Mini Size**
- **User-Friendly** Wireless Installation
- **Ultra-low power** consumption
- Easy Configuration via NFC
- **Manage the usage of toilet paper easily**



Smart Fill Level Monitoring Sensor

Restroom Trash Bin Management



“Detect” the trash bin is full

A LoRaWAN ultrasonic distance sensor mainly for the detection of waste bin and other container's fill level.

With a compact size and wide measure range, it can be installed to any types of waste bins or containers to monitor solid or liquid level.

Features

- **3 - 450 cm** wide measuring range with short blind zone
- **Ultra-wide-distance wireless transmission** up to line of sight of 15 km
- Equipped with **NFC** for one touch configuration
- **IP67 waterproof** and salt spray resistant enclosure
- Built-in **3-axis accelerometer** sensor to monitor device **tilt status**



Restroom Safety Precaution



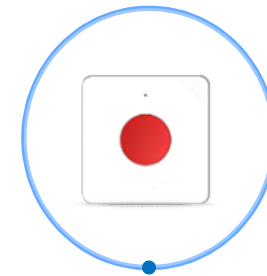
“Ask for” Help with Just One Button Press

The Smart Button can function as a panic button, offering a valuable convenience for seniors, the sick, and youngsters by enabling them to easily contact caregivers when needed.

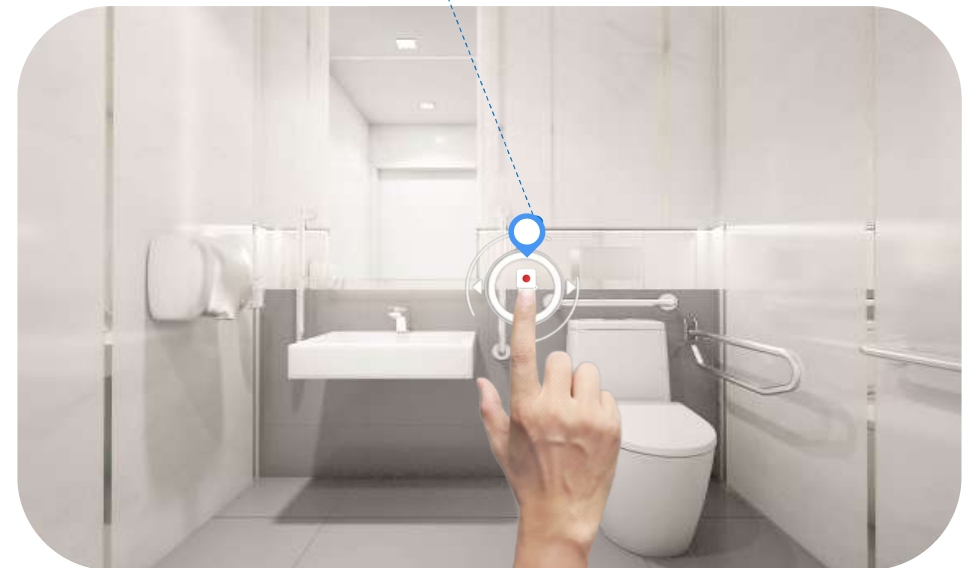
It can be easily installed in a nearby location or conveniently moved as required.

Features

- Press It when there is any **emergency**
- **Instant Alert** to Trigger Rescue
- **Up to 15 km** Communication Range
- Up to **5 years** battery life
- Easy Configuration via NFC
- **Compact Design, Easy to Install or Carry**
- **Built-in LED Indicator and Buzzer**



Smart Button



Restroom Safety Precaution



“Alarm” sent automatically when fall is detected

60GHz Human Fall Detector is based on millimeter wave radar system to detect the static perception of human biological movement and human biological perception.

It is anonymous and used in various spaces such as toilets, bathrooms and hotels.

Features

- **60GHz Radar Millimeter Wave**, High Accuracy
- Compliant with **100% Anonymous** Detection
- Real-time and Remote Alarm Automatically
- **Wireless** with LoRaWAN®
- **Compact Design** with High Sensitivity
- **3 Years** Battery Life
- **Multi-mounting** for Various of Applications



Restroom Intelligent Display



Real-time Restroom Status Display

The 32-inch IPS screen is a low-cost, high-quality universal capacitive touch screen with 1080x1920 hardware resolution, compatible with most standard HDMI devices, and comes with fixing screw holes for easy integration and application.

Features

- Tell the Real-Time **Available Number of Cubicles**
- Tell the Real-Time Indoor Quality: **Temperature, Humidity, and Carbon Dioxide (CO₂)** Data
- Both Horizontal and Vertical Screens, **Wide Applicability**
- **10-point Capacitive Touch**
- **Ultra-thin Screen, Thickness Thick to 40mm**
- **3mm Tempered Glass** Front Panel for High Hardness and Safety Protection



Ultra-Thin 32-inch Display

LoRaWAN® gateway for Connectivity

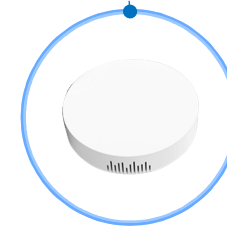


“Connect” all the IoT devices together

Mini LoRaWAN® gateway is a cost-effective device that is suitable for a small number of dispersed small-scale application scenarios to achieve network coverage.

Features

- Economical and Practical
- Supports **Cellular and Ethernet** Backhaul
- Wire-Free Deployment with **4G**
- **Blind Spot** Coverage
- **Global Frequency Plans**
- **Remote** Configuration and Management
- **Highly Compatible** with Mainstream Network Servers
(on Premise or on Cloud Server)



Mini LoRaWAN® Gateway

LoRaWAN® gateway for Connectivity



Not limited in Restroom application, this LoRaWAN gateway is also applicable to shopping malls, airports, MTR and other public areas



- Easily access to BMS System with BACnet/IP
- Supports global LoRaWAN® frequency bands
- Optimized efficiency with Device Hub management
- Customizable secondary development with Node-Red

Features

- 8-Channels LoRaWAN gateway offering reliable connectivity
- Multi-link backup for secured and high-quality connection
- Compatible with mainstream third-party Network Servers
- Embedded network server and high compliance
- Strong signal penetration and wide coverage
- Low power consumption and easy to deploy
- Large capacity of up to 2,000 connections
- Secondary development with Node-Red and sufficient storage
- IP65 Rating
- Optimized efficiency with Device Hub management

Transformation into Smart Restroom



Remote Smart Control

Collecting data and control remotely for better management and convenient adjustment.



Energy Conservation

Occupancy-based HVAC automation and AI-based energy optimization can save up to 20% of total energy consumption.



Visualized Data & Regularly Reports

Utilize the data to identify inefficiencies and optimize usage.



Mobile Integration

Develop a mobile application integrated with the IoT platform to monitor and control the environment in real time.

Thank you

